June 19 - 20, 2025
Hollywood, FL

TRANSPORTATION SYMPOSIUM

Digital Delivery Today & Moving Forward

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Transportation Symposium Website

SCAN ME

FDOT WSP

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Introduction and Agenda

01 Collaboration between DOTs: BIM Week 2024

02 Building 3D Models with a Purpose in Mind

03 Software Benefits…and Limitations

04 Tampa's Westshore Interchange – All in on 3D Modeling

05 FDOT Perspective and Future Direction

06 Questions

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Safety Moment: Safe Summer Travel Month

Stay hydrated

Protect yourself from the sun

Be aware of teen drivers

Replace worn wiper blades

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Collaboration between DOTs: BIM Week 2024

Problem

Interopobility issues with different software between stakeholders

Solution

Digital information exchange and national open data standards

Vision

Design in whatever software

Export to IFC for owner to advertise

Open Exchange Format

Contractor imports and uses their preferred software

Digital as-builts (Open Exchange format)

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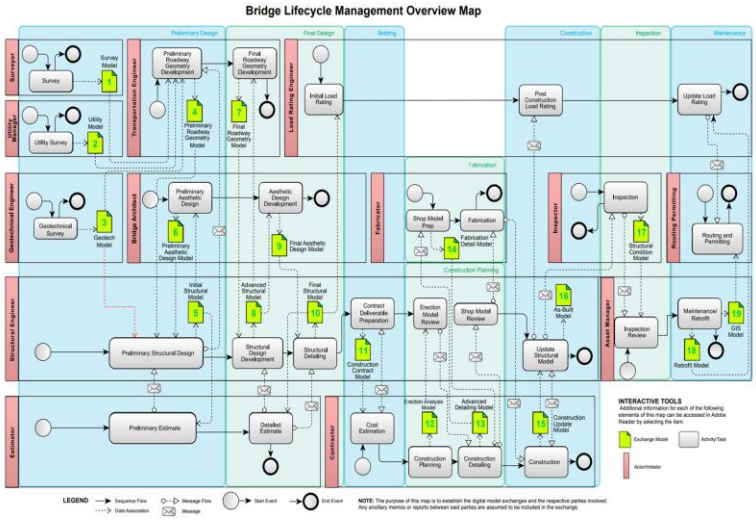
Collaboration between DOTs: BIM Week 2024



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Source: https://bimforbridgesus.com

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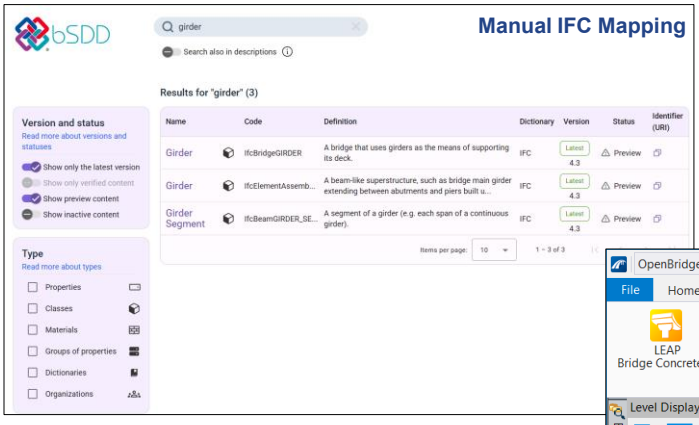
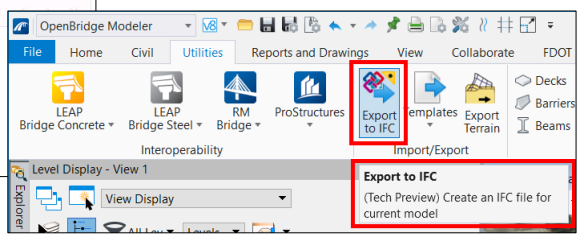
Collaboration between DOTs: BIM Week 2024



Manual IFC Mapping

Software Export to IFC



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Building 3D Models with a Purpose in Mind

Level 1: For Information Only

Lower Level of Detail

- "Fill the Gap" for OpenRoads Projects
- Only out-of-the-box OBM tools

Level 2: Model-Centric Plans (and/or Contractor Coordination)

Medium Level of Detail

- Accurate concrete dimensions with solids modifications and/or parametric cells
- No rebar modeled
- Standard details often omitted

Level 3: Contract Document

High Level of Detail

- Model as legal document for construction
- Full rebar modeling
- Shop drawings possible from model
- Significant metadata attached

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Software Benefits…and Limitations – Bentley Suite of Transportation Software

MicroStation CE (MSCE)

Basic CADD software – without previous InRoads, Geopak, etc. Lines on paper; can do manual 3D CADD.

OpenRoads Designer (ORD)

Builds on MSCE, while adding in Civil tools (previously InRoads, Geopak, etc).

OpenBridge Modeler (OBM)

Builds on ORD (and thus MSCE) to include 3D Bridge Modeling tools. Most ORD tools available in OBM.

ProStructures

Can be used with an OBM model to model rebar or detail steel. Can use standalone PS software or within OBM.

OpenBridge Designer (OBD)

Suite of software to bring together multiple components of bridge design/detailing (see items to the right).

OBM, LEAP Concrete/Steel/ RM Bridge

Modeling/Analysis software included in OBD.

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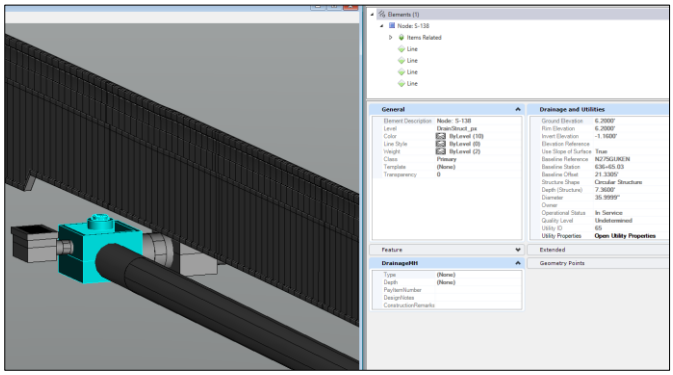
Software Benefits…and Limitations – General



Benefits

- Interdisciplinary Coordination allows design intent to be better managed.
- Similar to non-3D, reference files
- Walls Example: Structures gives leveling pad alignment/profile, Roadway Models the physical walls
- Clash Detection/Conflict Resolution
- iTwin/Bentley Infrastructure Cloud
- Model-Centric Plans Production
- Contractor/Stakeholder/Public Coordination and Feedback
- Quantities (Built-in or FDOT tools)

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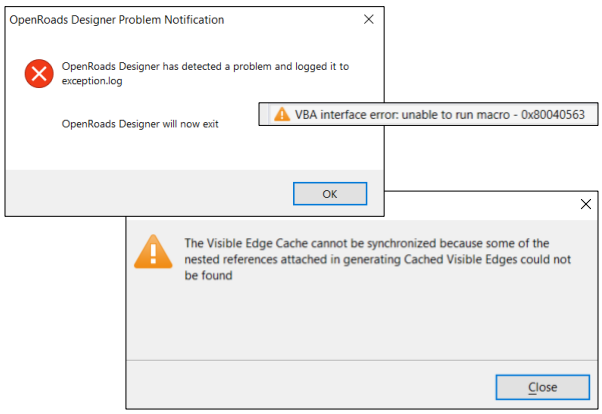
Software Benefits…and Limitations – General



Limitations

- Model Files can be VERY slow to open/update
- Constant release of new versions
  - Updating to latest often not easy or practical
- Custom Item Types (i.e. FDOT pay items) often don't get reflected in iTwin/Bentley Infrastructure Cloud/SYNCHRO models
- Workarounds routinely required
  - Staffhours/effort difficult to estimate

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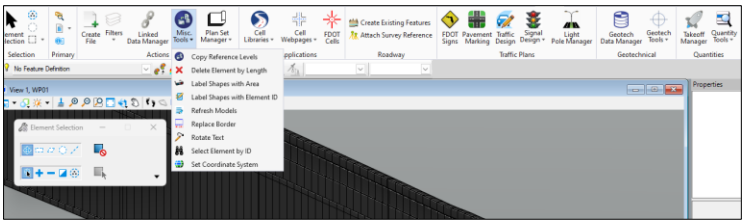
Software Benefits…and Limitations – FDOTConnect

Benefits

- Well-documented workflow for most disciplines
- Custom tools and templates for efficient workflows
- Accommodate model-centric or 2D plans production
- Proven process in place for continued development
  - Collaboration with industry on bugs and Beta testing



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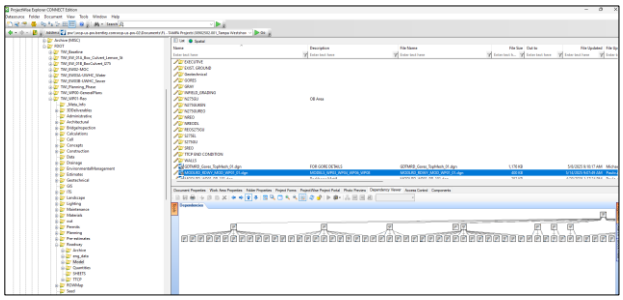
Software Benefits…and Limitations – FDOTConnect



Limitations

- FDOT applications do not work with PW Explorer
  - Manual process of exporting mass amounts of files to use FDOT plans production tools
  - Manual process for exporting files from ProjectWise to FDOT during submittals
  - Recently worked with Bentley to work with PW Drive, but many companies not using PW Drive because of issues
- FDOT Model-Based Quantity tools limitations
  - Roadway
  - Structures
  - Drainage
  - Walls

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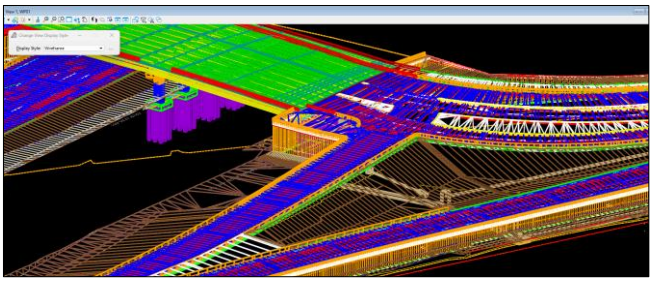
Software Benefits…and Limitations – OpenRoads Designer (ORD) General

Benefits

- Visualization of design allows for better cross discipline collaboration
  - Complex grading and skewed areas
  - Analysis of clearances and clash detection
  - Interdisciplinary and constructability reviews
- Improved accuracy and ease of establishing quantities for Pay items that rely on 3D elements
  - Earthwork (Cut/Fill/Select fill)
  - SOD/Turf on slopes are more easily evaluated
- Design integrated in model allows for easier updates
  - Drainage analysis is directly linked to drainage structure sheets



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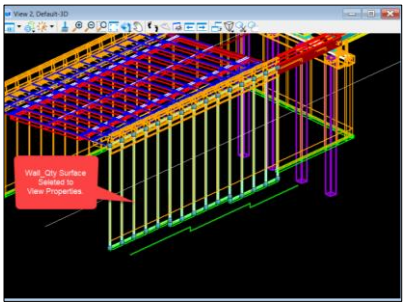
Software Benefits…and Limitations – OpenRoads Designer (ORD) General



Limitations

- Modeled features do not always match Index/Spec/BOE description used for pricing
  - MSE walls are quantified up to top of Coping but modeled separately from traffic railing.
  - Inconsistencies with EQ reports not quantifying all elements or not providing sufficient geometric information (Station, LT/RT, ETC)
  - Recommend review of pay items to align with limitations of software.
- The software cannot model specific criteria required in the Standard Index
  - Parabolic Super elevation transitions per index 000-510 cannot be modeled
  - Discrepancy created between gutter grade shown in model and what is required.
- 3D model still needs to be supplemented with traditional plans for construction
  - Quantities provided in compliance with BOE is not always possible
- Flexibility in models to accommodate project specific concerns
  - TWI phasing of Drainage installations

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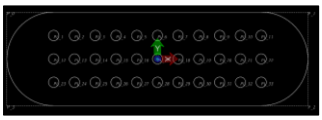
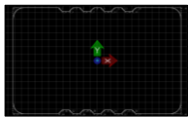
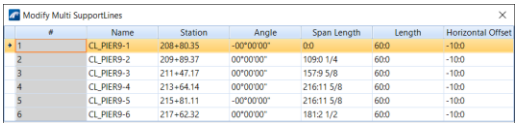
Software Benefits…and Limitations – OpenBridge Modeler (OBM)

Benefits

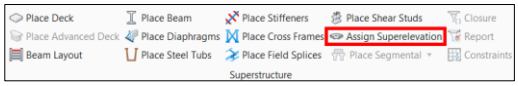
- Parametric/repeatable for long spans
  - Template-based workflow
  - Easy to make changes for preliminary layouts

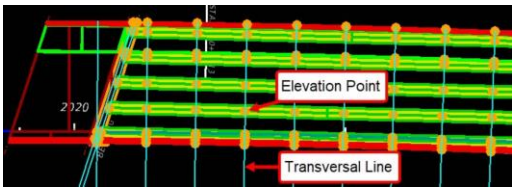






- Accurately generate or check geometry
  - Superelevation transitions
  - Finish Grade Elevations





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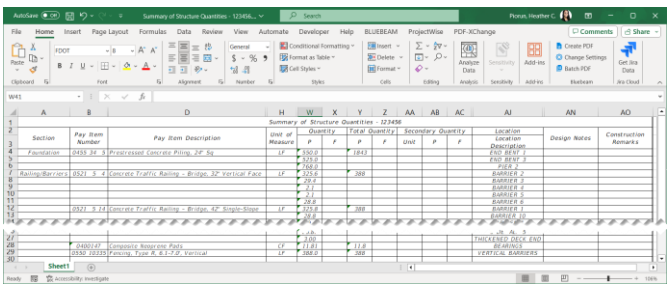
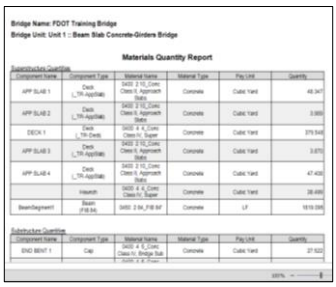
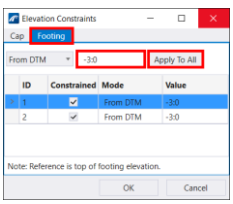
Software Benefits…and Limitations – OpenBridge Modeler (OBM)

Benefits

- Quickly get order of magnitude quantities
  - Footing elevations set on terrain elevation







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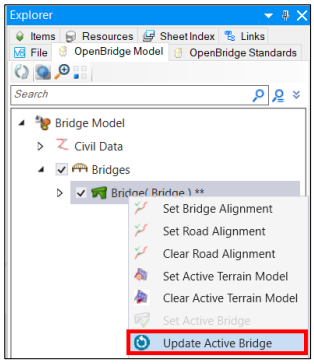
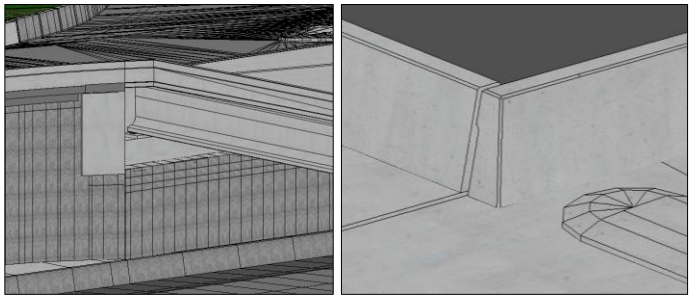
Software Benefits…and Limitations – OpenBridge Modeler (OBM)

Benefits

- Changes to alignments/profiles will be pushed to bridge model



- Visualize complicated bridge geometry and details



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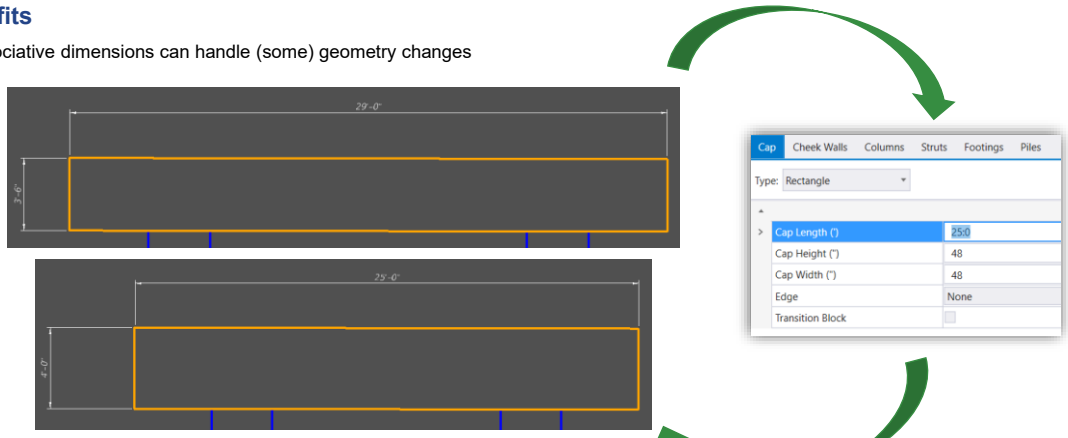
Software Benefits…and Limitations – OpenBridge Modeler (OBM)

Benefits

- Associative dimensions can handle (some) geometry changes



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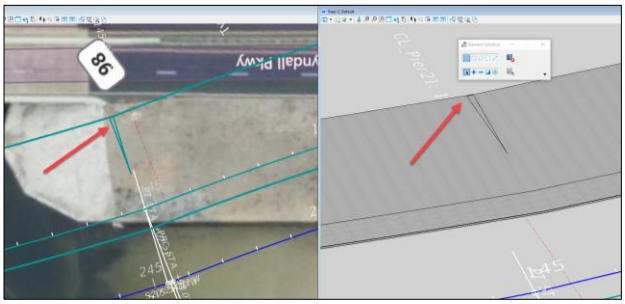
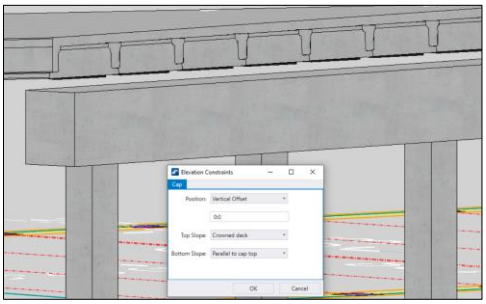
Software Benefits…and Limitations – OpenBridge Modeler (OBM)

Limitations (OBM Models)

- OOB Tools set up for simple bridges (i.e. straight, no skew)
  - Often need workaround for more complex elements
  - Software sometimes doesn't react as anticipated
  - Once OBM solids are modified, future changes unpredictable
- Bentley recommends as *last* step, but for model-centric plans, needs to be done early enough in process to work on plans
- Issues with alignment/profile changes after solids mods





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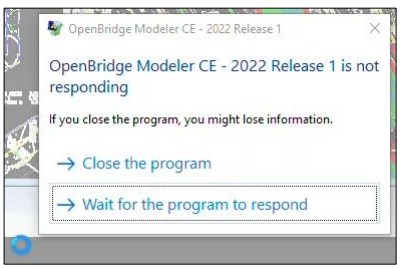
Software Benefits…and Limitations – OpenBridge Modeler (OBM)

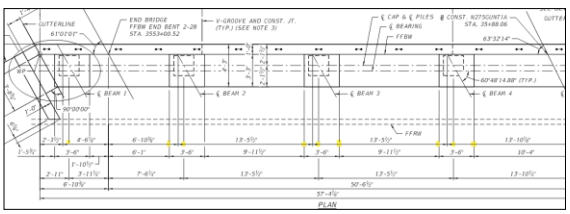
Limitations (OBM Models)

- Updates to longer bridges can take a while to process
- Design often done in separate software, unlike other disciplines
  - Mixed results for interoping tools (LEAP Concrete, LEAP Steel, RM Bridge)
- Advanced tools not well-documented, steep learning curve, gaps in functionality
  - Rebar Modeling, Parametric Cells, Generative Components



Limitations (Model-Centric Plans)

- Expectations for model-centric plans
  - "Heavy" model-centric sheets (slow navigation)
  - Unexplained crashes
- Model-centric plans difficult to clean up or modify for details
- Levels sometimes unpredictable even with proper settings
- Crossing of dimension lines with associative dimensioning



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Tampa's Westshore Interchange

Commitment to 3D Modeling

- Buy-in from all stakeholders
  - Design Team: WSP/subconsultants
  - Construction JV: Lane/Superior
  - Client: FDOT D7

Contractor Collaboration

- Very engaged
- Live access to ProjectWise files (read only)
- Utilizing SYNCHRO for 4D/5D Modeling

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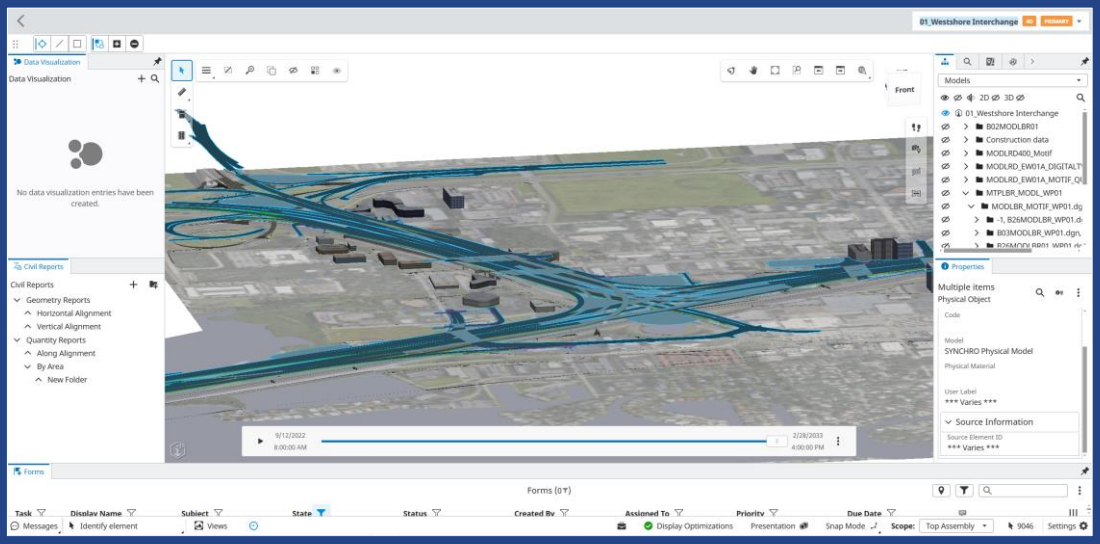
SYNCHRO – 4D (Schedule) and 5D (Budget) using 3D Design Models



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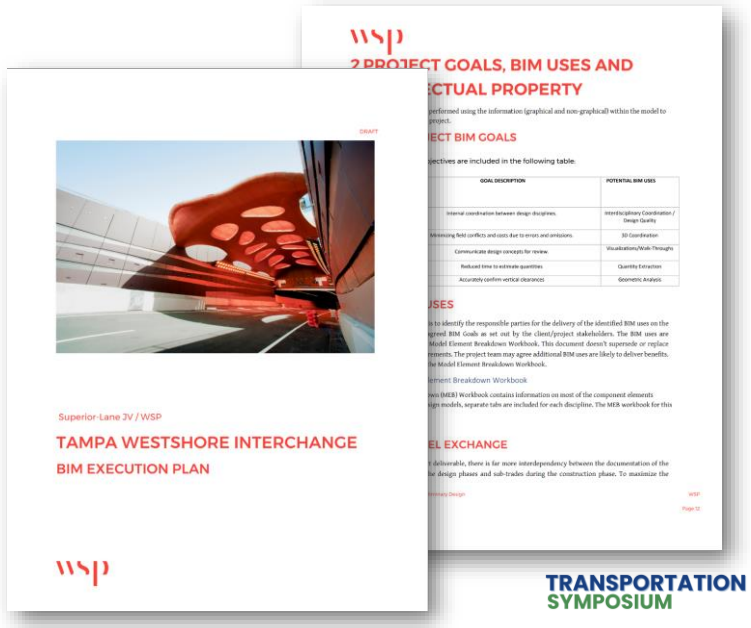
BIM Execution Plan

- **Establish Project BIM Goals/Uses**
- **Model Exchange/Ownership**
- **Technology Stack**



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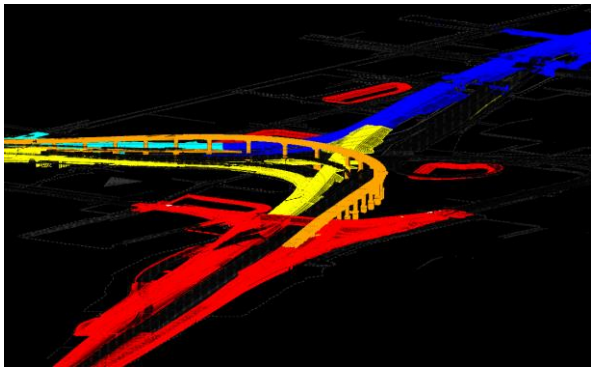
Motif File Organization – Working with Contractor

Key challenges

- Submit FDM compliance Vs Contractor goals
- Submit for industry bids Vs Internal Management
- Managing 15 work packages that overlap and phased



Solutions

- Outline Motif structure in BEP
- 3D submittal built from files submitted to industry
- Sync and manage in Bentley Infrastructure to track and mange 5D capabilities

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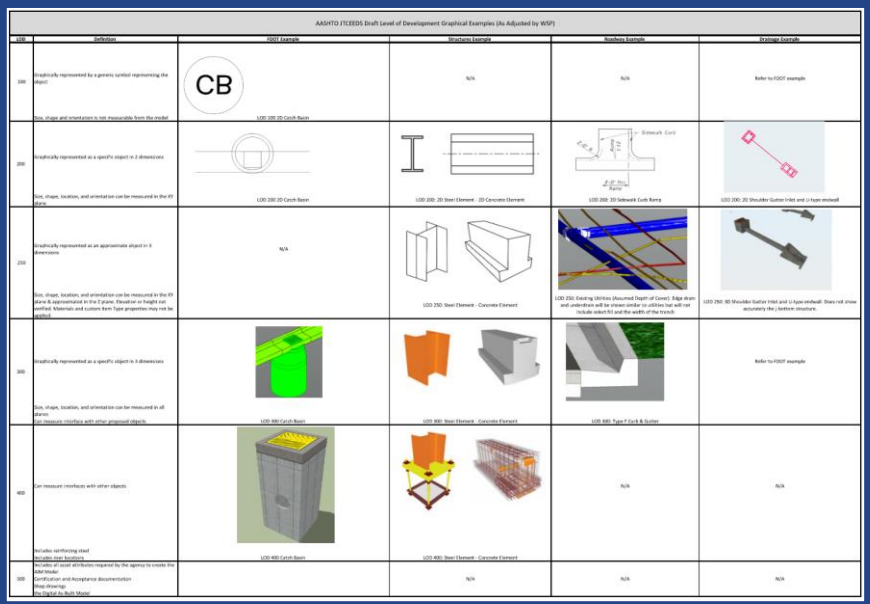
Model Element Breakdown



Model Element Breakdown

Model Element Name	LOD Standard	Data Model 2D,3D, Both	Legal Document? Yes Contract / No FIO	Engineer of Record	Source CADD File	Required Element Data Attributes (BOE, Location, GIS, Other)				Limitations
						Pay Item Data: Number, Quantity and Unit	Location Data: Alignment, Station Offset	GIS Data Portal	Updated by DAB	
Substructure										
Pier Cap (Including curvature and aesthetic chamfers)	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Cannot model integral steel caps, if required on project.
End Bent Cap/Backwall/Cheekwall	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Individual EB elements cannot be broken apart in OBM.
Column (Including aethetic chamfers)	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Footing	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Crash Wall (if required)	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Concrete Pile	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Drilled Shaft	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Auger Cast Piles		Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Wingwall	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Slope Pavement	300	Both	No	Structures	MODLRD_WallW# or WRWall01	Yes	Yes	No	N/A	
Riprap	N/A	N/A	N/A	Structures	N/A	N/A	N/A	N/A	N/A	
Superstructure										
Concrete Approach Slab	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	45deg vertical taper not modeled. Generally asphalt overlay not modeled for flexible pavement. Barrier modeled without taper.
Concrete Traffic Barrier/Parapet	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Any attached metal fencing/post/rails not modeled.
Beam Seat/Pedestal	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Pedestals cannot be modeled sloped, will be shown level (2D plans detail corner elevations). FDOT standard thickened end slabs not modeled (use 2D plan detail).
Concrete Deck	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Expansion joints not modeled.
Thickened End Slab	N/A	N/A	N/A	Structures	N/A	N/A	N/A	N/A	N/A	
Concrete Haunch	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Haunch modeled in OBM does not take into account beam camber, will be estimate.
Concrete Intermediate Diaphragms	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Prestressed Concrete Girder	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Flange chamfers not required per CIV.
Steel Girder (top flange, bottom flange, web)	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Steel Cross Frames	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Steel Stiffeners	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Large effort to generate for unique geometry/maintain for design changes.
Steel Connection Plates	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Large effort to generate for unique geometry/maintain for design changes.
Steel Shear Studs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Large effort to generate for unique geometry/maintain for design changes.
Steel Field Splice (Beam Breaks)	300	Both	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Large effort to generate for unique geometry/maintain for design changes.
Segmental Box Girder* (not including blisters, deviators)	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Limited segmental OBM experience - unknown limitations.
Concrete Sidewalk	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Deck Joint - Poured Joint with Backer Rod	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not currently modeled in OBM.
Deck Joint - Strip Seal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not currently modeled in OBM.
Deck Joint - Finger Joint	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not currently modeled in OBM.
Deck Joint - Modular Joint	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not currently modeled in OBM.
Drainage Structure	250	Both	No	Drainage	DRPRRD	Yes	Yes	No	N/A	
Elastomeric Bearing Pad	300	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Pot Bearing	200	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Disc Bearing	200	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	
Lightpole Overhang	200	Both	No	Structures	BR#MODLBR	Yes	Yes	No	N/A	Limitations within OBM for deck protrusions.
Structure Miscellaneous										
Foundation (Sign, Lightpole, Traffic Signal, etc)	300	Both	No	Structures	DSGNSG_Foundations and DSGNLT_Foundations	Yes	Yes	No	N/A	
Bridge Mounted Lightpole Connection	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	
Bridge Mounted Signal Connection	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	
Bridge Mounted Sign Connection	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	
Walls (see Roadway Tab)										

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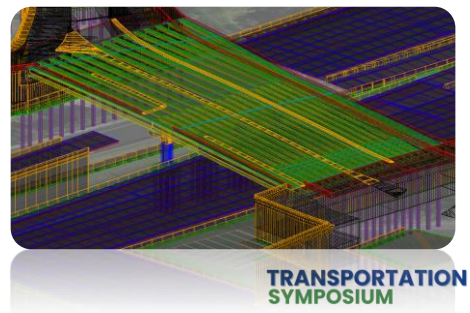
Tampa's Westshore Interchange

Model-Centric Plans

- Schedule/Workflow
  - Start in 2D – prioritize getting geometry right
  - Preliminary Calculations (Geometry/Beam)
  - Preliminary OBM Model (No solids mods)
  - Calculations Finalized/QC'd
  - Pre-Solids Mod OBM Model QC'd
  - Solids Modifications to OBM Model
  - Solids Mod OBM Model QC'd
  - Model-Centric Plans

Lessons Learned (…So Far)

- Documentation/Input Spreadsheets
- Archive Pre-Solids Mod OBM Model
- Keep scratch linework outside of model file
- 2D Decoration levels can be manually manipulated – helpful for certain plan sheets
- Other Discipline Container File
- Reference Settings!
- File Management/Organization
  - LOTS of Work Packages
- Change Management



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FDOT Perspective and Future Direction

Transforming Design with Digital Delivery

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Current Landscape

- Hybrid Approach
- Increasing use of Building Information Modeling (BIM)
- Ongoing adoption of OpenRoads, OpenBridge, Civil 3D, and 3D visualization tools

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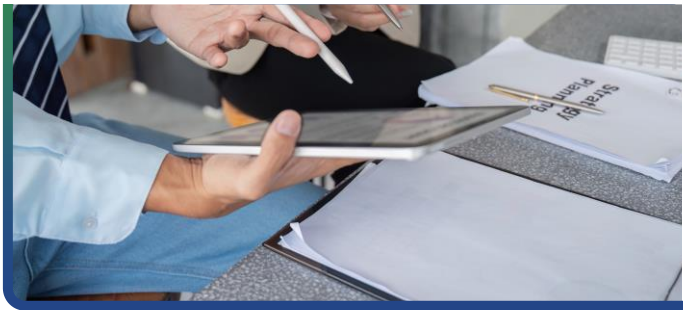
Why Digital Delivery?



Alignment with National Perspective

- Accuracy & Coordination
- Model-based reviews
- Construction automation
- FHWA Every Day Counts (EDC)

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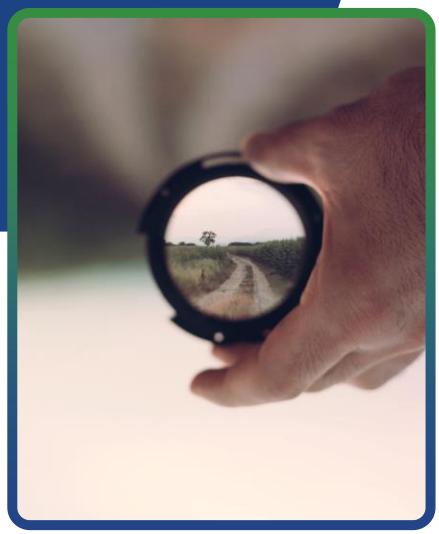

BIM & 3D Modeling Focus Areas

- Geometry, surfaces, utilities, and structures
- Define LOD (Level of Development) Standards
- Linking data-rich elements to:
  Cost, schedule, and asset management

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Future Direction

Moving forward effectively

- Advancing statewide training & standardization
- Integration with Digital Twin
- Expanding partnerships
- SPR Pooled Fund TPF-5:
  BIM for Bridge and 480 Bim for infrastructure)
- Streaming - working with Bently and Autodesk

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Be a part of the solution!

Production is our goal -
ensuring contractors have tools in hand.

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Questions?

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Safety Message: **Speeding – Slow Down, Stay Cool**

Speed limits are in place to keep you and those around you safe.

Together, we can create a safer summer for all by **slowing down** and **staying cool** on the road.

In Florida, the **speed limit** will *never* be **higher than 70 mph** on highways.
Slow down – no excuses.

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June 19 - 20, 2025
Hollywood, FL

Thank you for attending!

Contact Information

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June 19 - 20, 2025
Hollywood, FL

TRANSPORTATION SYMPOSIUM

Please be sure to **certify your attendance** before leaving this event or no later than **Monday, June 30**, in order to receive PDH/CEC. Detailed instructions are available on the Transportation Symposium website.

Transportation Symposium Website

SCAN ME

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