OpenBridge Modeler

Information Modeling for Bridges

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Bentley Sustaining Infrastructure

Agenda:

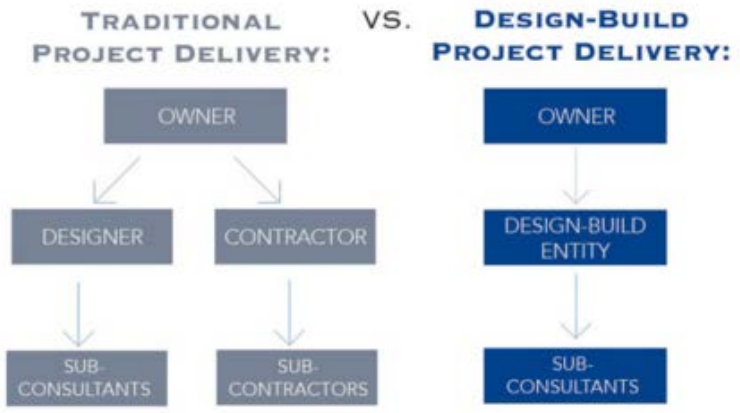
- Overview: BridgeDesign Process
- Introducing OpenBridge Modeler
- Features

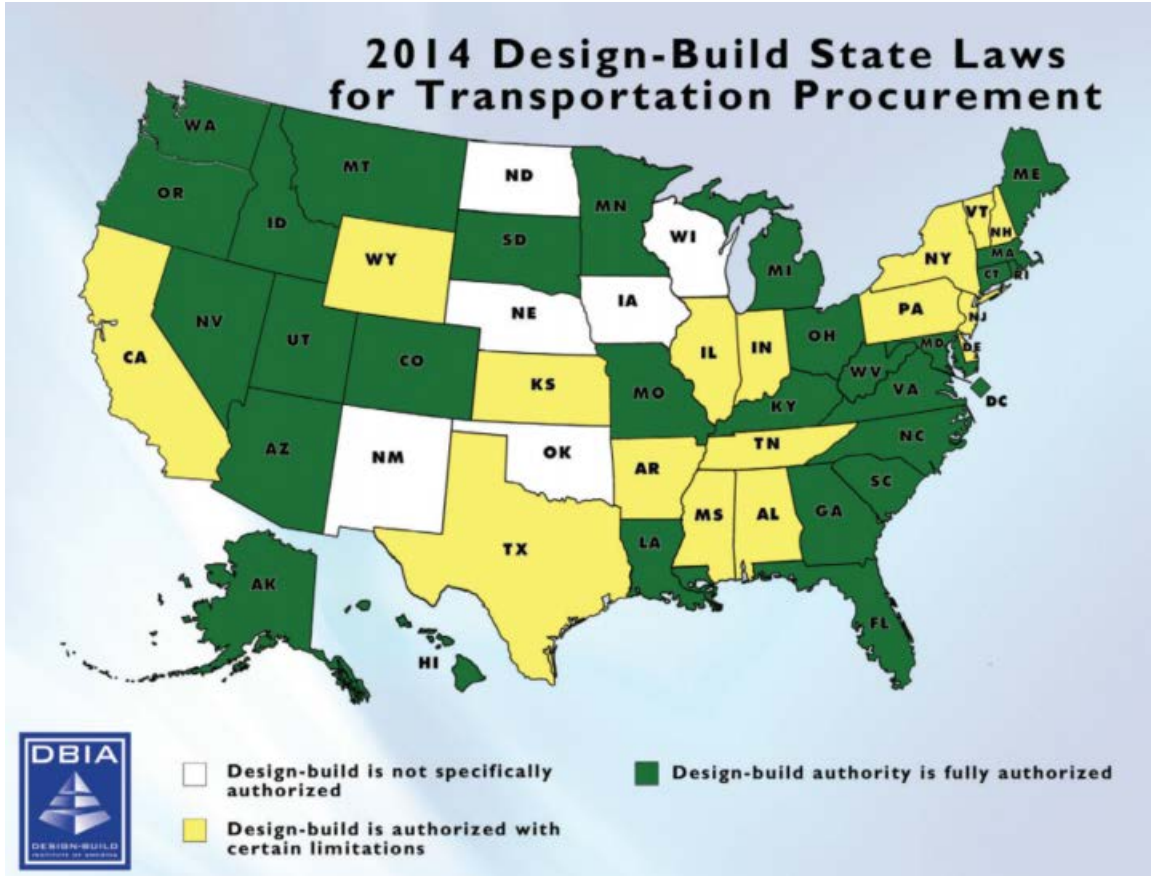
Bridge Design Process

A complex and fragmented process poised for innovation

Bridge Engineers: Driven to Innovate

- New Trends
  - Design Build
  - Public Private Partnerships
  - Mobile Technology



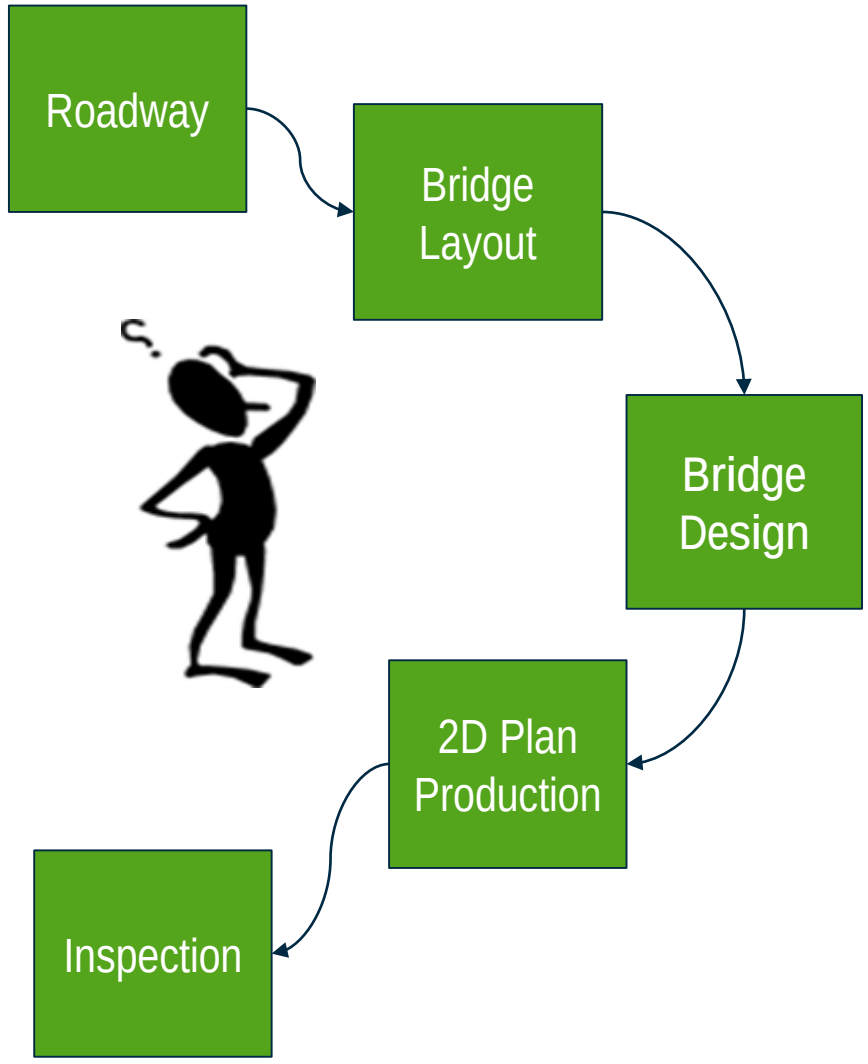


New processes require new tools!

Source: DBIA.org

Traditional Bridge Design Process

- Disadvantages
  - Manual data transfer with Roadway
  - Repetitive data entry
  - No change management
  - Communication issues
  - Physical to Analytical model translation issues
  - Numerous spreadsheets
  - Numerous design applications from different vendors
  - Plans production - lack of automation



Integrated Approach to Bridge Design

- Benefits
  - Automatic data transfer from Roadway
  - Change management
  - Bridge layout in context of true world
  - Intelligent connection to analytics
  - Data re-use, repurpose
  - Efficiency resulting in time & cost savings
  - Leverage MicroStation tools

Introducing: OpenBridge Modeler

Integrated Bridge Modeling on the Civil Platform and MicroStation

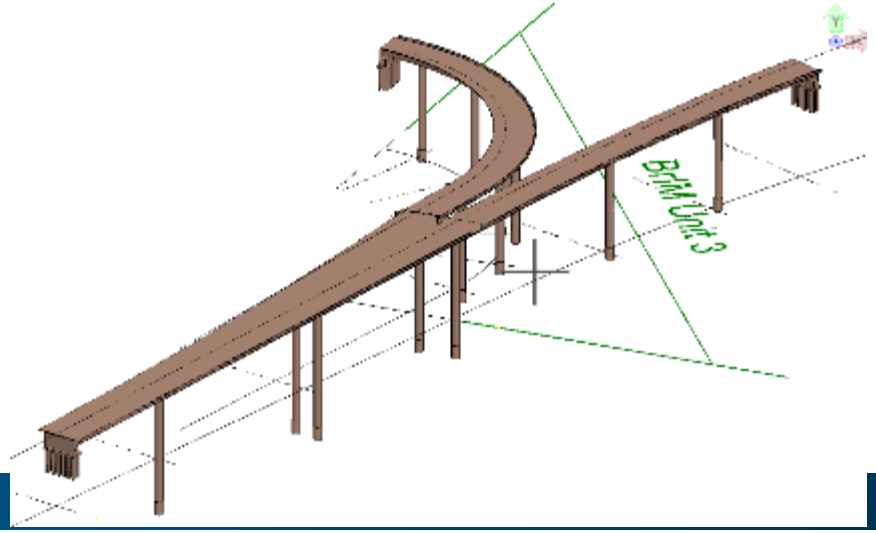
What is OpenBridge Modeler (OBM)?

- A comprehensive bridge information modeling application built on Civil Framework addressing the geometric layout, connection to analysis and design, visualization and documentation for any type and scale of bridge project

- Key Advantages:
  - Interdisciplinary modeling environment
  - Efficient and comprehensive 3D modeling with custom toolset
  - Analytics connection
  - Trusted deliverables
  - Efficient collaboration

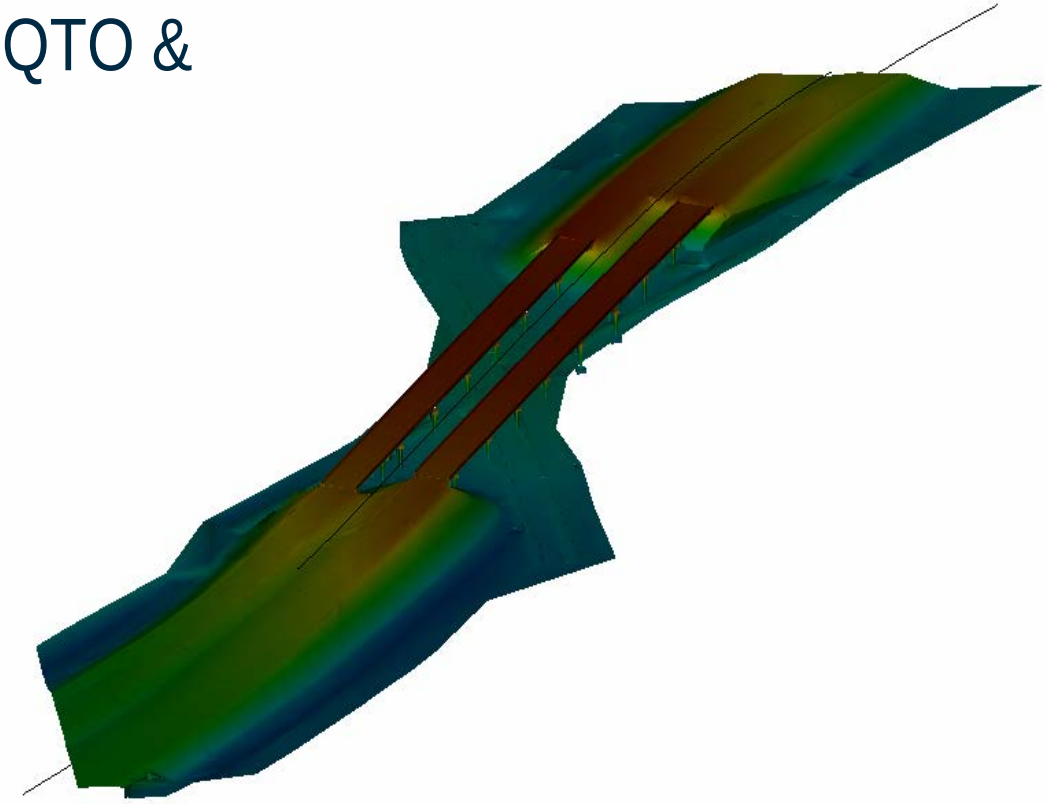
Vision

- OBM focuses on the creation of an information-rich data model useful for the lifecycle of the bridge.
- OBM helps bridge engineers maximize their creative potential, develop innovative solutions and avoid repetitive and error prone data transfer while achieving improvements in bridge design, safety, and sustainability.
- On Design/Build and PPP use of OBM will be instrumental to project cost reduction. Constructability and maintenance of traffic dictate design and cost.



OBM Principal Benefits

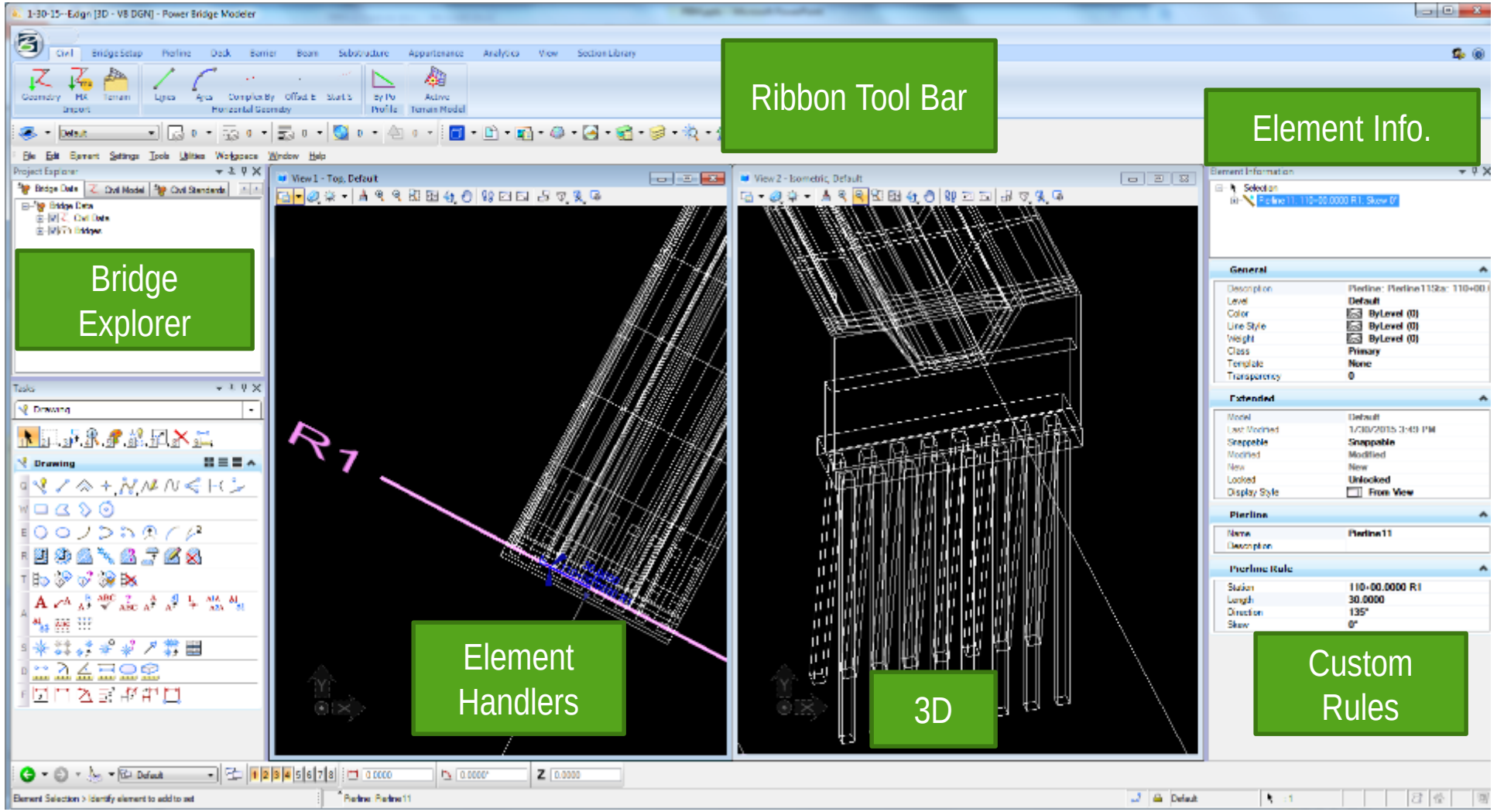
- Direct connection/referencing of Civil data
  - Horizontal Alignment, Vertical Profile, Ground Contours
  - GEOPAK, InRoads, MXROAD
- Visualization, Rendering, Clash Detection, QTO & Clearances
- Interoperability with:
  - Analytics:
    - LEAP Bridge, RM Bridge
  - Operations and Maintenance
    - InspecTech
  - Detailing and Documentation:
    - ProStructures, MicroStation



OpenBridge Modeler - Features

Enabling Bridge Information Modeling and Data Reuse

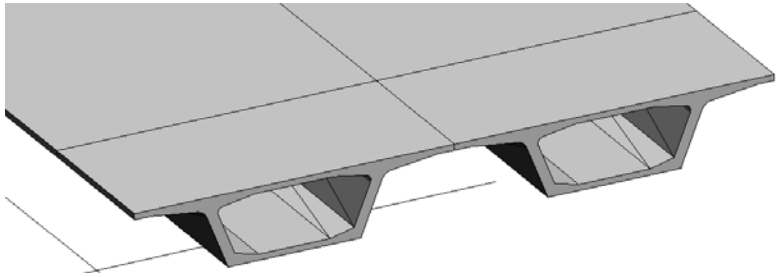
GUI

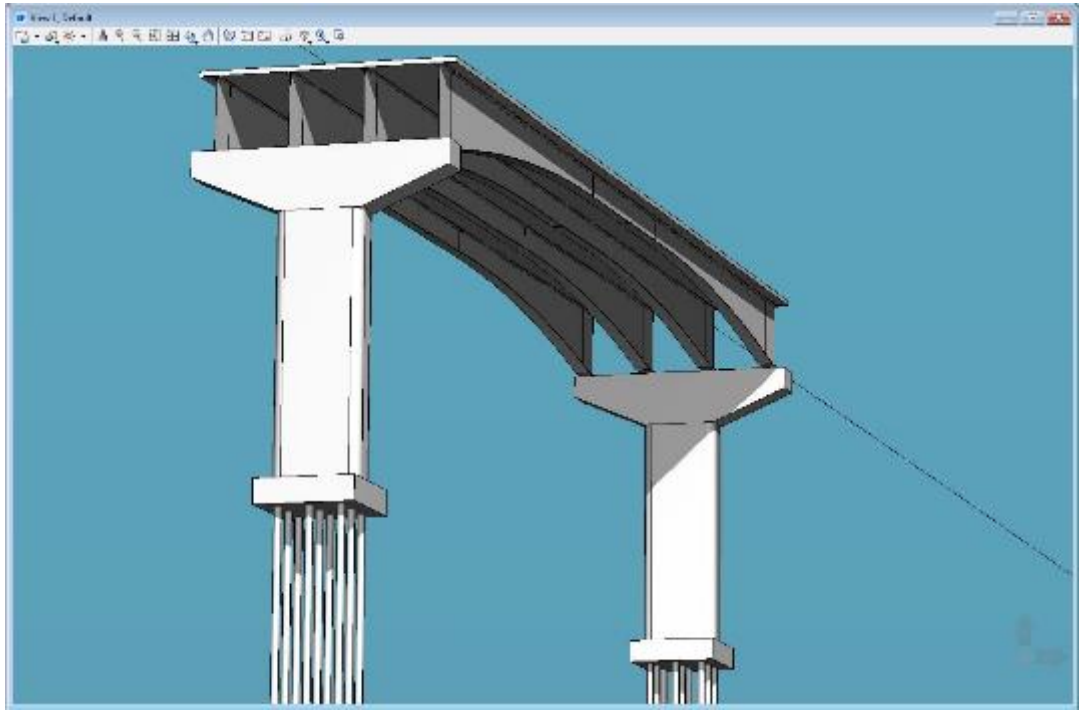


Built on Power Platform V8i

Supported Bridge Types in Version 1.0

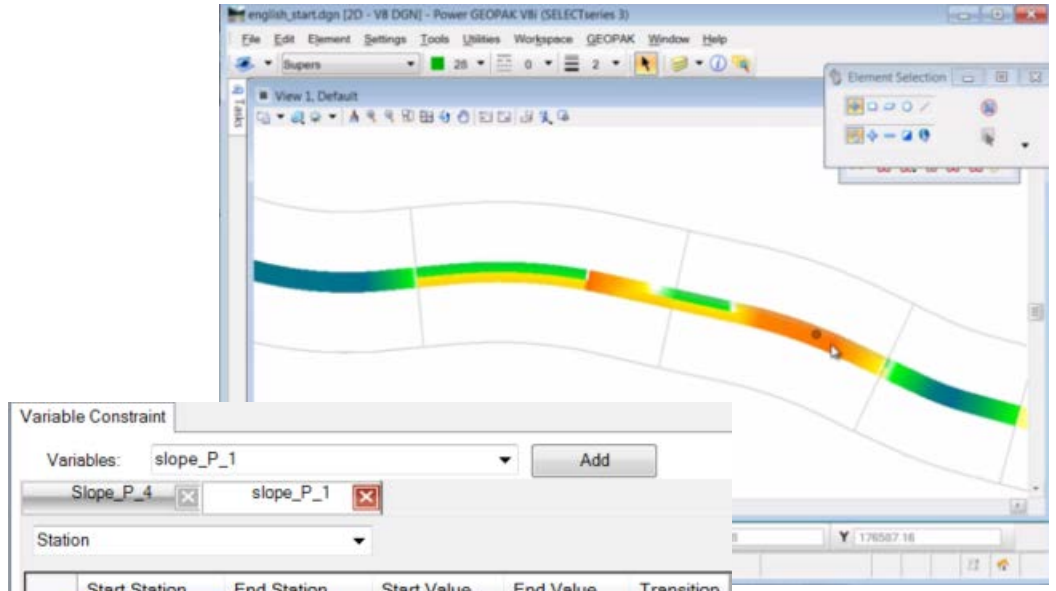
- Pretensioned Concrete
  - Girder + slab bridges
- Steel girder + slab bridges
  - Rolled Shapes
  - Built-up
- Segmental bridges
  - Span-by-span
  - Balanced cantilever
- Cast-in-Place Concrete Boxes and Slabs

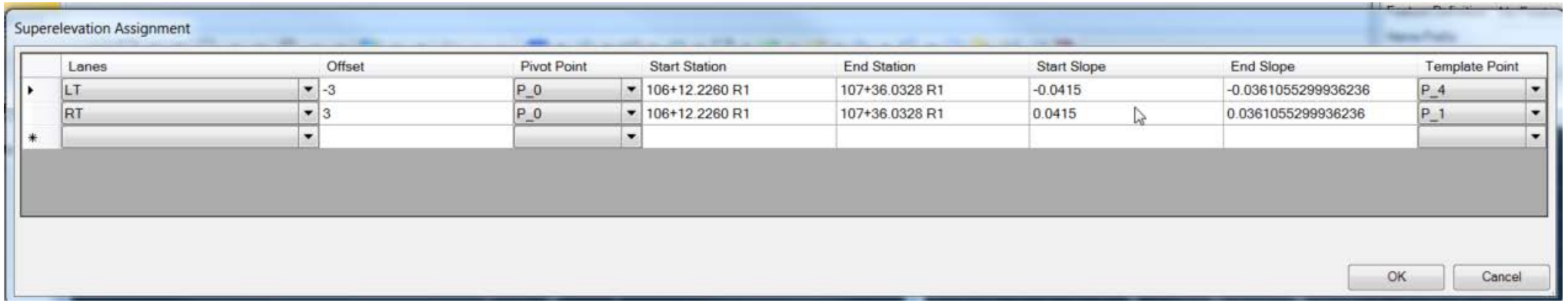




Civil Corridor Integration

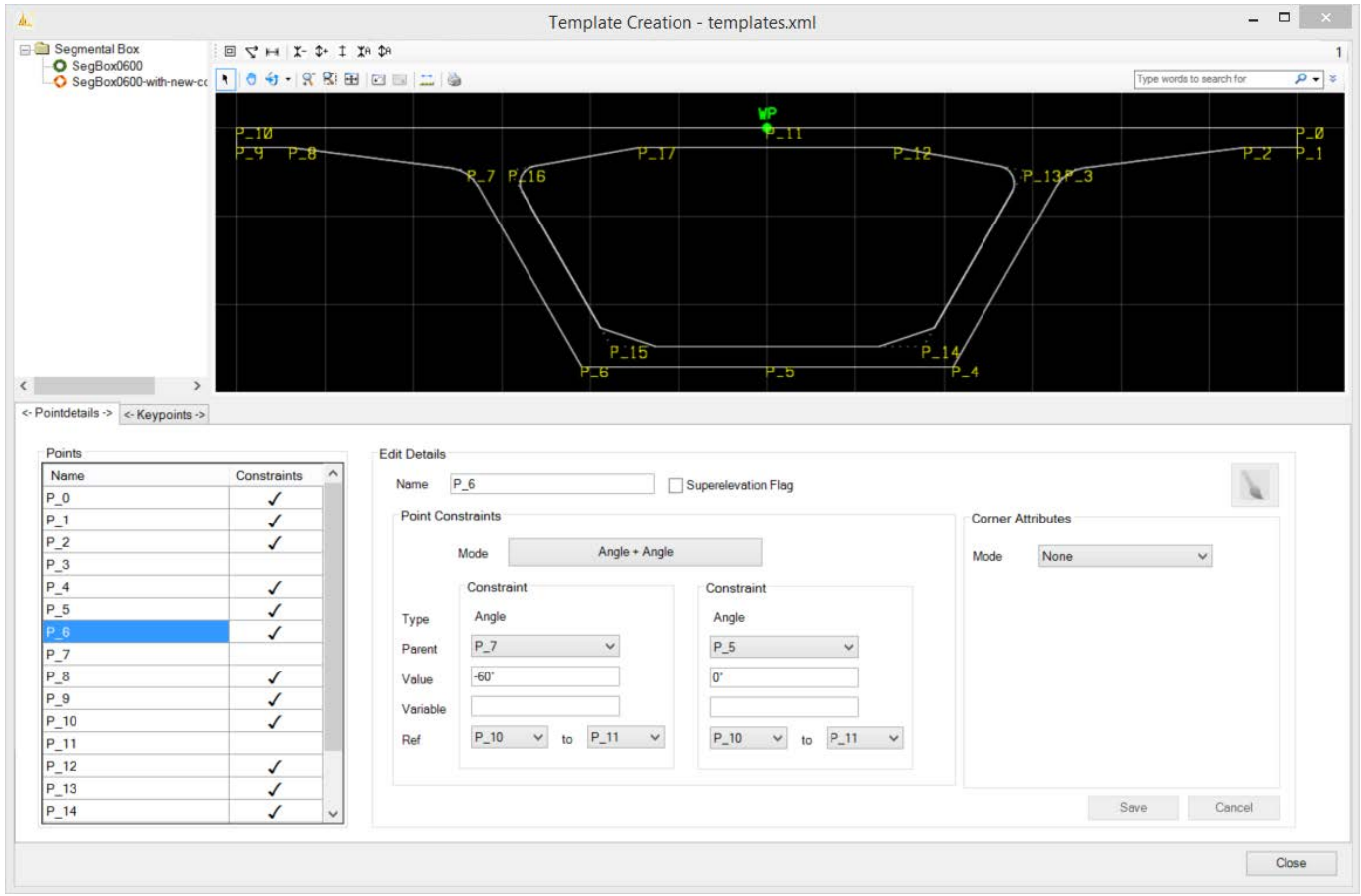
- Specify Deck Template points to read Super elevation from Civil Corridor
- Variable constraints automatically populated with information from Civil Corridor values.





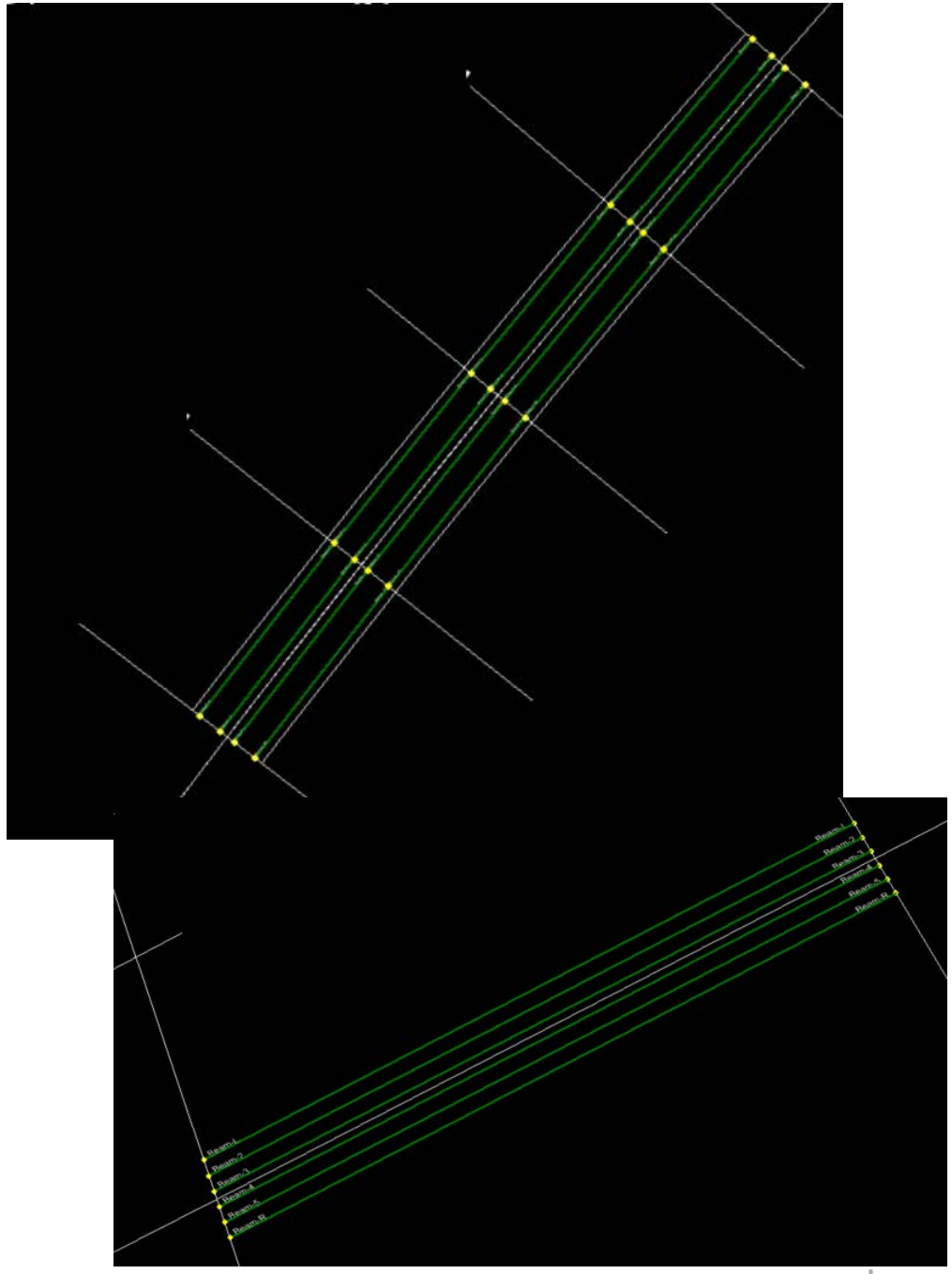
Template based Definitions

- Flexible and powerful geometric definition of Templates
- Define relationships between points and how they could vary along the bridge length
- Powerful graphics guide input
- No artificial parameter limits
- Start with predefined templates or create your own.



Beam Layout

- Flexible beam path definition
- Support for both Steel and Prestressed/Pretensioned Girders
- Continuous or simple span options
- Copy to options
- Parametric definition allows intelligent updating and accommodates changes

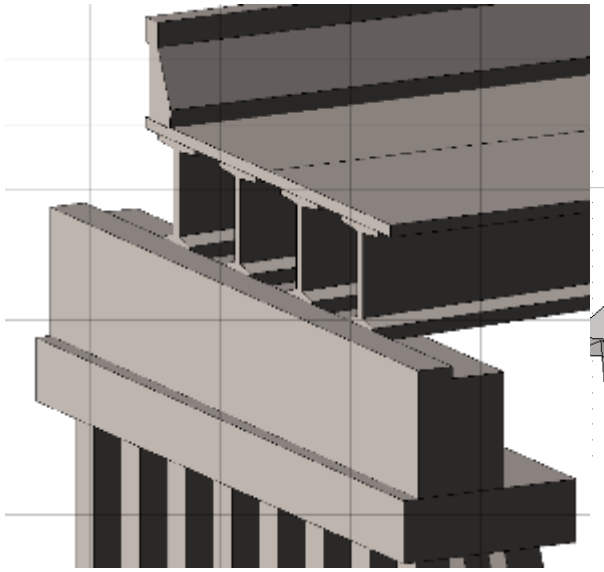


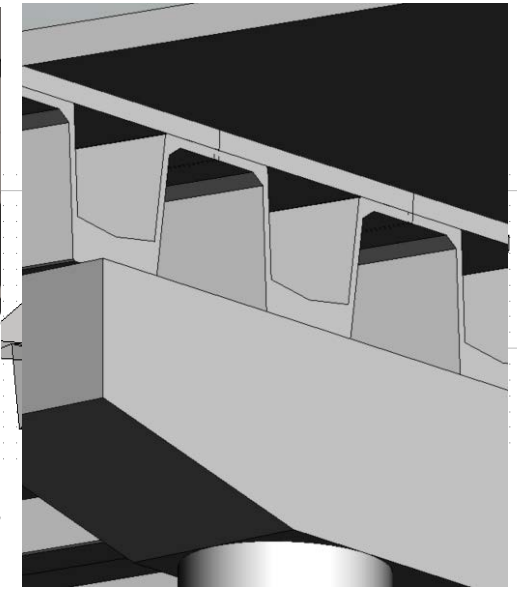
Segmental Bridge Modeling

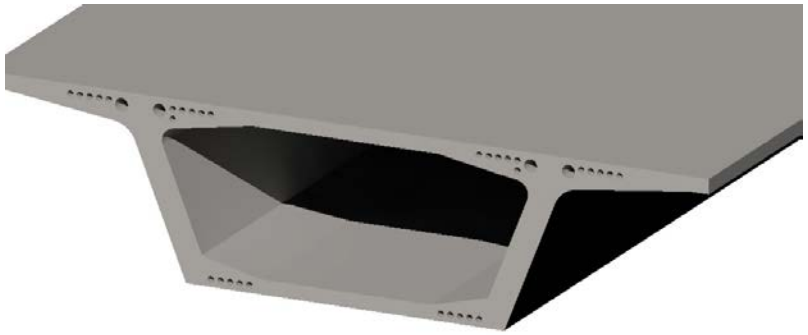
- Quickly create/update complex bridges using simple parameters
- Typical, Pier, Closure Segments
- Flexible support for complex Section variations
- Report Segment Weight, Volume and Surface Area
- Full 3D Model generated
- Send to RM Bridge – with push of a button

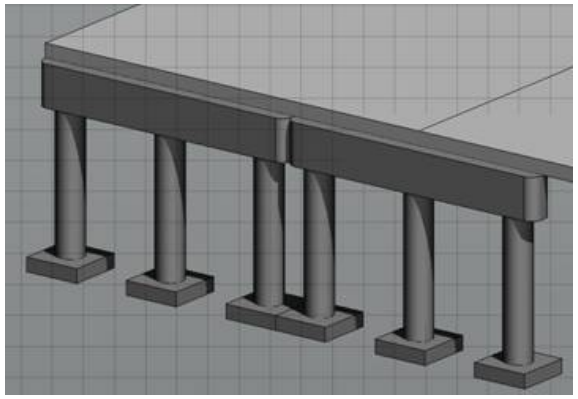
3D Modeling

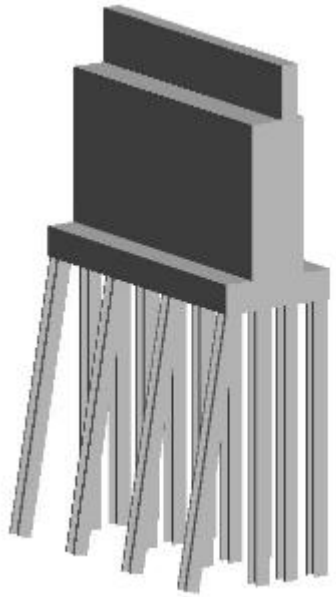
- 3D parametric bridge modeling
- Super and substructure modeling toolset
- Physical Bridge modeling
  - using PBM native geometry tools

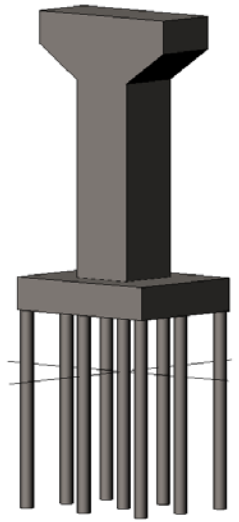






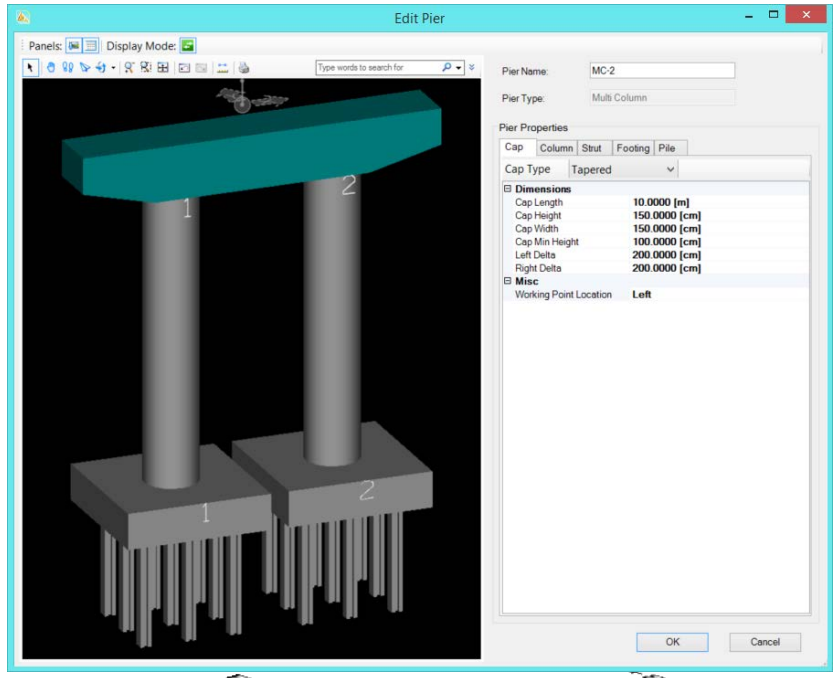


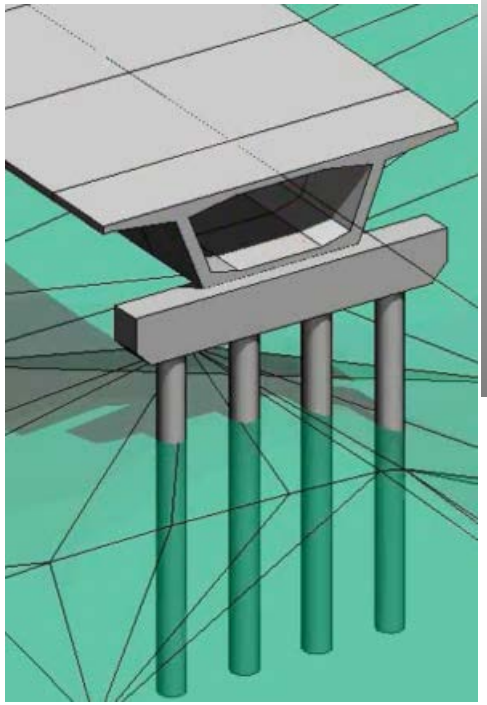


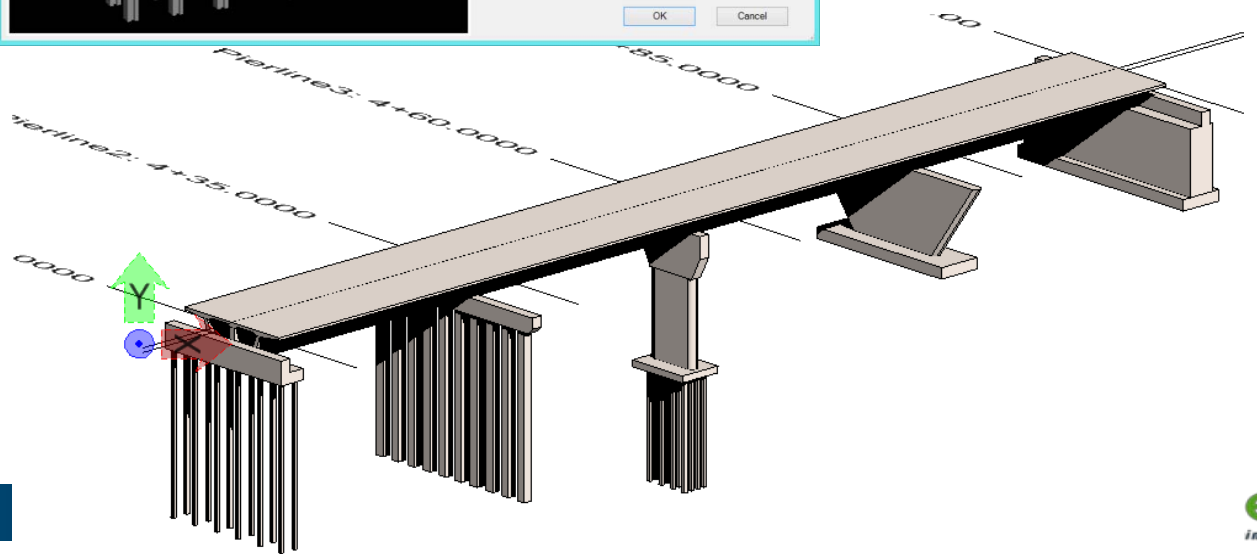


Substructure Modeling:

- Abutments
  - Stem Wall
  - Pile Cap
  - User Defined
- Piers
  - Wall Piers
  - Multi-Column Piers
  - Hammer Head Piers
  - Pile Bents
  - User Defined

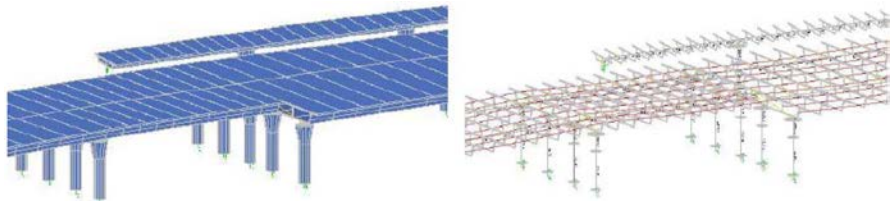


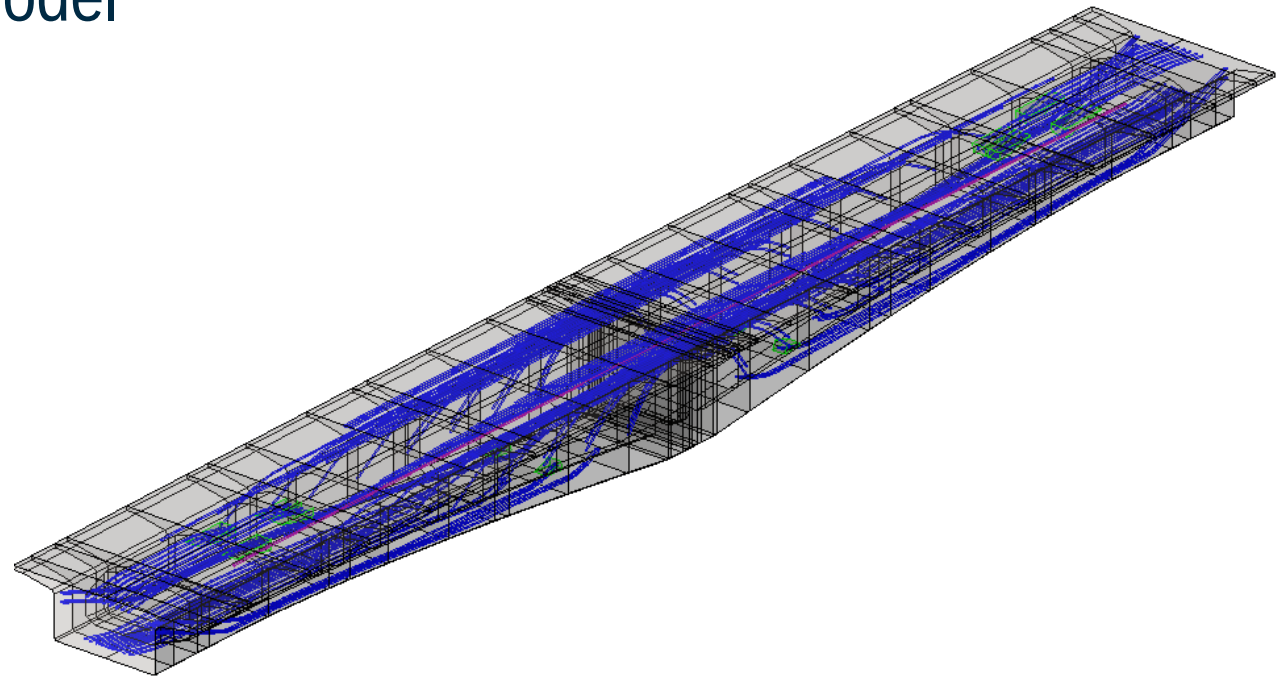




Analytics Connection

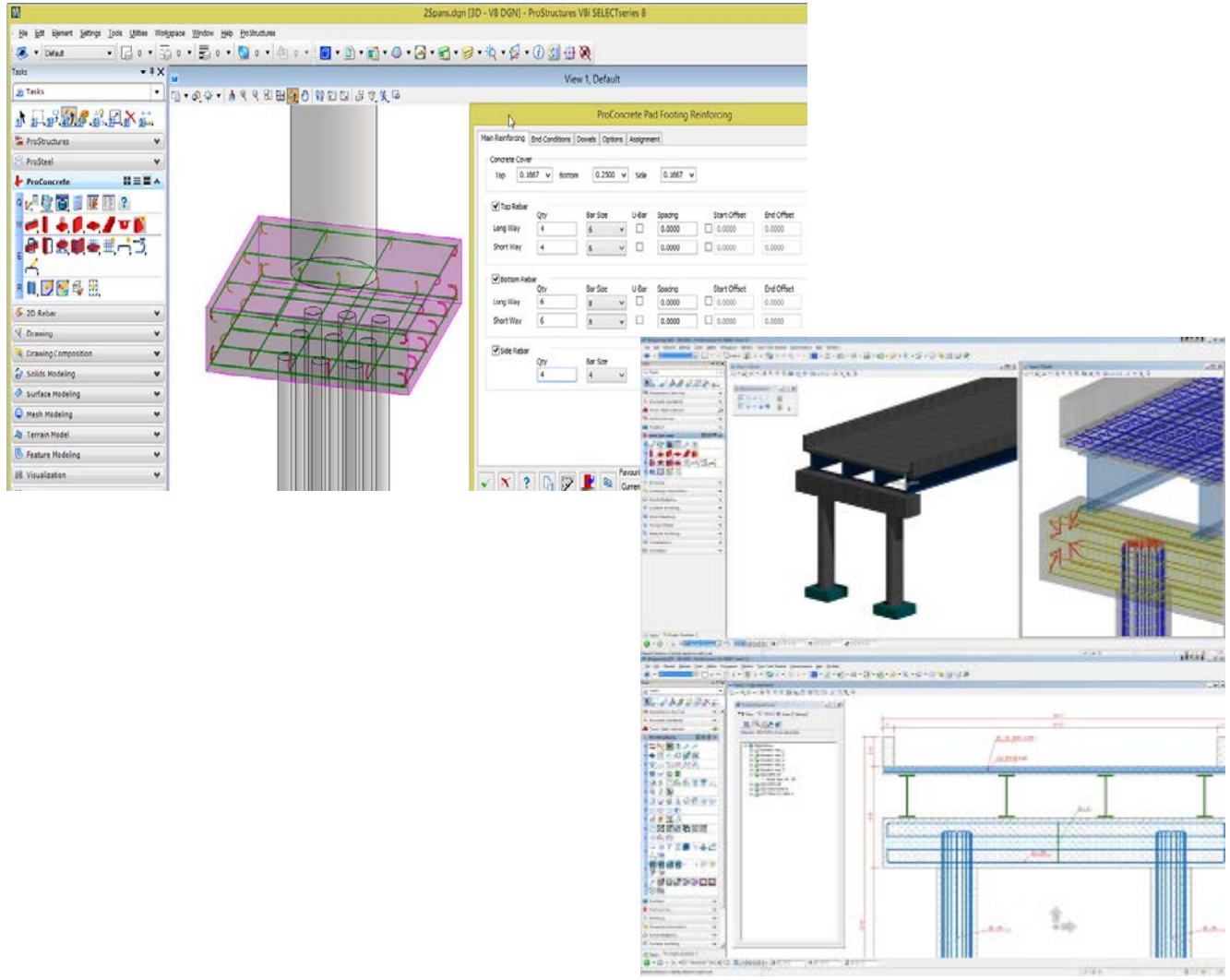
- Model in OBM, and design using
  - RM Bridge
  - LEAP Bridge (concrete & steel)
- Direct links for Physical to Analytical model
- One way connection in version 1.0





Integration with ProStructures

- Concrete objects are automatically recognized for appropriate tool in ProStructures
  - Footings
  - Columns
  - Beams
  - Slabs
- Reinforcing using ProConcrete tools and Dynamic Views to Label & Detail



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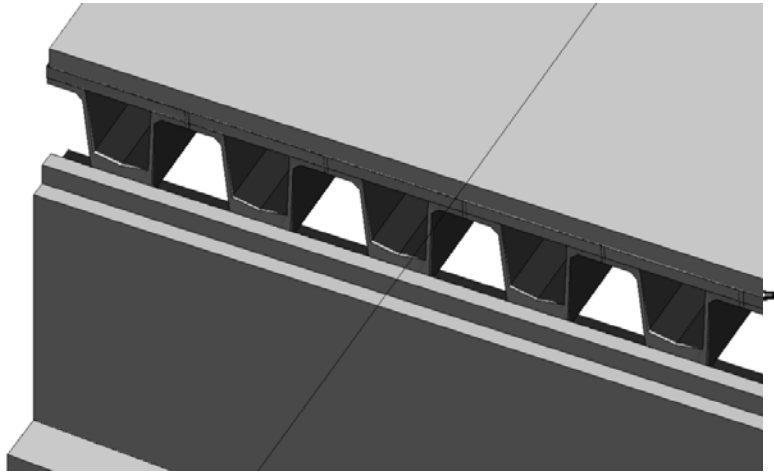
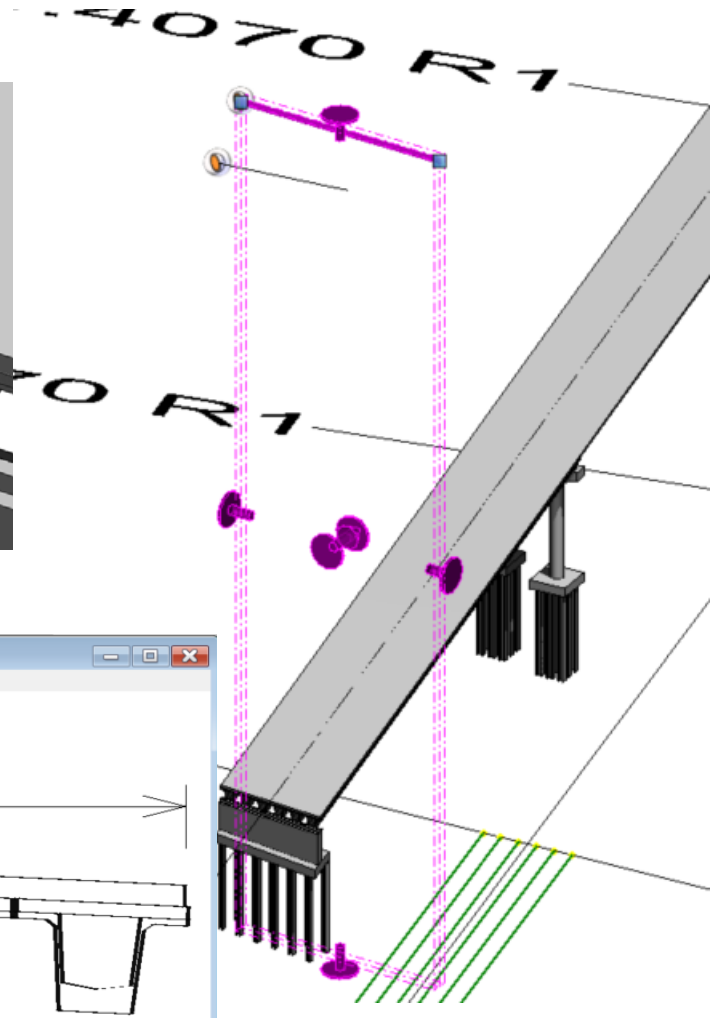
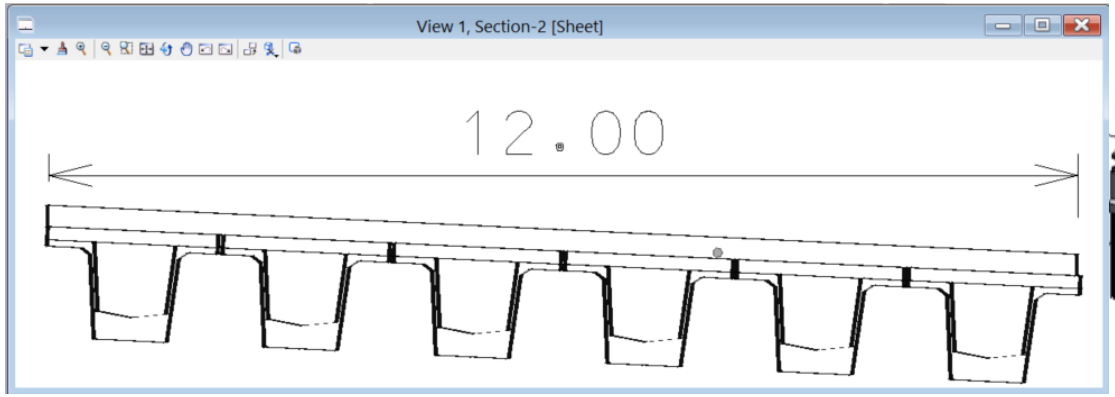
Dynamic Views

- Efficient workflows for 2D view generation from 3D models
- Dynamically updates 2D views based on 3D Model updates
- Allows for rapid creation of section, plan and elevation views

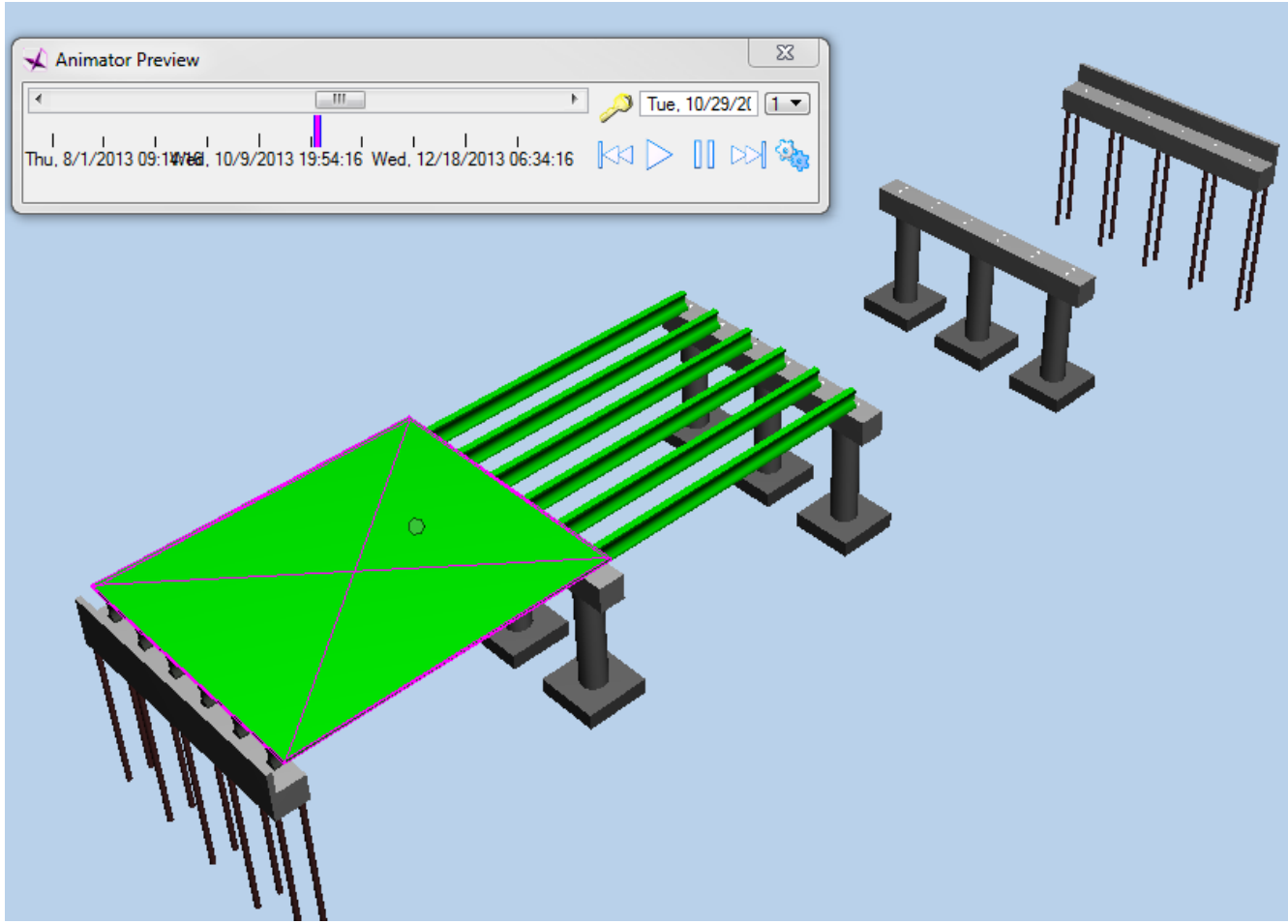






Construction Sequencing

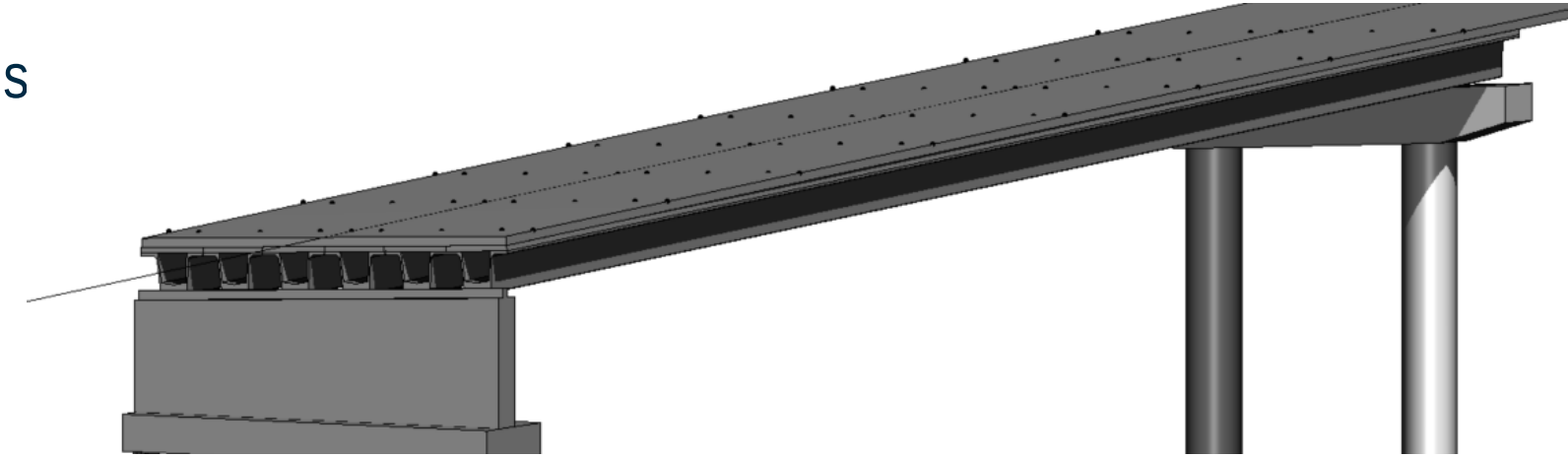
- Bentley Navigator
- Sequence of Construction
- Animation



Reports:

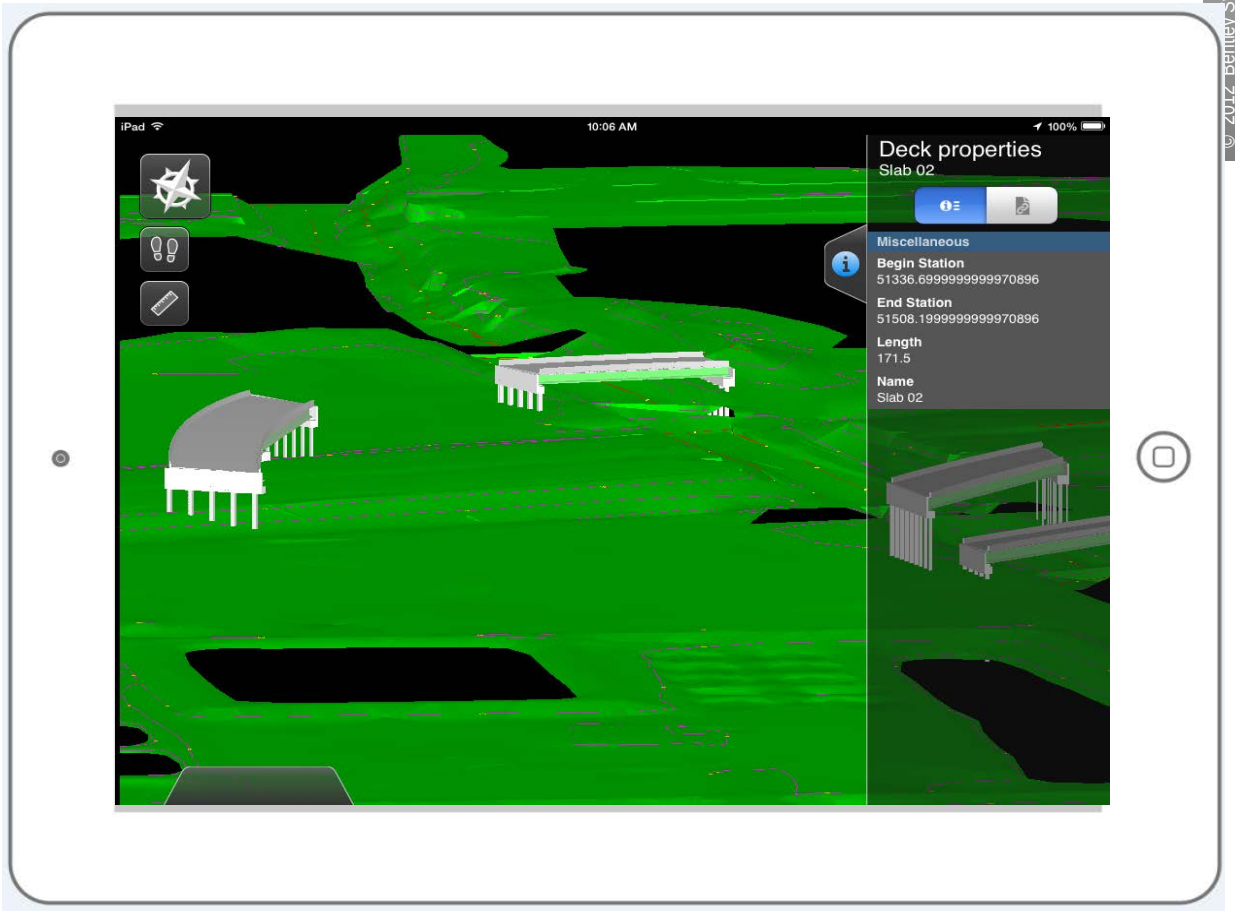
- Quantities
  - Concrete in v1.0
  - Rebar in future versions
  - Cost Estimates included
- Deck Elevations
  - Flexible reporting point options
- Beam/Seat Elevations
- Support Elevations

Girder	Distance (m)	Station (m)	Offset (m)	Elevation (m)
Girder_1_1	40.0000			
		0+000.0000	-4.0375	30.0000
		0+004.0000	-4.0375	30.0000
		0+008.0000	-4.0375	30.0000
		0+012.0000	-4.0375	30.0000
		0+016.0000	-4.0375	30.0000
		0+020.0000	-4.0375	30.0000
		0+024.0000	-4.0375	30.0000
		0+028.0000	-4.0375	30.0000
		0+032.0000	-4.0375	30.0000
		0+036.0000	-4.0375	30.0000
		0+040.0000	-4.0375	30.0000



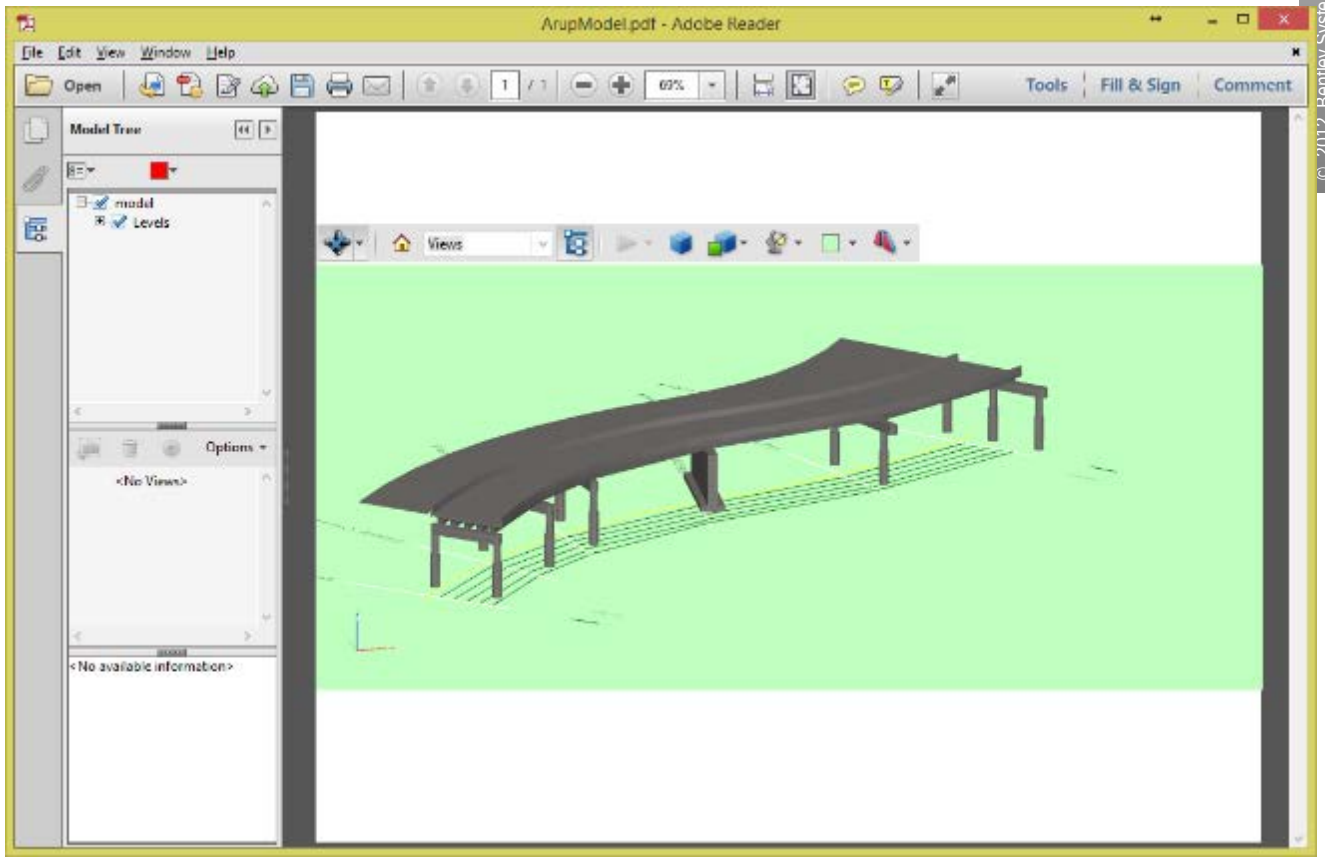
Efficient Collaboration

- ProjectWise integration
  - Support for distributed project teams
- Conceptual phase through construction
- Information mobility using i-models



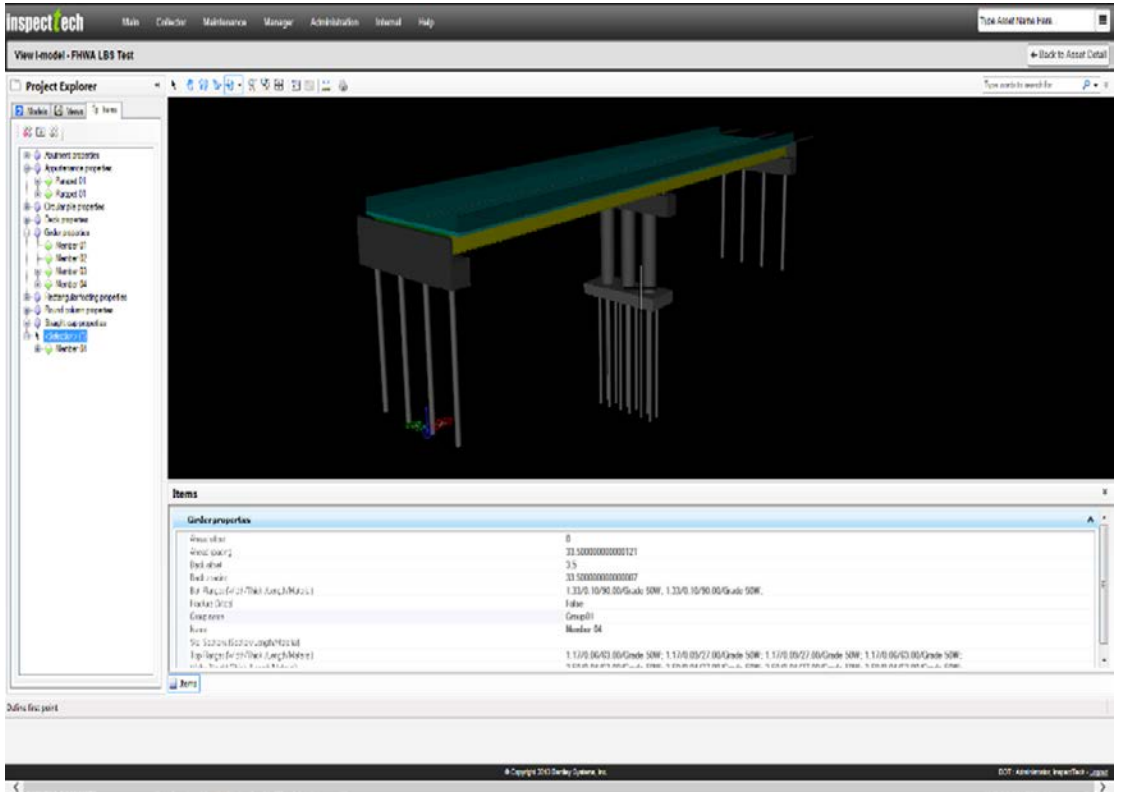
3D PDF

- Create 3D PDF directly from PBM
- 3D PDF's invaluable for sharing information with users without access to CAD software
- Components based view options
- View on supported mobile devices



Operations and Maintenance

- Generate i-models with rich data
- Reuse i-models in InspecTech
- Inspectors have accurate 3D Model during inspection and when filing reports
- Useful for Element Level inspections



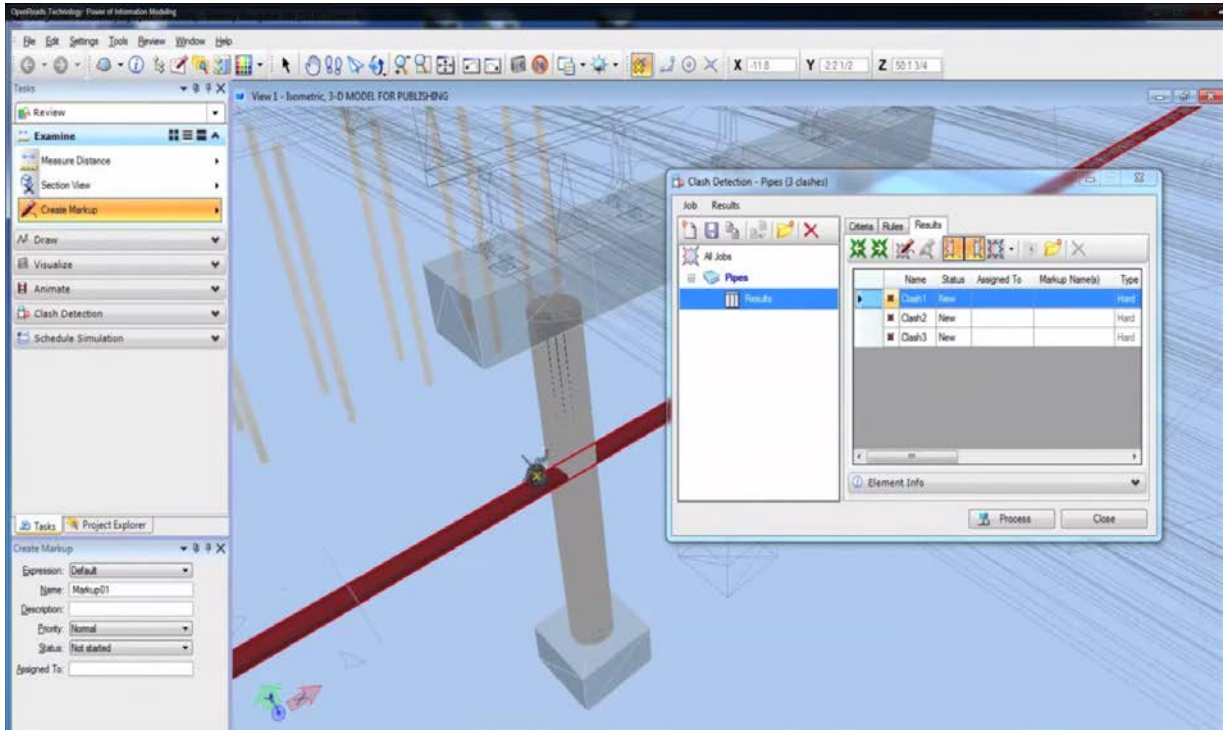
Visualization

- Use native MicroStation visualizatio tools. Powerful and easy to use
- Integrate models with Civil Roadway information for more comprehensive project visuals
- Use in public hearing presentations, project proposals and in marketing campaigns

Courtesy: Finley Engineering, FL

Clash detection

- 3D Models help evaluate complex situations easily missed by 2D views
- Quickly verify vertical and horizontal clearances
- Check for clashes with subsurface utilities
- User selected objects and clash check criteria definition



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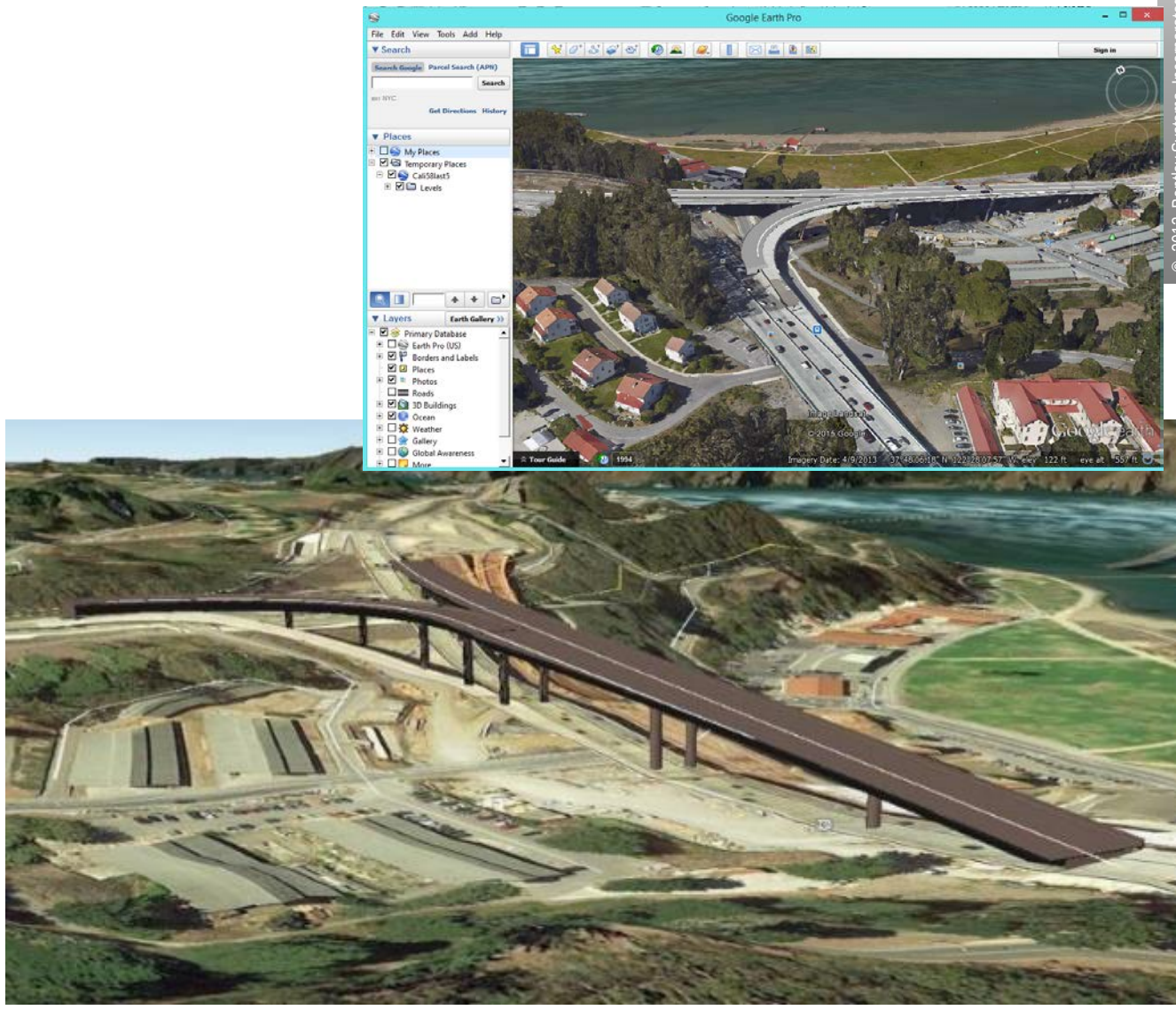
Google Earth integration

- Accurately geo-locate project
- Export files directly from PBM to Google Earth
- View the bridge in the true/visual context of the site surroundings
- Create and share realistic presentations quickly



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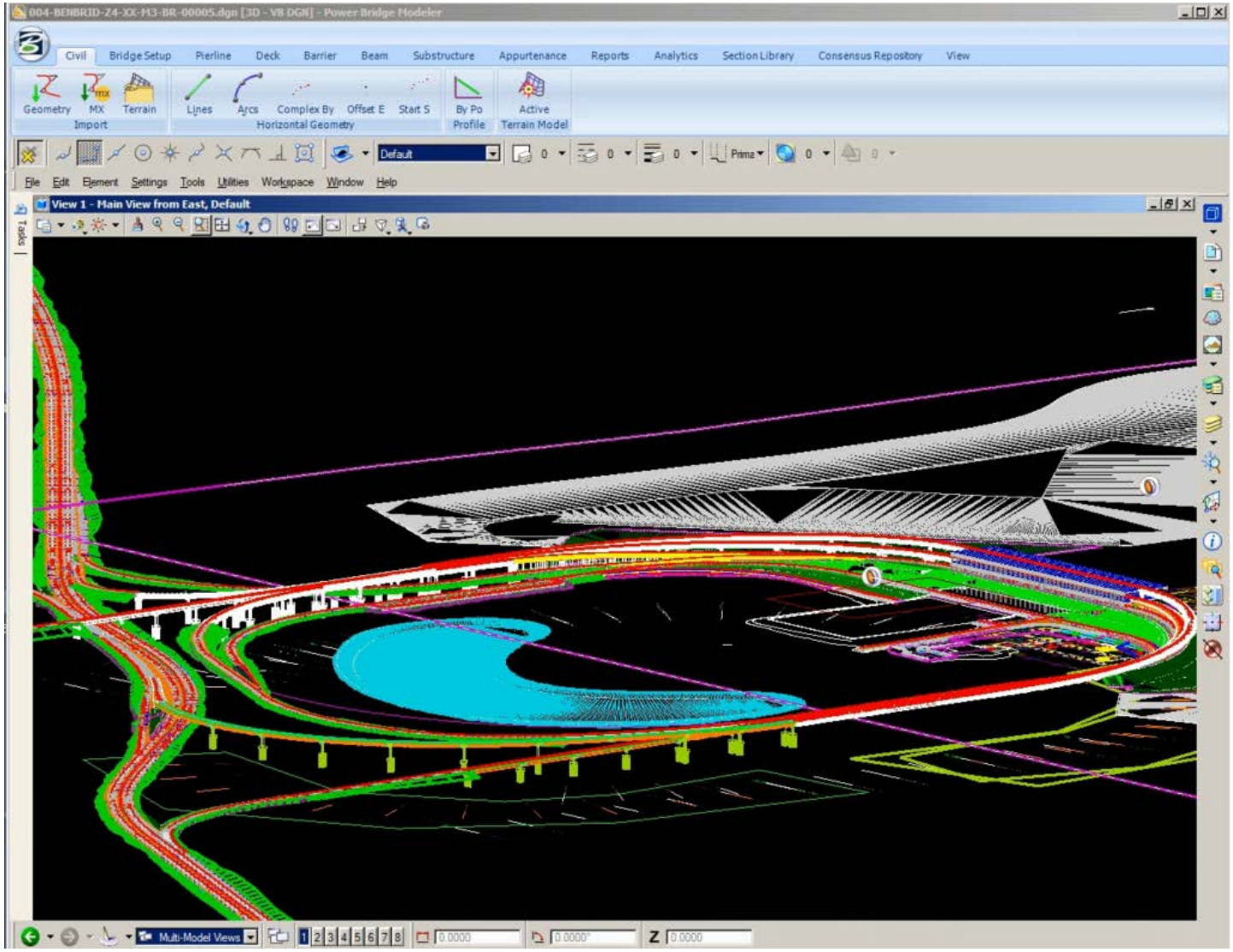
Video



Summary

- OpenBridge Modeler in an innovative software solution poised to revolutionize Bridge Information Modeling
- OpenBridge Modeler's approach leverages complex Civil Elements to create accurate physical bridge models
- OpenBridge Modeler has unique Physical to Analytical model creation capabilities
- OpenBridge Modeler leverages powerful MicroStation capabilities such as Dynamic Views, realistic rendering, and clash detection.
- OpenBridge Modeler supports native data exchange with ProConcrete for detailing

Thank You !