Iowa DOT Bridge Forum on 3D and Digital Deliverables

Steve Willoughby, Senior Services Manager - Bridge and Tunnel

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Common Challenges

- Increasing costs of projects/Supply chain challenges
- Aging workforce/Retirements/Labor shortages capacity to execute new projects
- Siloed and fragmented data leading to design assumptions
- Communication challenges between disciplines
- Increasing need to be sustainable

Opportunities

Given the increased number of infrastructure projects, changes in the workforce, and to the design process there is an immediate need for streamlined collaborative workflows, increases in design efficiency, and automated plan production.

Reduce risk of project overrun through increased collaboration

Move towards Digital Delivery to streamline data handover between disciplines.

Plan and design with a more complete picture of existing conditions.

Reduce costs through improved efficiency of plan/design activities and downstream decision-making processes.

Leverage design data for enhanced decision-making around sustainability.

Produce a data-rich deliverable for clients.

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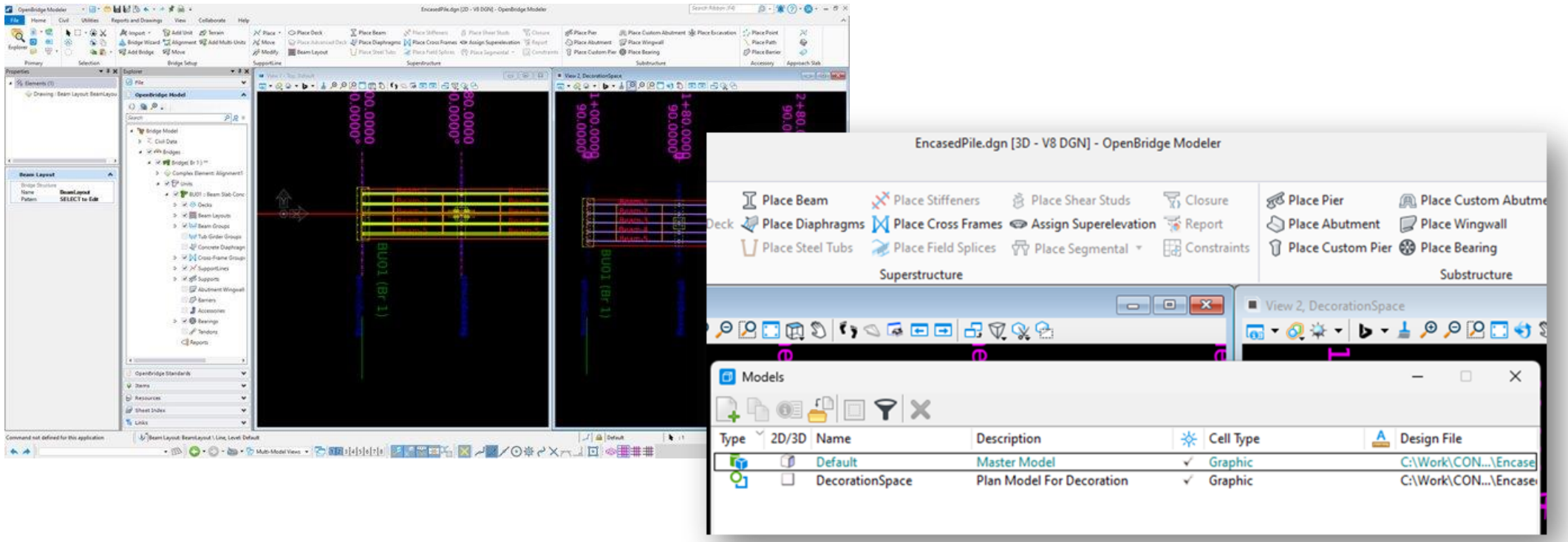
OpenBridge Modeler 2023

2D / 3D Separation

Bridge decorators that were written at elevation zero in a 3D model and now placed in a 2D model.



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Pain: *All bridge elements are written in a 3D environment, even the elements at elevation zero (2D elements). Then, extra manipulation is needed for plans production and properly being displayed in iTwins or export to IFC.*

Benefit: *Clean 3D models in iTwin. Plan Production is easier in a 2D file.*

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Export to IFC

Added a new *Export to IFC* (*Technology Preview*) application that allows for the exporting of all element types from the desktop.

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Problem/Pain: Users were not able to export IFC files directly from OpenBridge.

***Value/Benefit:* Any bridge element or complex object can be exported to IFC. This can be done using generic building or bridge classifications from different IFC versions or a more precise identification accomplished through the use of *Item Types*.**

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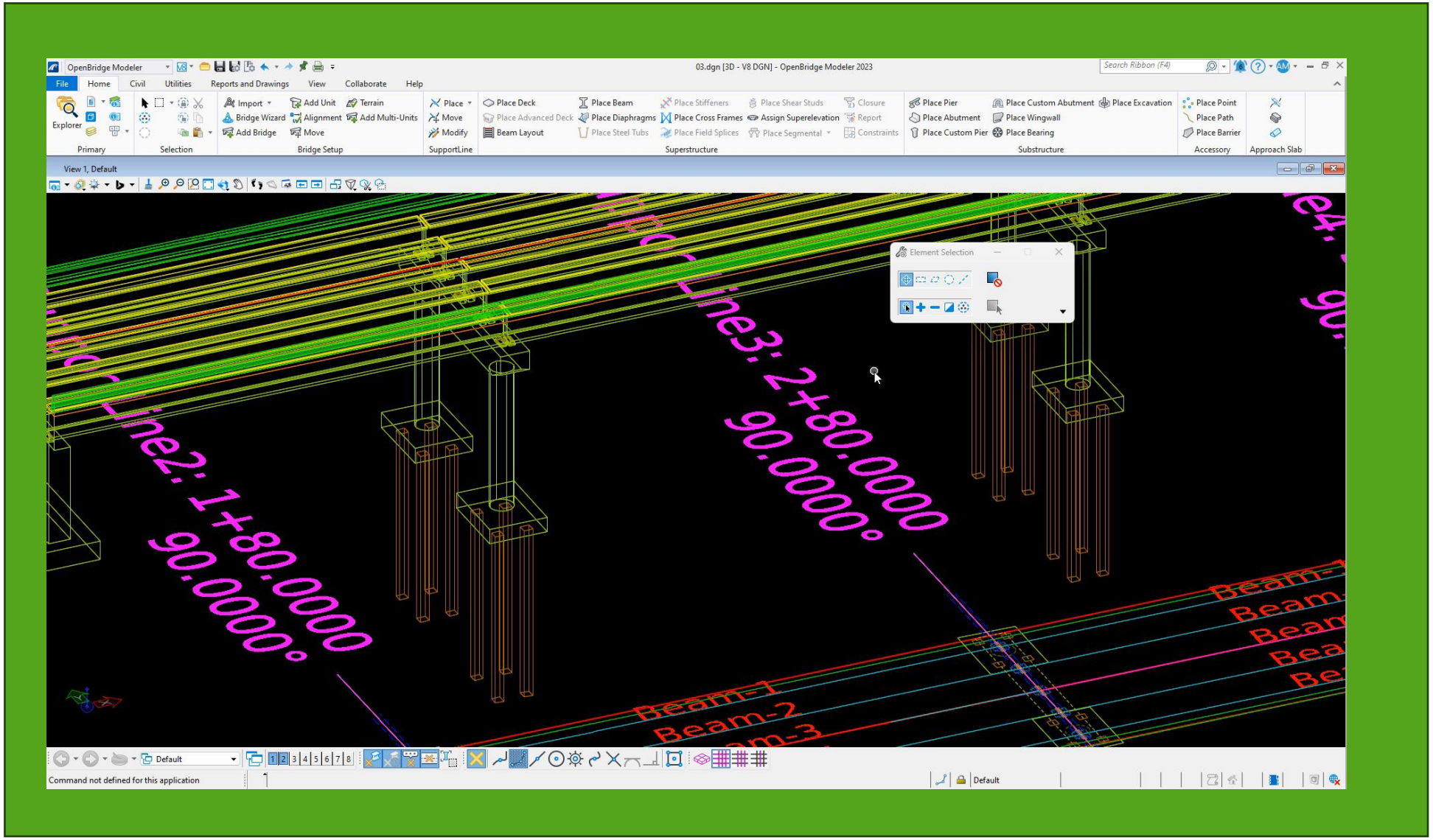
Export to IFC

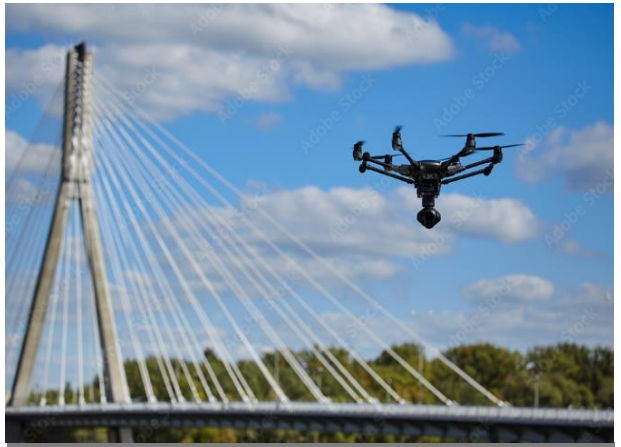


Building Infrastructure *Better*

PLAN

DESIGN

BUILD



OPERATE

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Going Digital Maturity Model

	I. 2D/3D USAGE	II. 3D IMPLEMENTATION	III. DIGITAL MATURITY
	• Work in a hybrid 2D/3D environment to deliver projects. • Plan to implement 3D across workflows to improve quality, efficiency, enhance talent skills, and increase ROI.	• Design in 3D models and have capacity to deliver digital twin to meet project requirements • Realize need for gains in efficiency, effectiveness, and reusable data to improve collaboration and competitiveness.	• Create and manage digital twins that are up-to-date virtual representation of asset or project. • Improve level and quality of services while reducing cost, time, and risk. • Meet sustainability goals. • iTwin Platform Partner
Focus Area	**Run**	**Grow**	**Transform**
Expected Outcomes	**Efficiency**	**Effectiveness**	**Transformation**
Mandatory	**All must rest on a solid foundation of a BIM Implementation Plan.**		

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> Regardless of infrastructure type, over time the digital twin of an asset or a project will become both its lifeblood and its central nervous system.
>
> We believe that to achieve sustainable infrastructure digital twins, it is imperative that you build your systems around open-source technology so the keys to your destiny remain in your hands.

Keith Bentley, Founder, Bentley Systems

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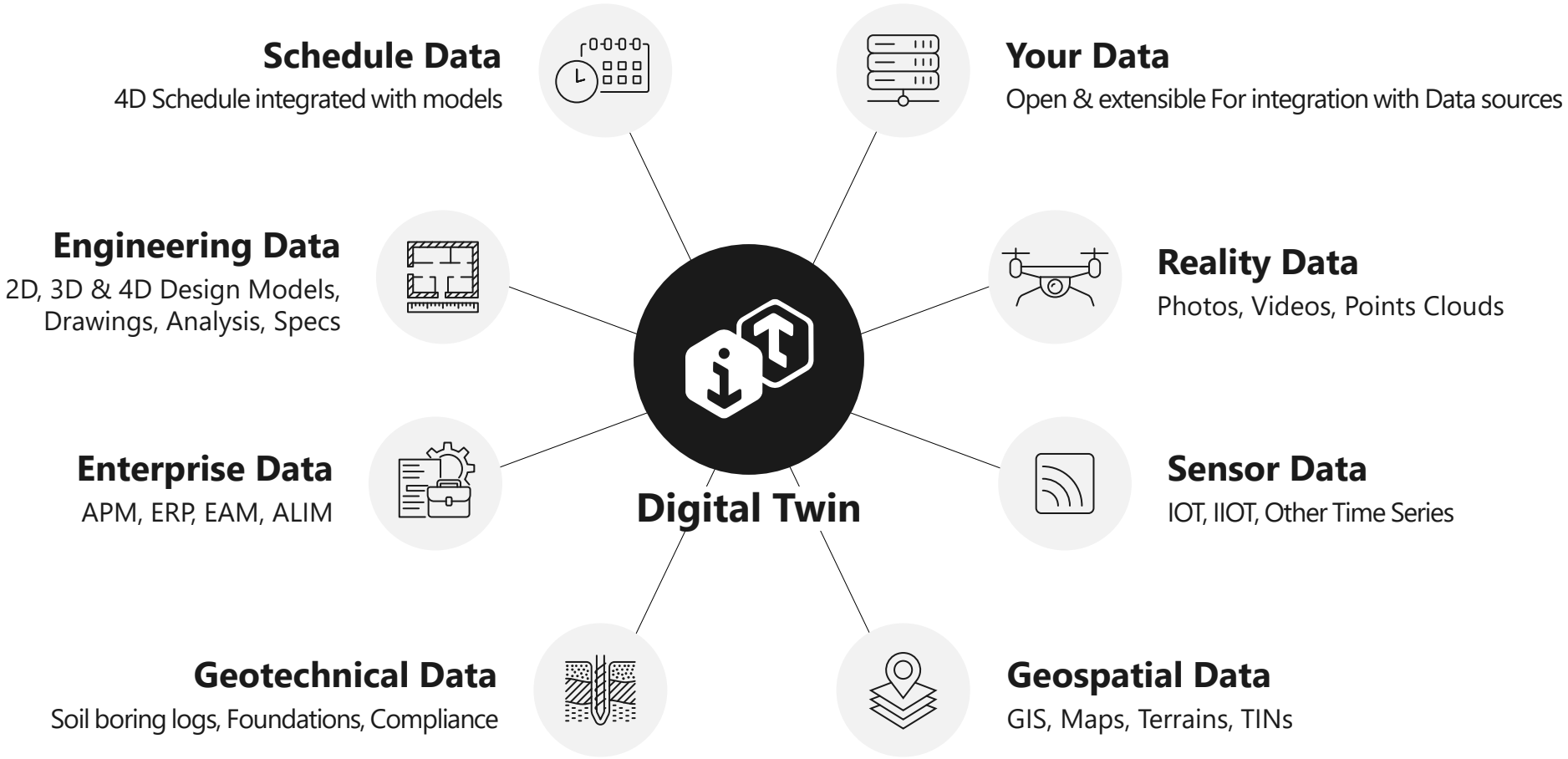

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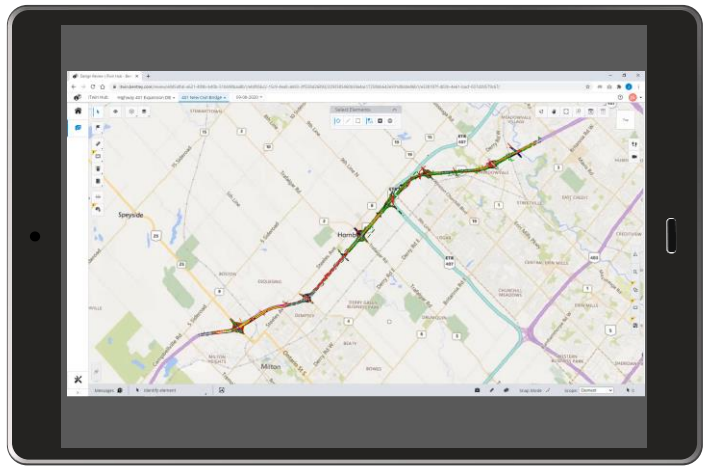
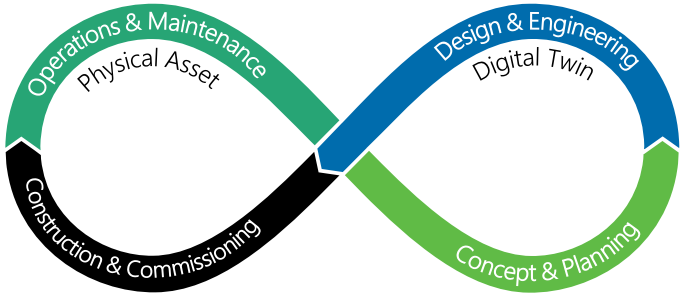
4D 5D Construction Rehearsal

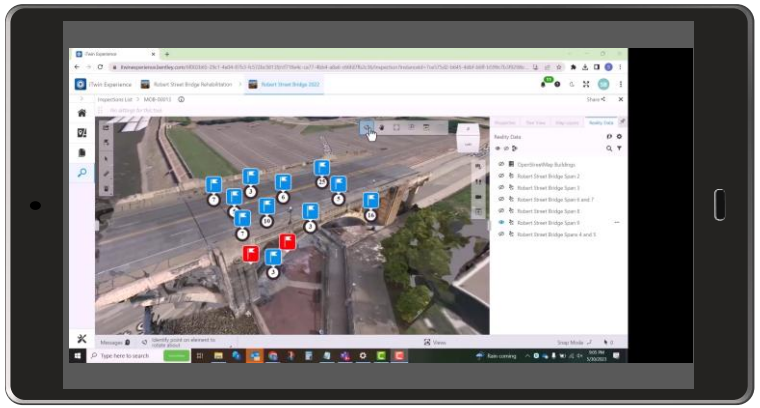
Virtual Design Reviews



Design Simulation



AI - Inspection



Project Pursuit /Stakeholder Engagement

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Best-in-class organizations are benefitting from Infrastructure Digital Twins

Digital Delivery enabled savings of over $15M to date

TH 169: Redefine Elk River ~ WSB, MNDOT

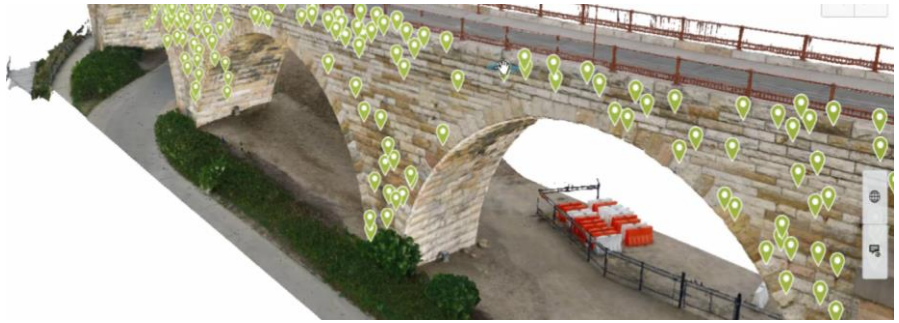
Avoided network relocation costs of $3.5M & a delay of 18 months

KY 9 Reconstruction ~ Gresham Smith

Reduced modeling time by 60%, saved 7% in bridge materials and reduced carbon footprint by 30%

WSP AUSTRALIA PTY LTD. - Southern Program Alliance

Saved 20% in field inspections in first four days



Stone Arch Bridge ~ Collins Engineering & MnDOT

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SYNCHRO | The construction digital twin

SYNCHRO

Inputs - Construction Data → **Outputs** - Construction Workflows

Design Data
- Specifications
- Drawings
- Documents
- 3D Models
- Survey/GIS
- IFC

Site Data
- Records
- Asset tags
- WBS
- Costs
- Quality

Field Feeds
- Sensors
- Drones
- Photos
- Mobile data capture

Digital Twin

Data

Alignment and Coordination
Accountability and Change Management
Accessibility and Capture

5D Management
- Quantities - Bids
- Contracts
- Time and materials
- Change Orders
- Budget

Task Management
- Documents
- Inspection
- Safety
- Daily logs
- Issues / RFIs
- Reporting
- Dashboards

4D Planning
- CPM
- Staging and sequencing
- Simulation
- Daily Plan
- Coordination

Operations
- Machine automation
- Pre-fabrication
- Reality capture

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SYNCHRO Construction

iTwin enabled

Web | Mobile | Cloud

4D

Cloud & desktop planning& estimating
Model-focused workflows

Includes **everything below plus**:

- ✓ **SYNCHRO 4D Pro**
- ✓ **SYNCHRO Modeler**

- ✓ Manage and view models
- ✓ Model-based quantity take off
- ✓ Model-based work planning
- ✓ Construction digital twin
- ✓ Reality model viewing

Cost

Cost management
Project- & portfolio-level costs

Includes **everything below plus**:

- ✓ Contract data
- ✓ Schedule of values
- ✓ Potential change orders

- ✓ Change orders
- ✓ Pay applications
- ✓ Contract insights
- ✓ API integrations

Perform

Project performance insights
Optimised site operations

Includes **everything below plus**:

- ✓ Earned value and performance management
- ✓ Daily costing and production management

- ✓ Progress measurement
- ✓ Resource management
- ✓ Subcontractor dockets
- ✓ Event management

Control

Project management & document controls
Task- & model-based workflows

Includes **everything below plus**:

- ✓ Document management
- ✓ Issue and RFI management
- ✓ Map and location services

- ✓ 4D web model collaboration
- ✓ Inspections management
- ✓ Work plans to the field

Field

Mobile field management
Tablet/Phone

- ✓ Documents to the field
- ✓ 4D models to the field
- ✓ Issues, RFIs, photos, daily logs
- ✓ Observations

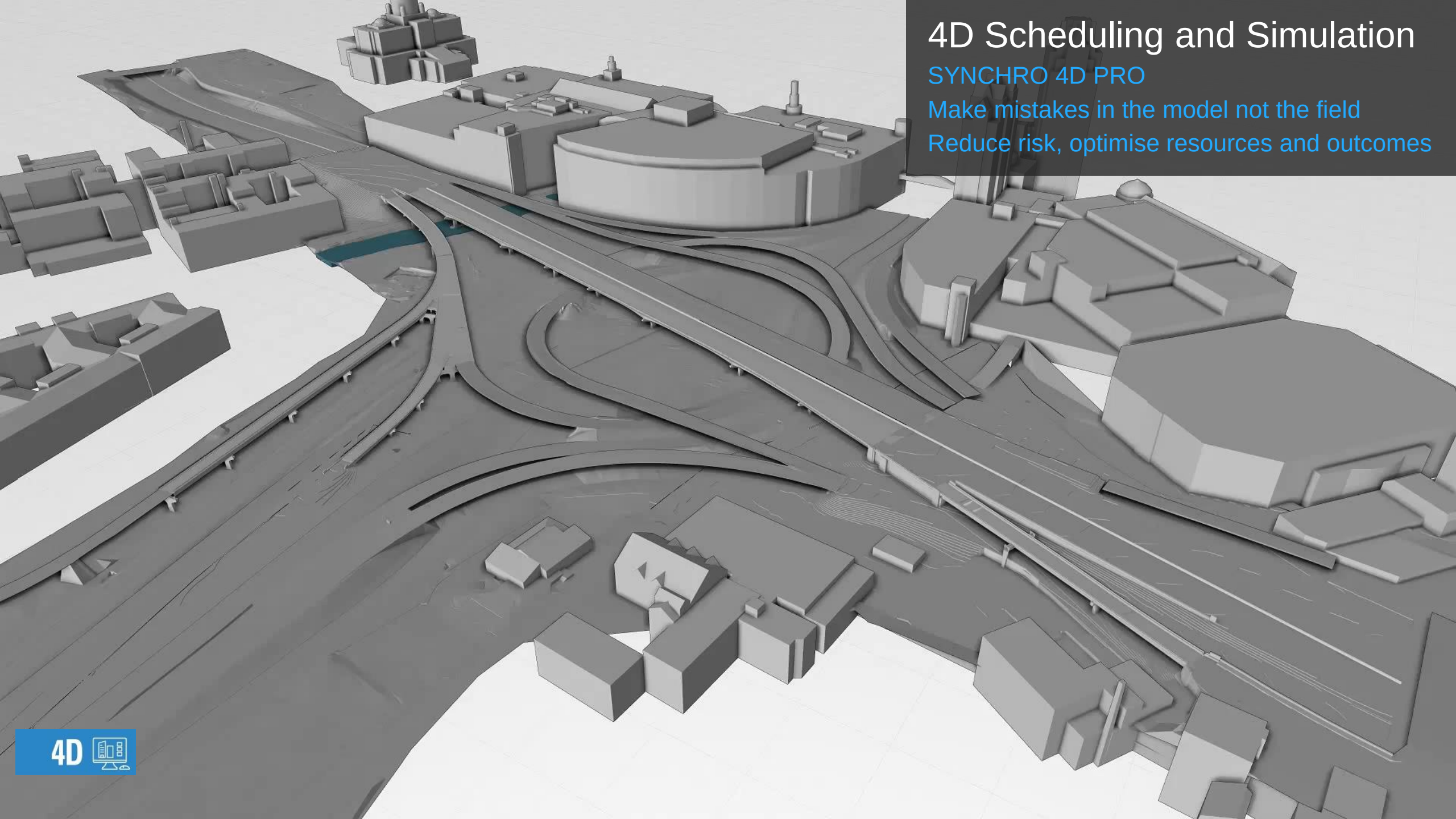
- ✓ Model-based progress tracking
- ✓ Quality and quantity inspections
- ✓ Work plans to the field

4D Scheduling and Simulation

SYNCHRO 4D PRO

Make mistakes in the model not the field

Reduce risk, optimise resources and outcomes



Field execution challenge | Field data access & capture

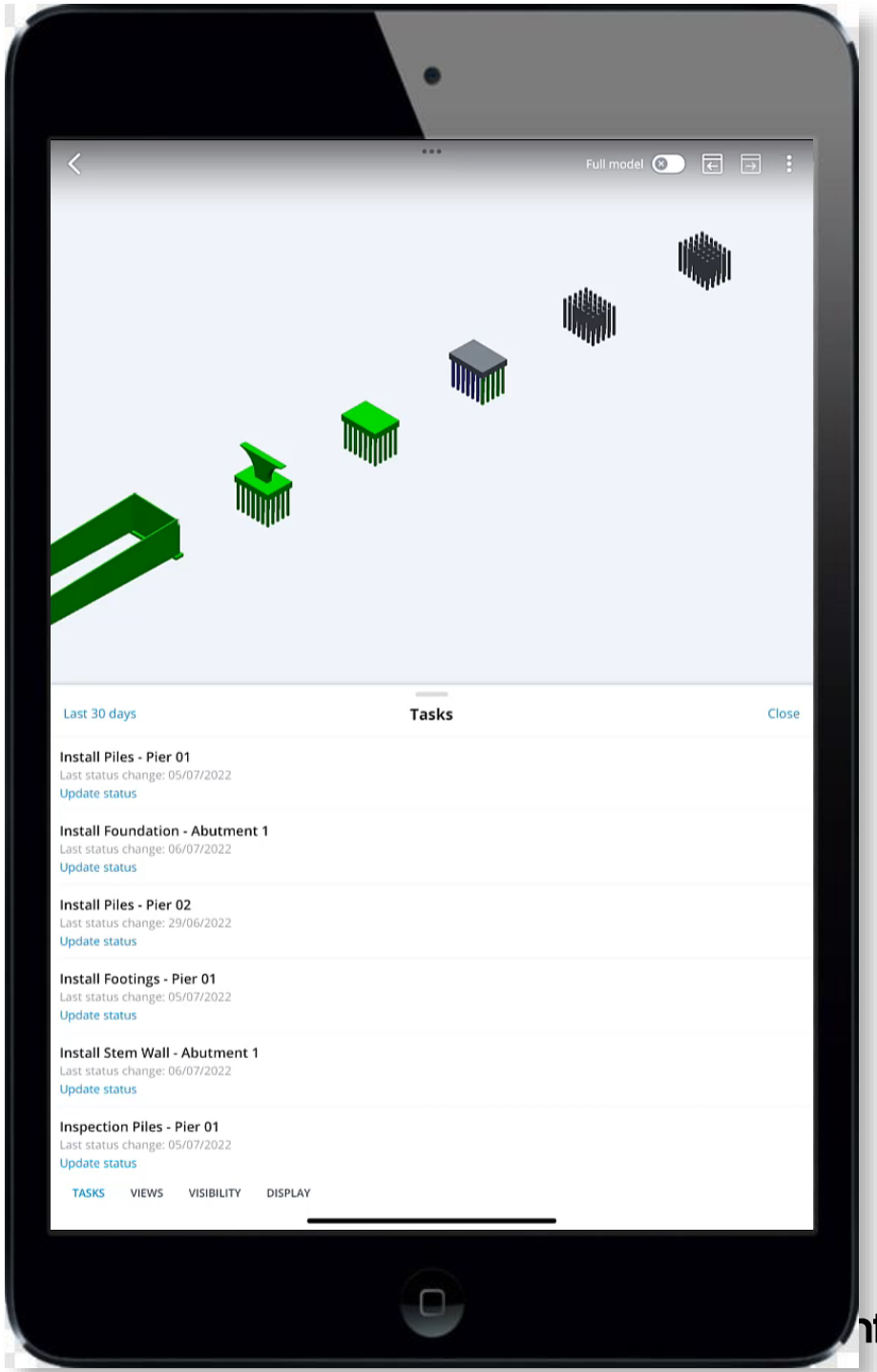
Solution

4D status tracking

Maintain visibility into the 4D schedule, so that projects stay in control

Civil Design Tools

Profiles, Sections, Measurements in the Field



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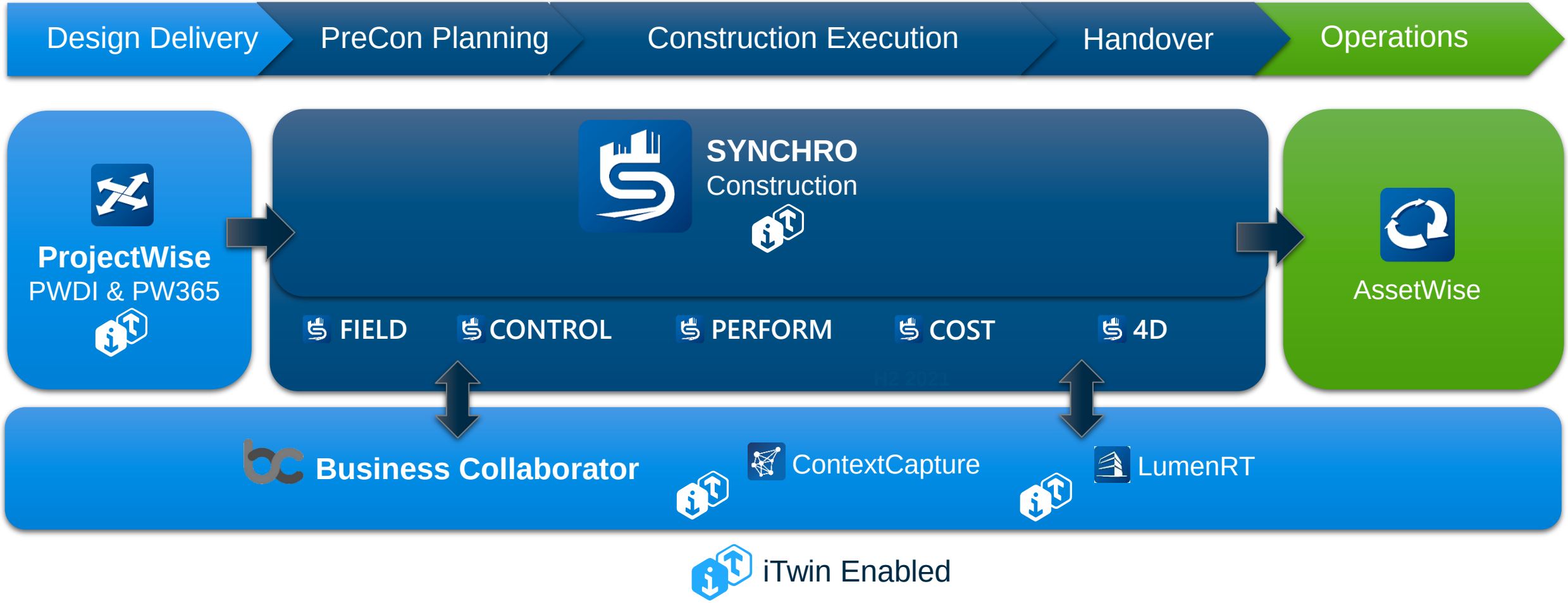
SYNCHRO | Part of Project Lifecycle Solution



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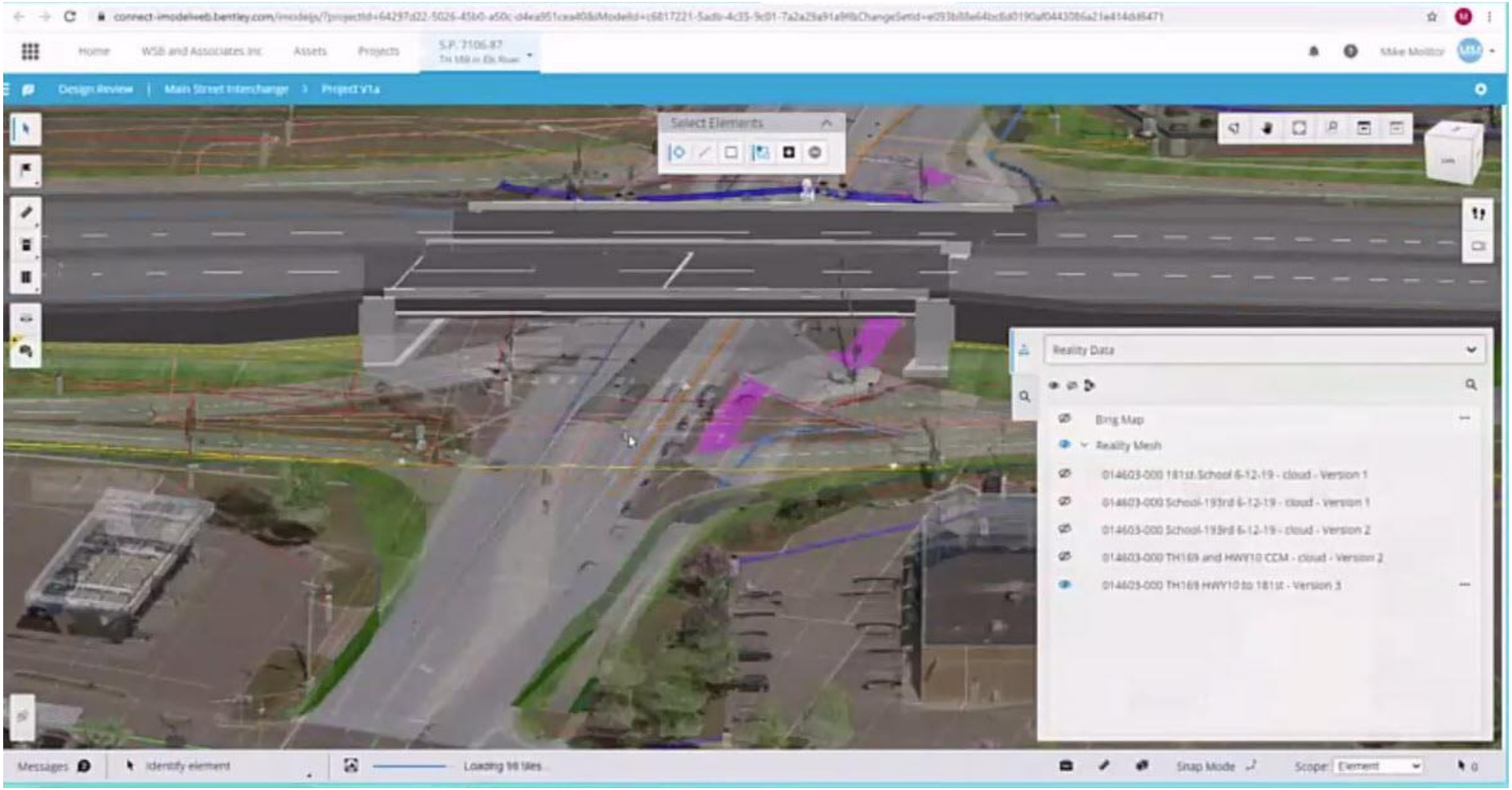
Share



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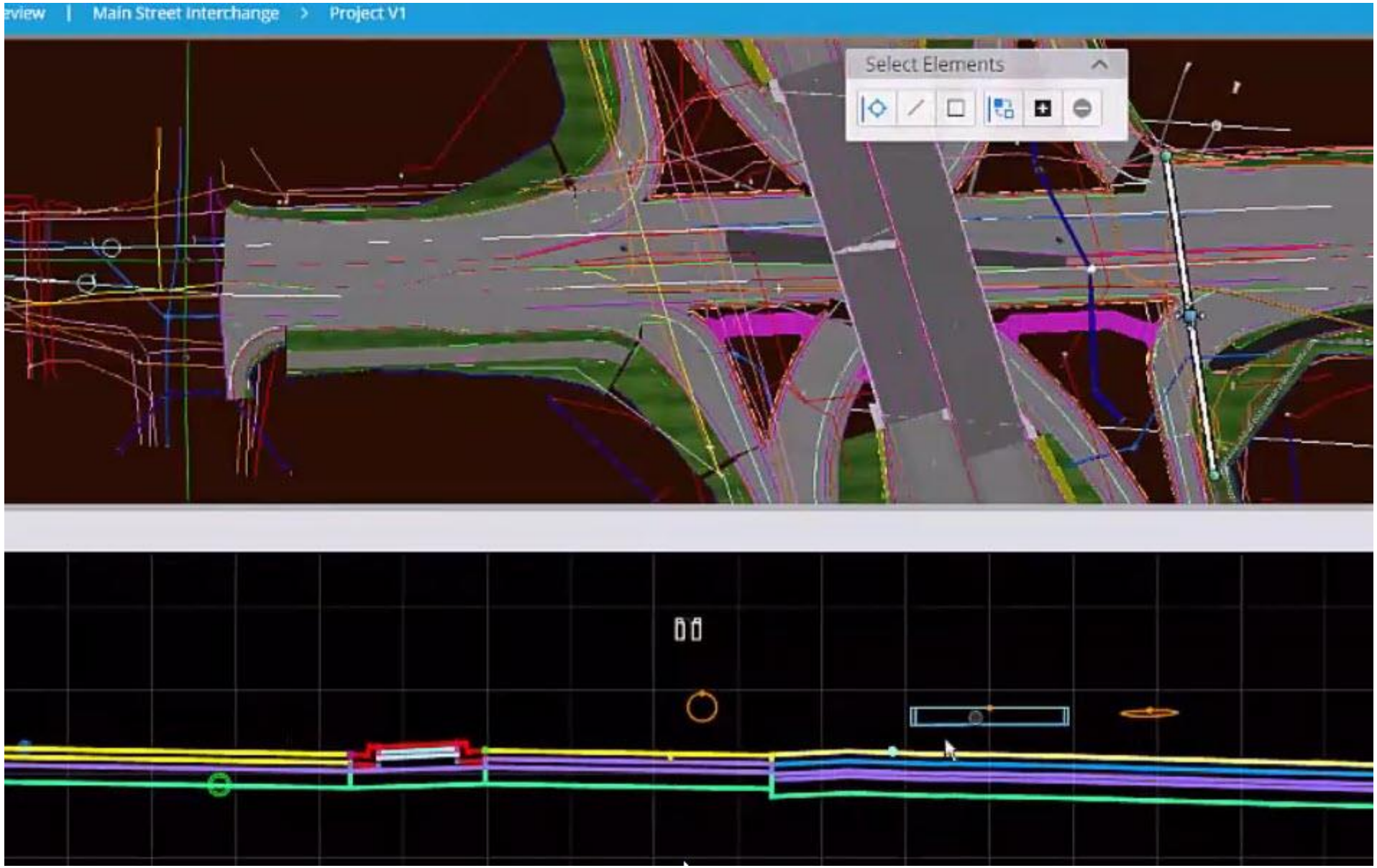

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