TR20425 - Do You Cross the Bridge or Fade Away?

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About Me

- Used AutoCAD ® since release 9
- Teaching since 2000
- Writing courseware since 2007
- Books are sold in 67 different countries
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Class summary

This class will help you to explore preliminary bridge design options by using Bridge Design for InfraWorks 360 software to visualize realistic civil structures in the context of the surrounding proposed site. Then Structural Bridge Design software is used to analyze the bridge in the cloud. We run a line girder analysis to verify the structural strength of the bridge girders and ensure they meet design standard requirements. Next, we take the design into Navisworks software to uncover design problems and constructability issues more effectively and plan the construction sequencing. The Autodesk InfraWorks 360 model is taken into AutoCAD Civil 3D software for precise grading. Then we round-trip the model back into Autodesk InfraWorks 360 for better design communication. This session features Autodesk InfraWorks 360, AutoCAD Civil 3D, and Navisworks Manage.

Key learning objectives

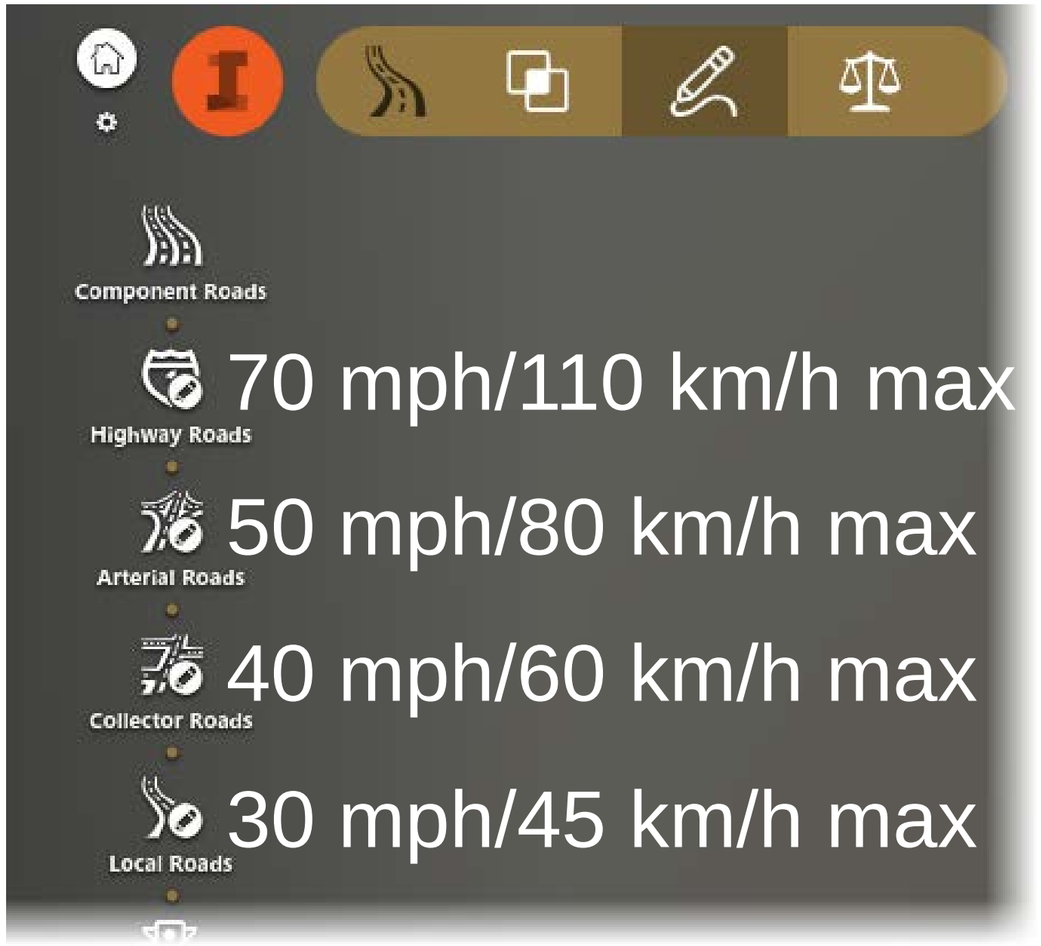
At the end of this class, you will be able to:

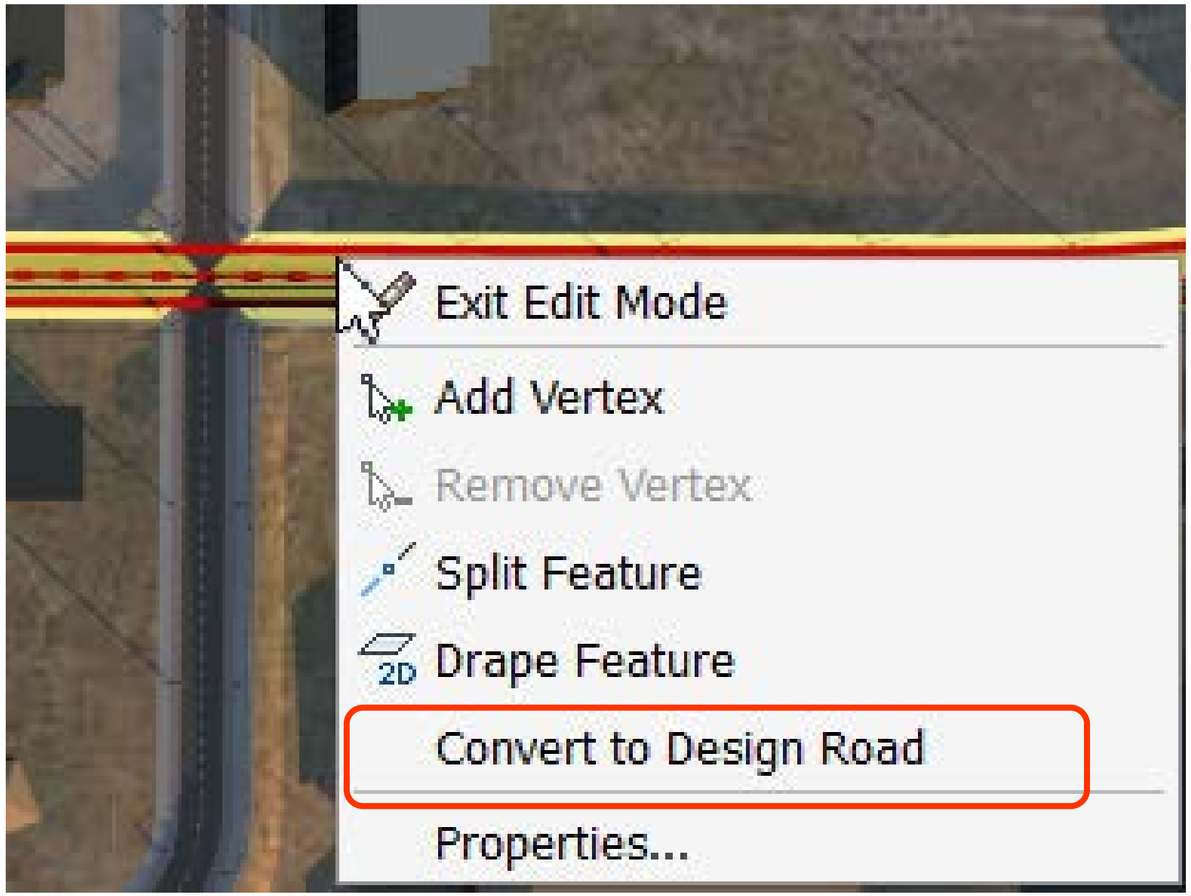
- Create engineered roads of the proposed design.
- Add bridges to design roads using Bridge Design for InfraWorks 360.
- Verify the structural strength of the bridge girders.
- Incorporate design changes from AutoCAD Civil 3D

Create Engineered Roads of the Proposed Design

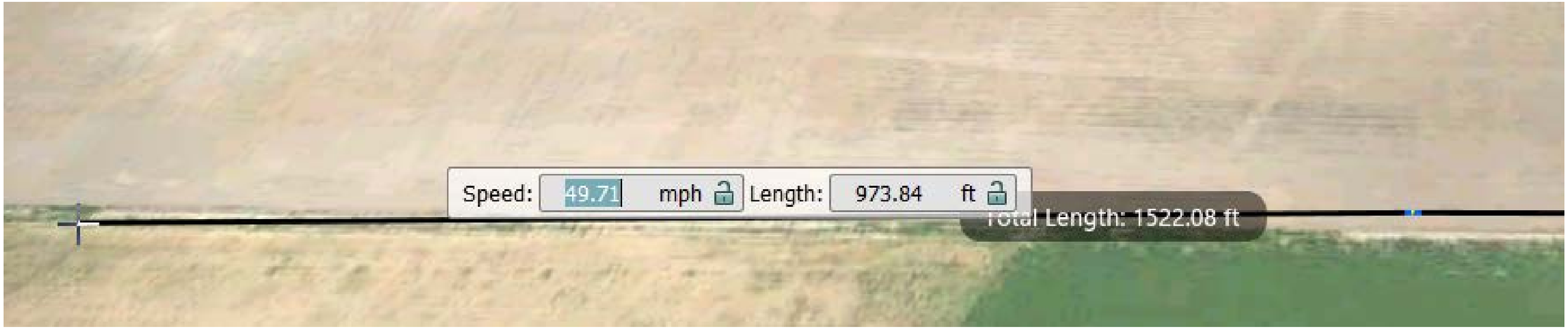
Road Types

In Canvas Tools

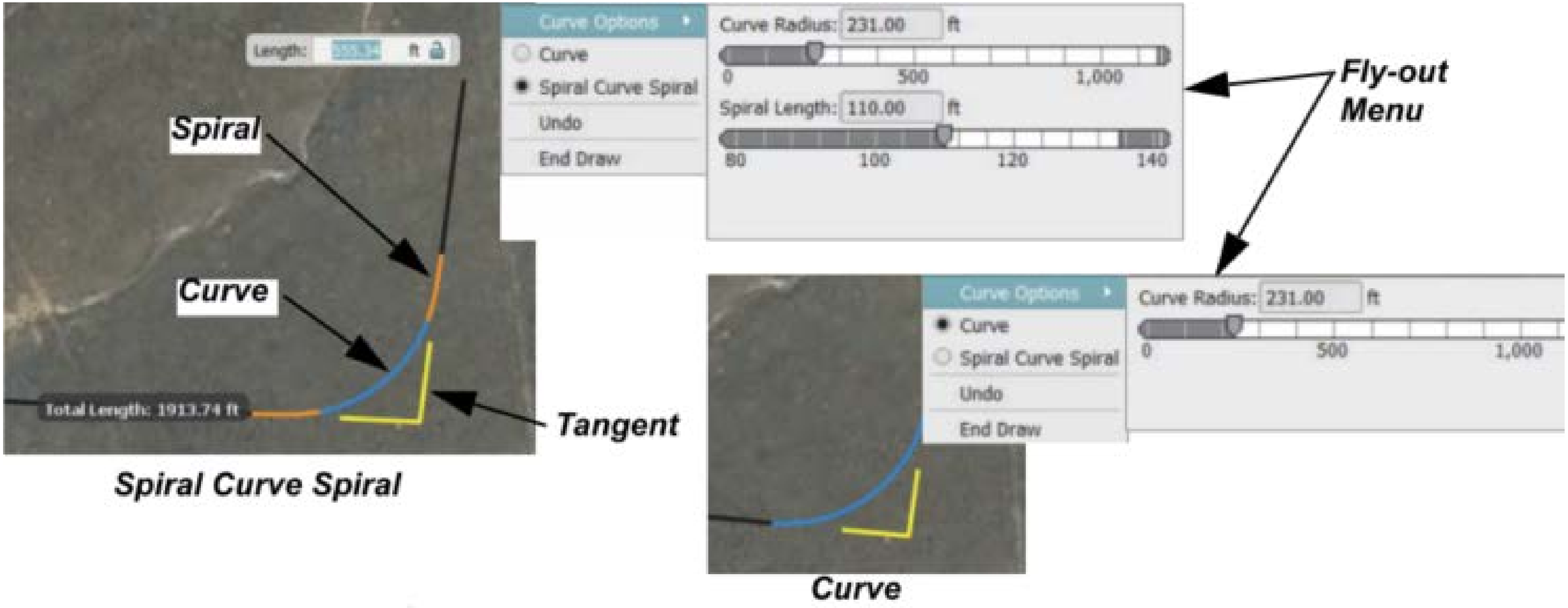




Set the design speed and tangent length



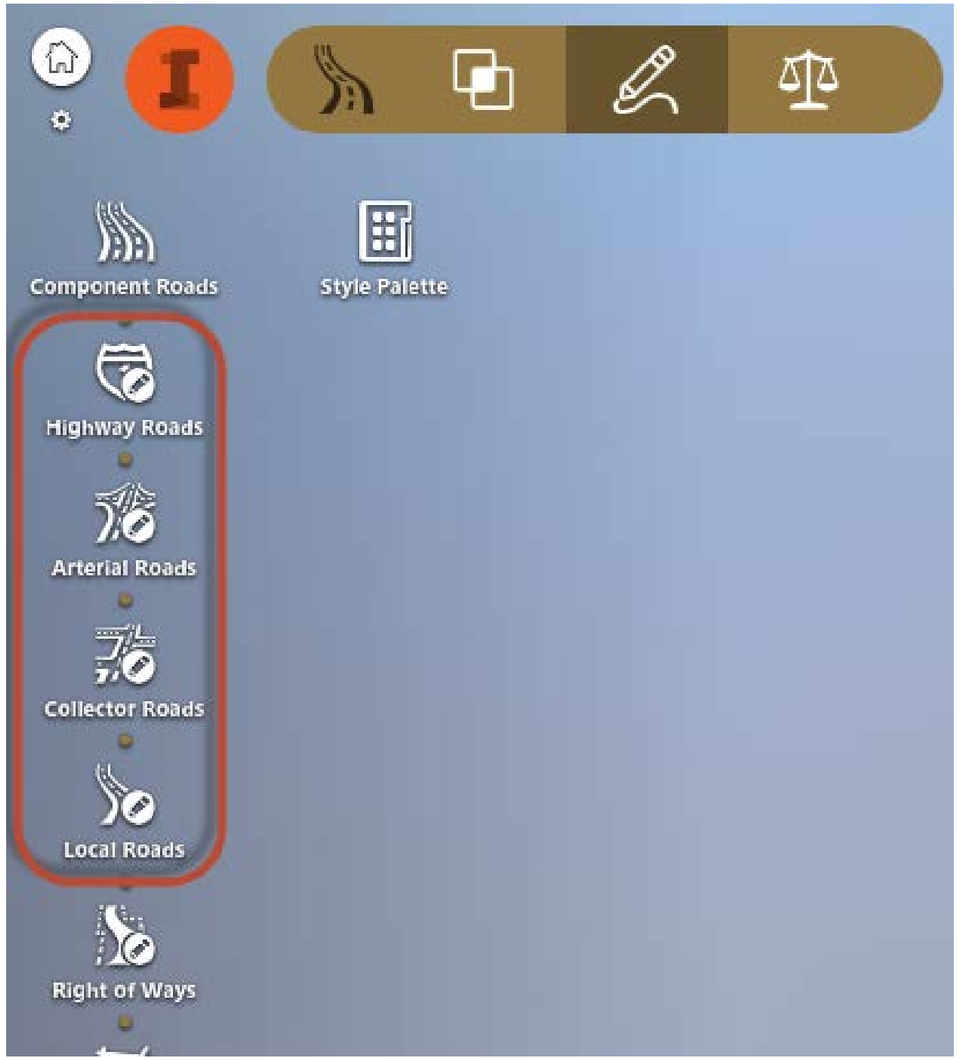
Horizontal curves and spirals



Spiral Curve Spiral

Curve

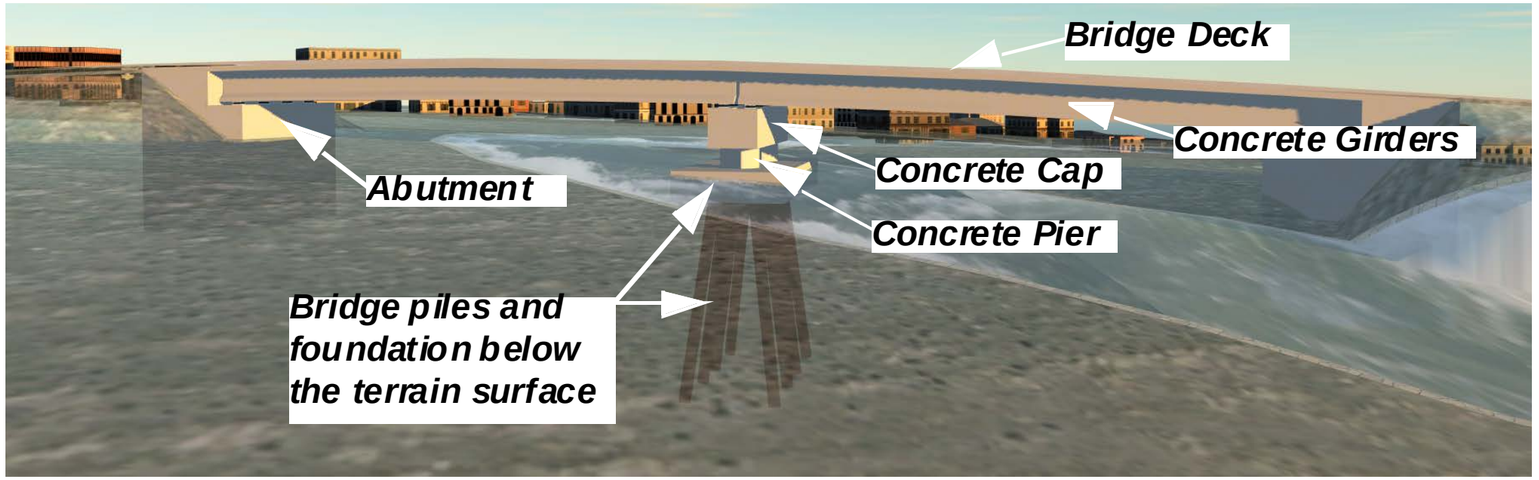
See it in Action

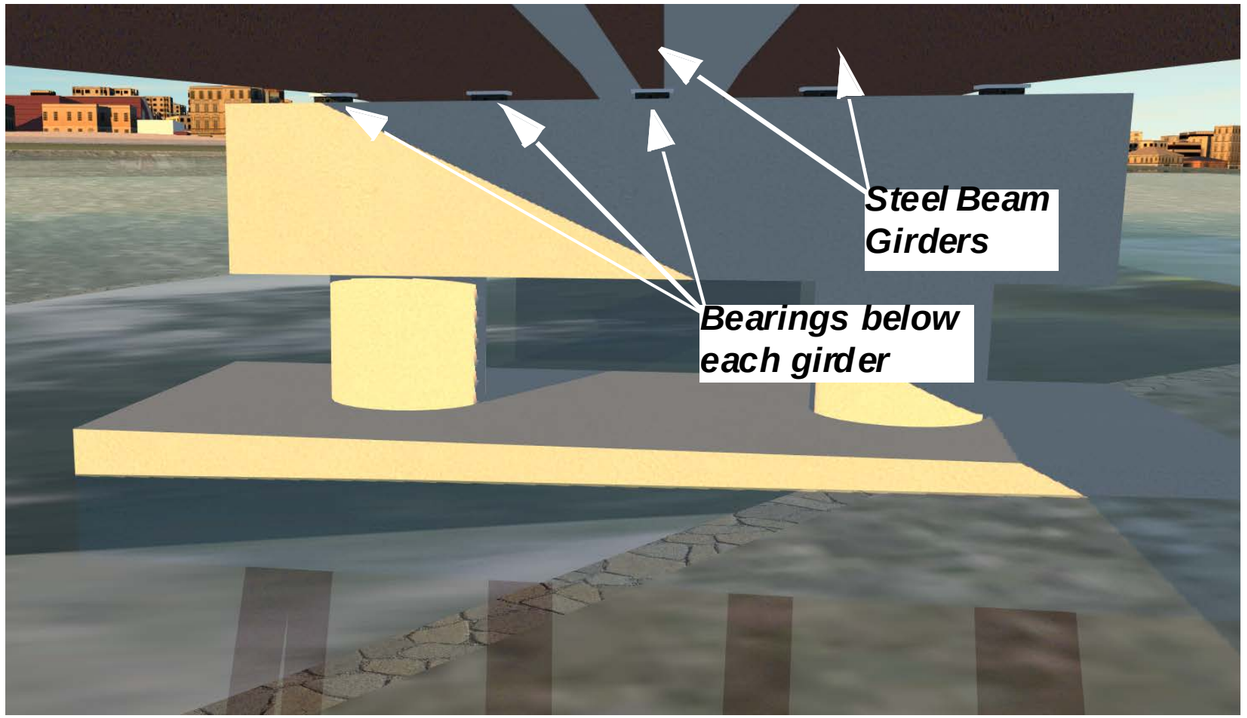


Add Bridges to Design Roads

Bridge Components

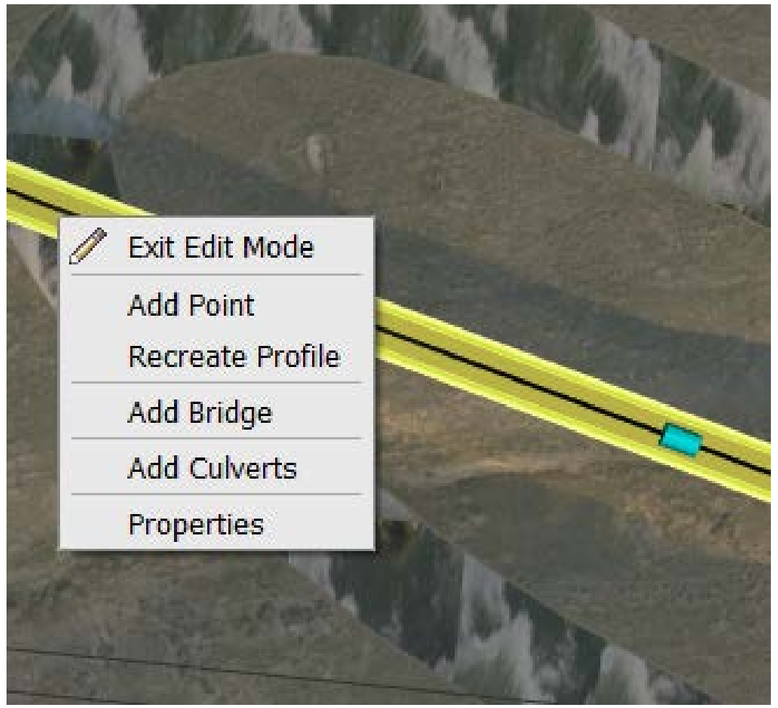
- Deck
- Girders
- Bearings
- Piers
- Caps
- Piles
- Foundation
- Abutment

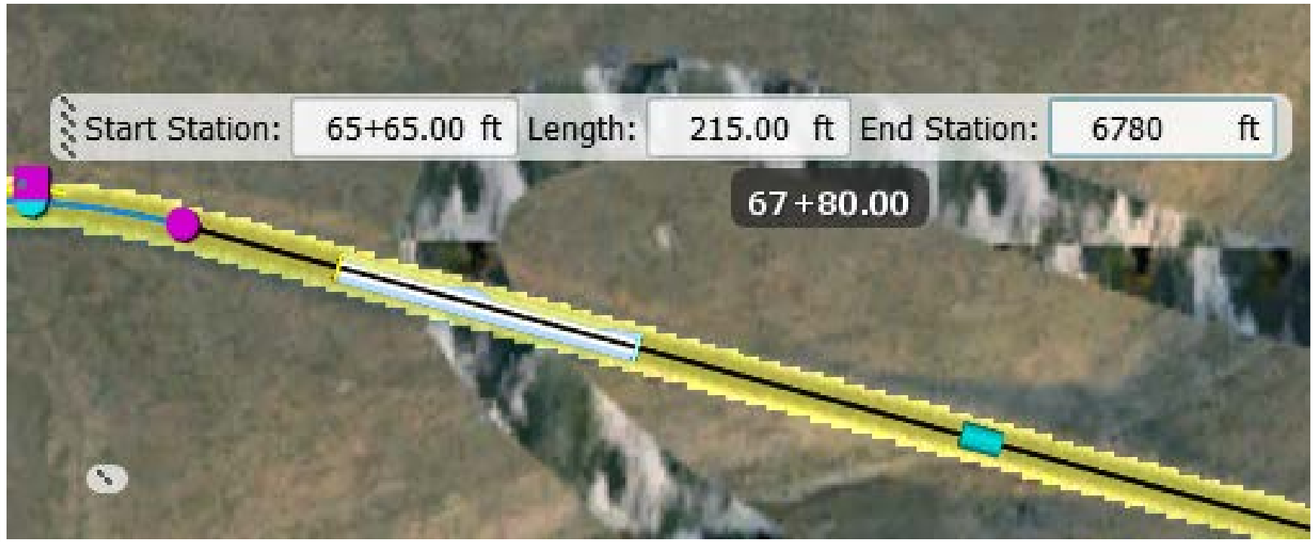




Create Bridges

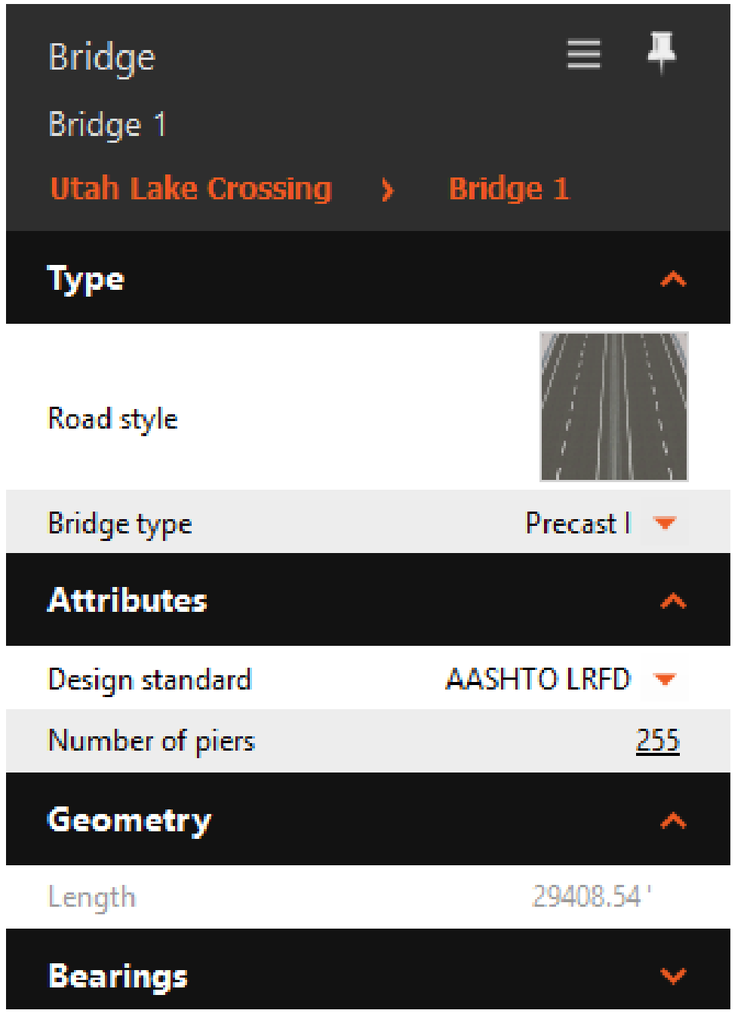
- Select the Design Road and Right-click
- In Canvas Tools
- Set Start and Ending Stations

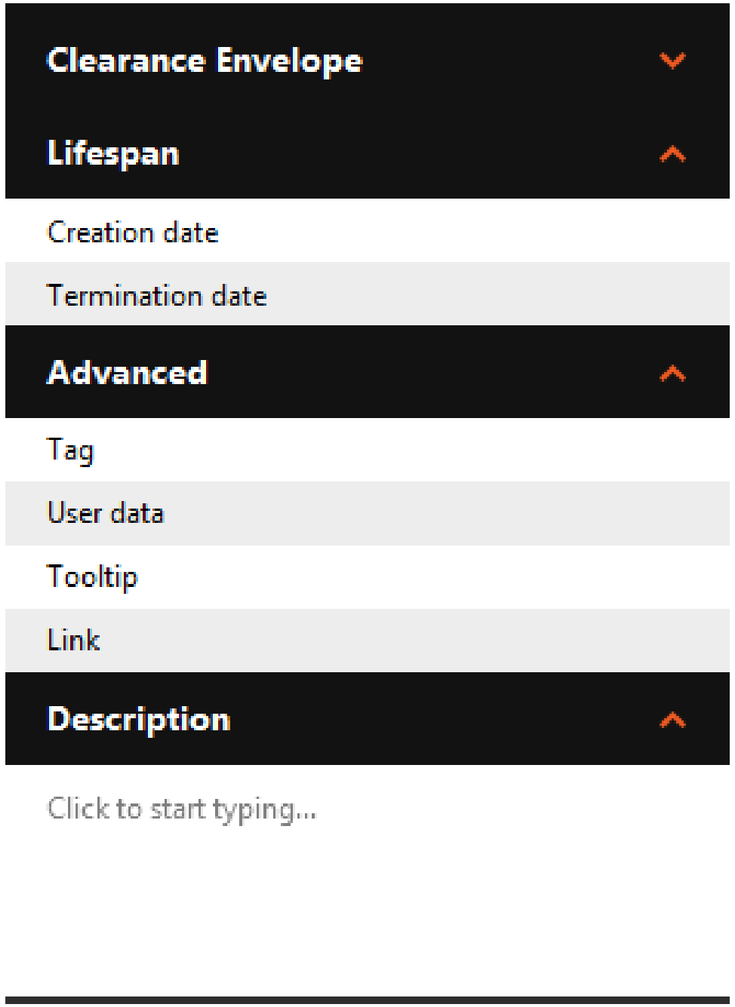




Modify Bridges - Bridge Asset Card

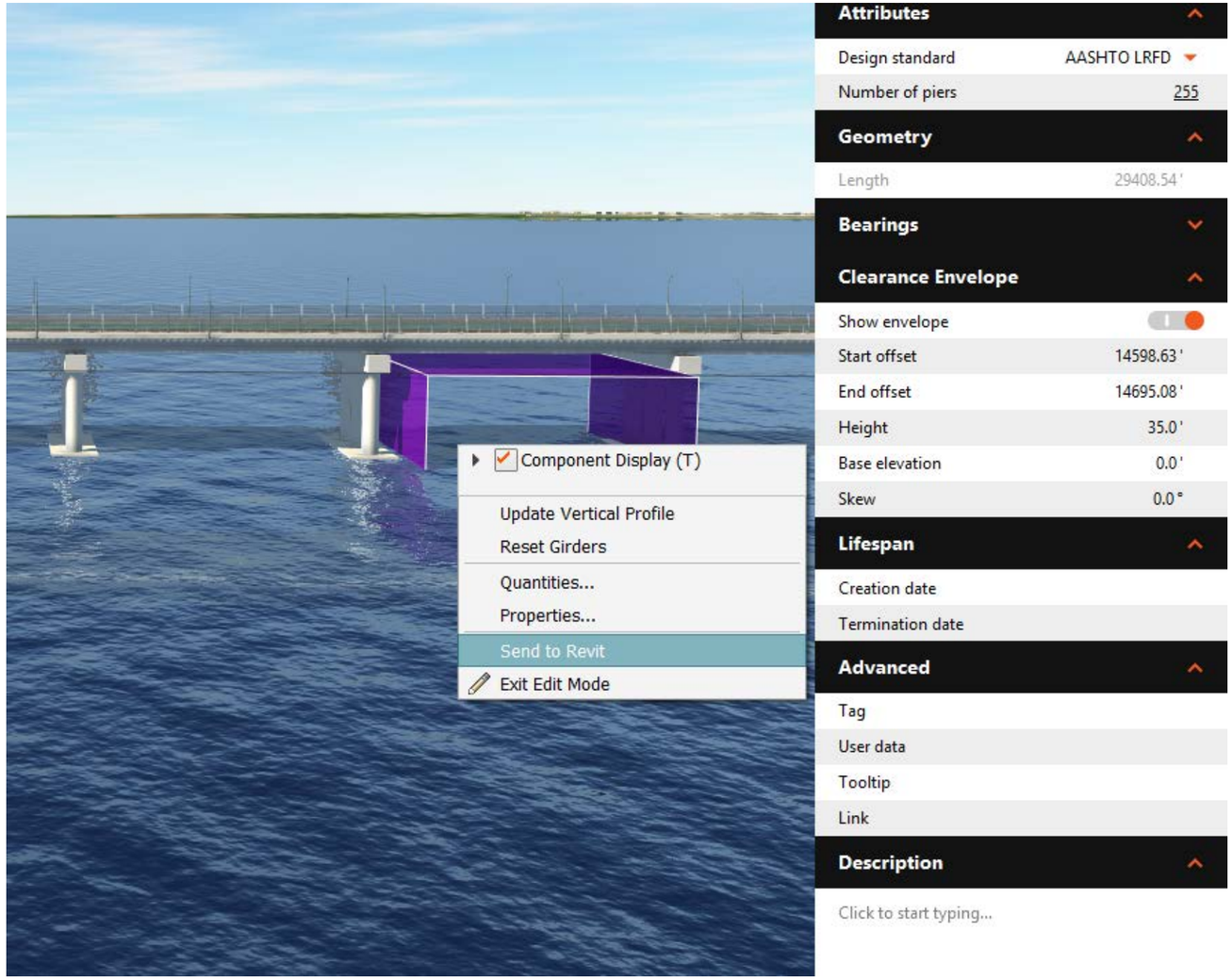
- Change type
- Set # of piers
- Show clearance envelope





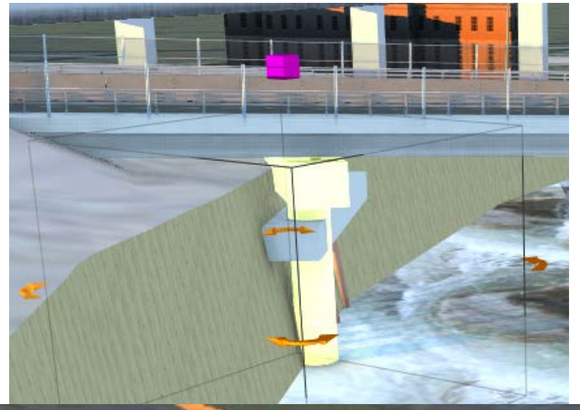
Modify Bridges - Bridge Clearance

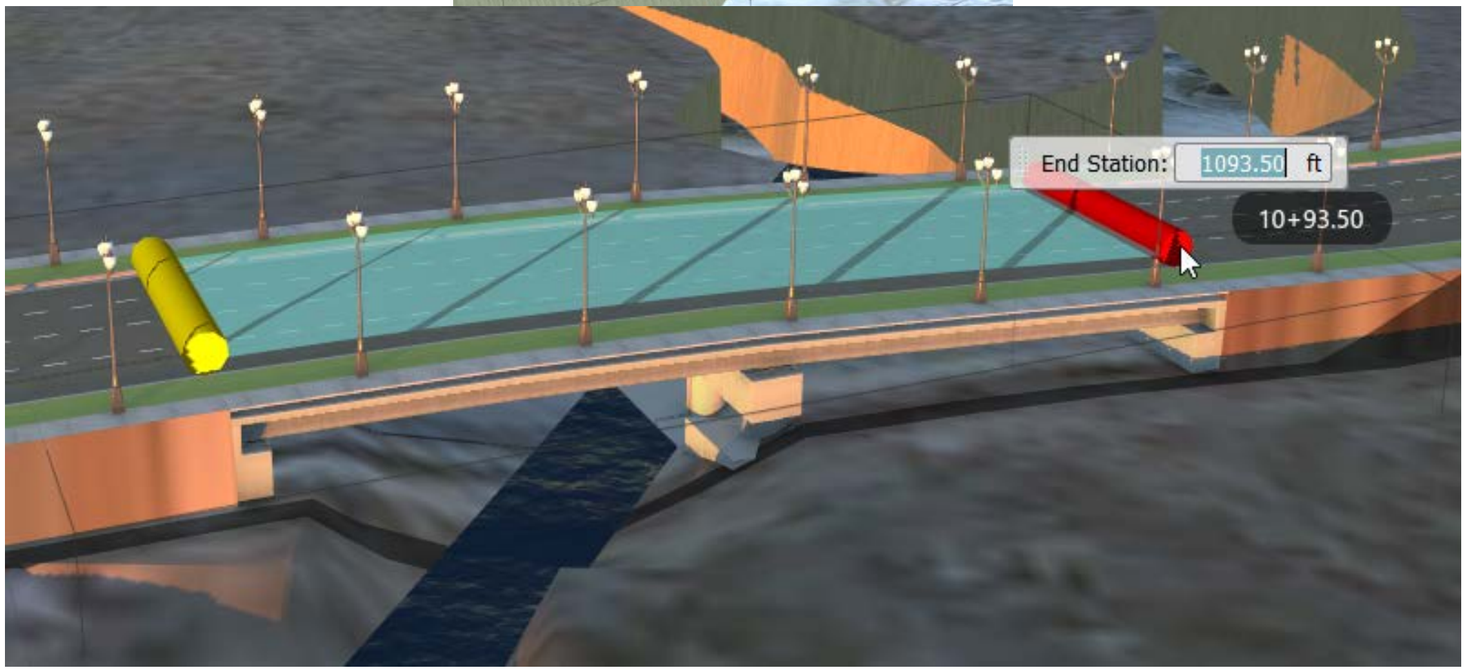
- Show clearance envelope
- Make Adjustments
- Update Vertical Profile



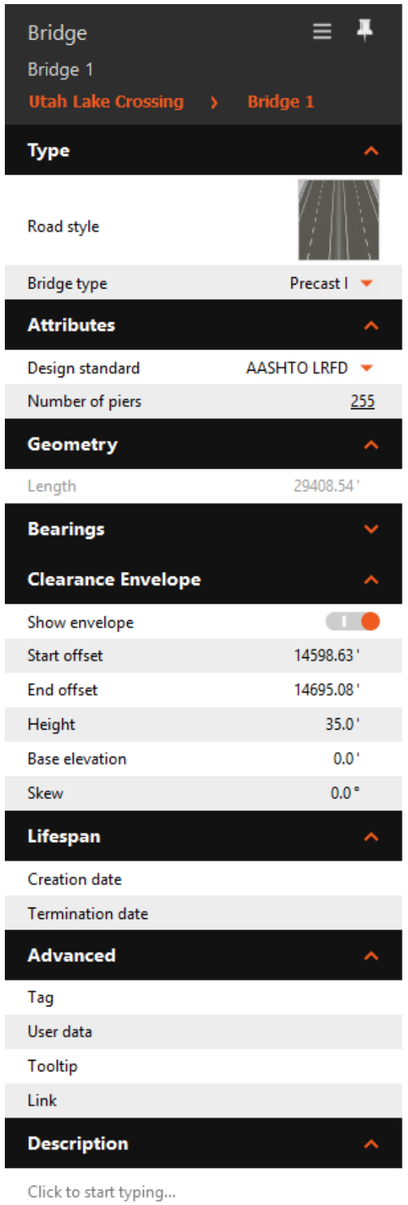
Modify Bridges – Bridge Gizmos

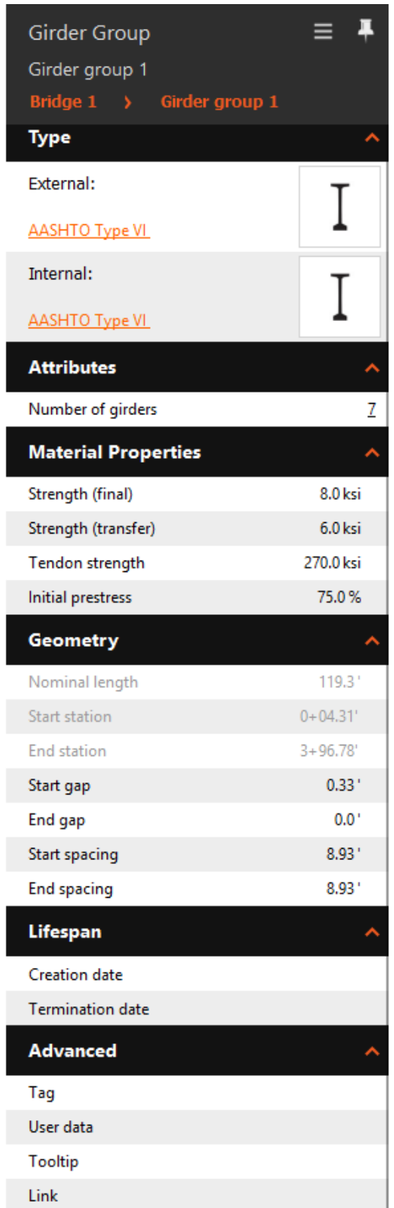
- Using Gizmos
  - Control gizmo
  - Rotate gizmo
    - Start/End gizmos

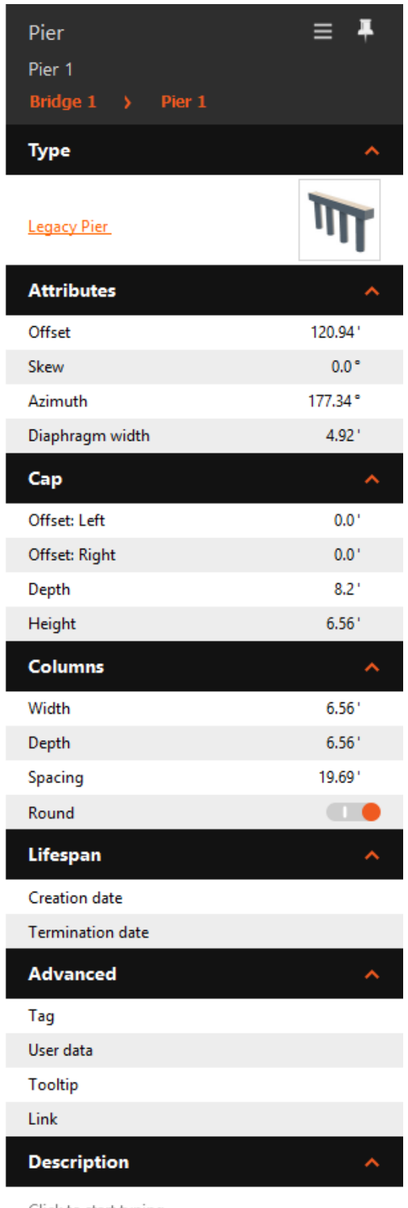




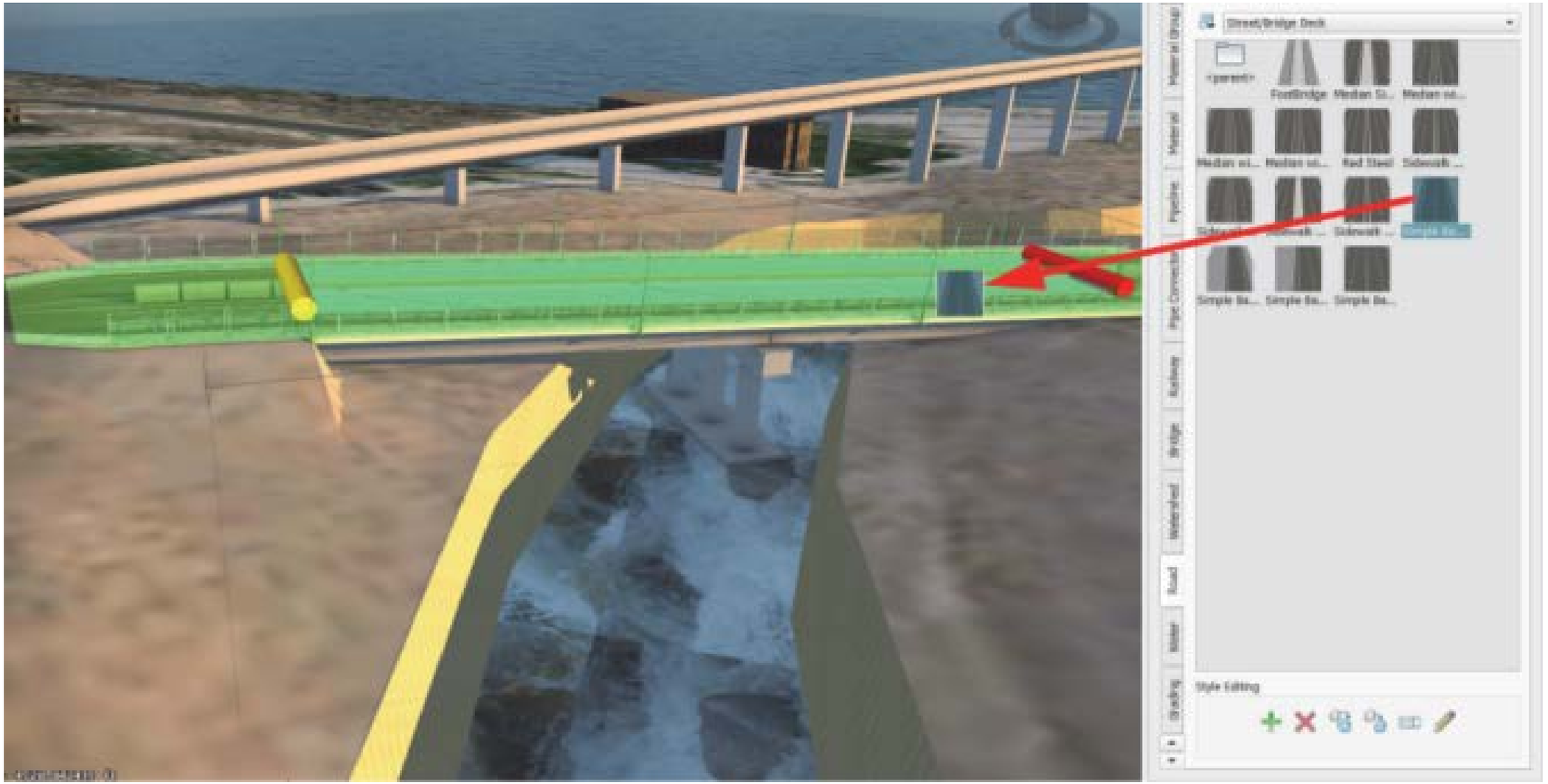
Modify Bridges – Bridge Stack



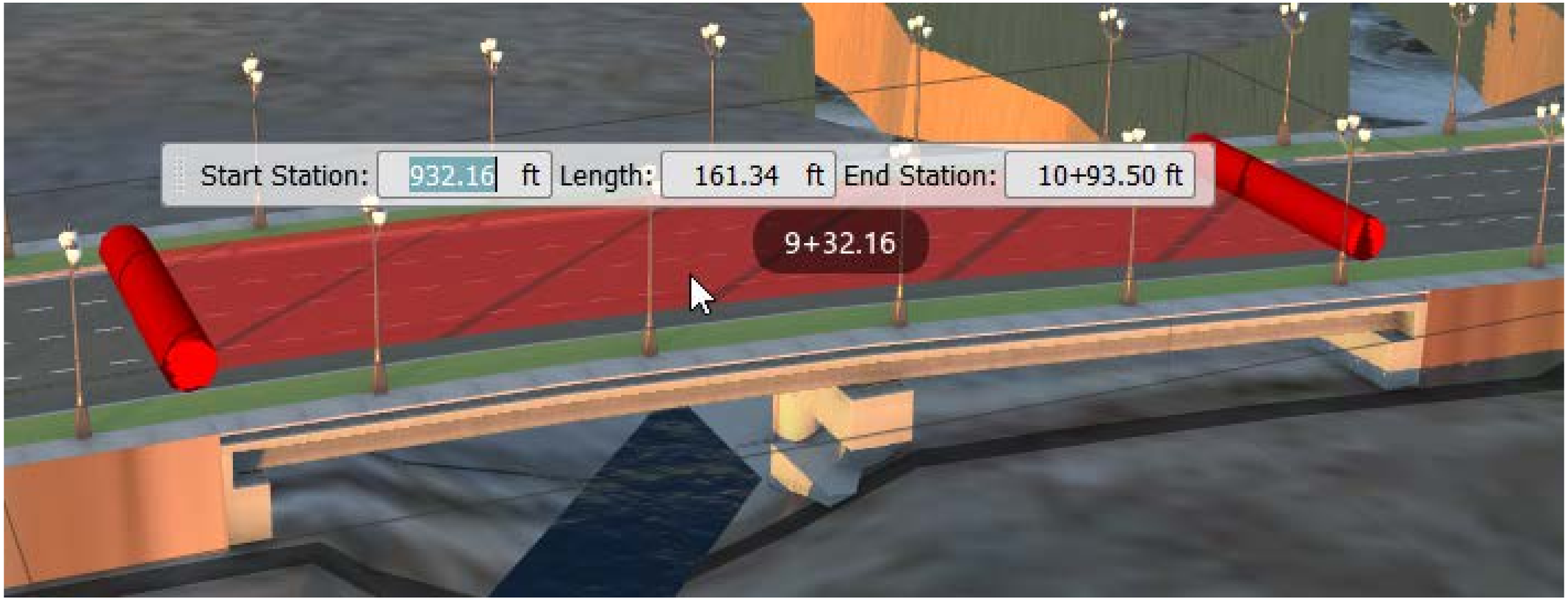




Modify Bridges – Style Palette



See it in Action

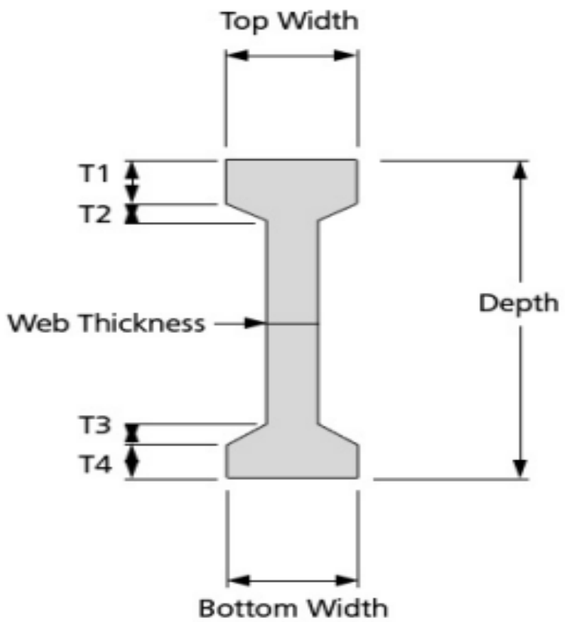


Verify the Structural Strength of the Bridge Girders

Girders

- Girder asset card

Concrete Girder



Girder Group

Girder group 3

Bridge 1 › Girder group 3

Type

External:

AASHTO Type VI

Internal:

AASHTO Type VI

Attributes

Number of girders	7

Material Properties

Strength (final)	8.0 ksi
Strength (transfer)	6.0 ksi
Tendon strength	270.0 ksi
Initial prestress	75.0 %

Geometry

Nominal length	114.83 '
Start station	7+73.51'
End station	11+50.25'
Start gap	0.0 '
End gap	0.0 '
Start spacing	8.93 '
End spacing	8.93 '

Lifespan

Creation date

Termination date

Advanced

Tag

User data

Tooltip

Link

Description

Girder

Left exterior

Girder group 3 › Left exterior

Type

AASHTO Type VI

Attributes

Length	114.83 '
Start offset	-26.78 '
End offset	-26.78 '

Section Dimensions

Top width	3.5 '
Bottom width	2.33 '
Depth	6.0 '
Web thickness	0.67 '
T1	0.42 '
T2	0.33 '
T3	0.83 '
T4	0.67 '

Lifespan

Creation date

Termination date

Advanced

Tag

User data

Tooltip

Link

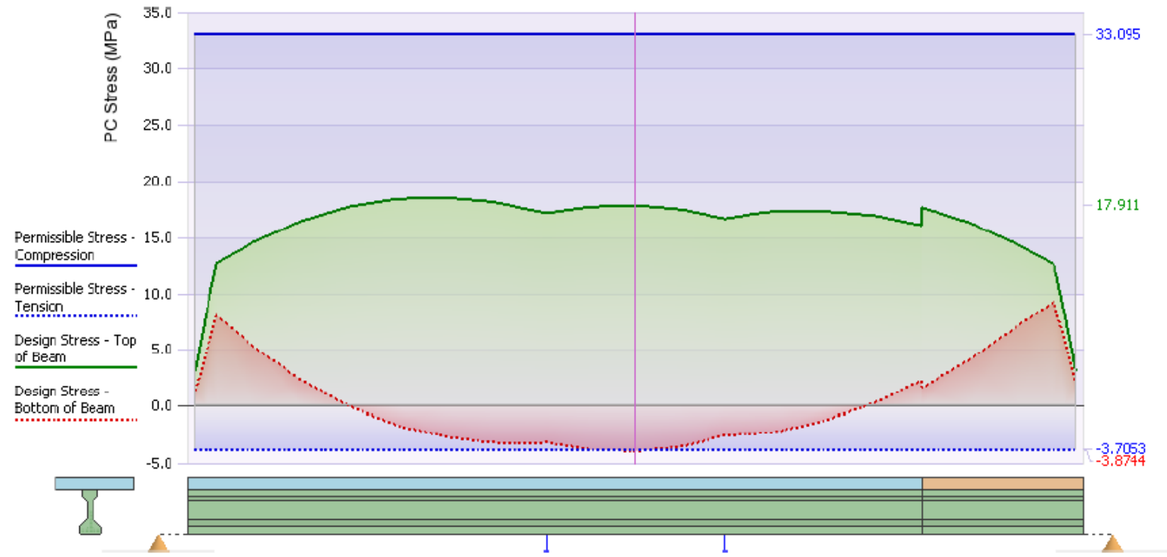
Description

Click to start typing...

Girder Analysis

- Verify structural strength of concrete bridge girders
  - Show results in model
  - Get Full Report (uses cloud credits)

Girder Design Calculations: Live Load Bending



Effects ignored within 0.2m from each beam end.

Performance ratio = -3.87 / -3.71 = 1.05

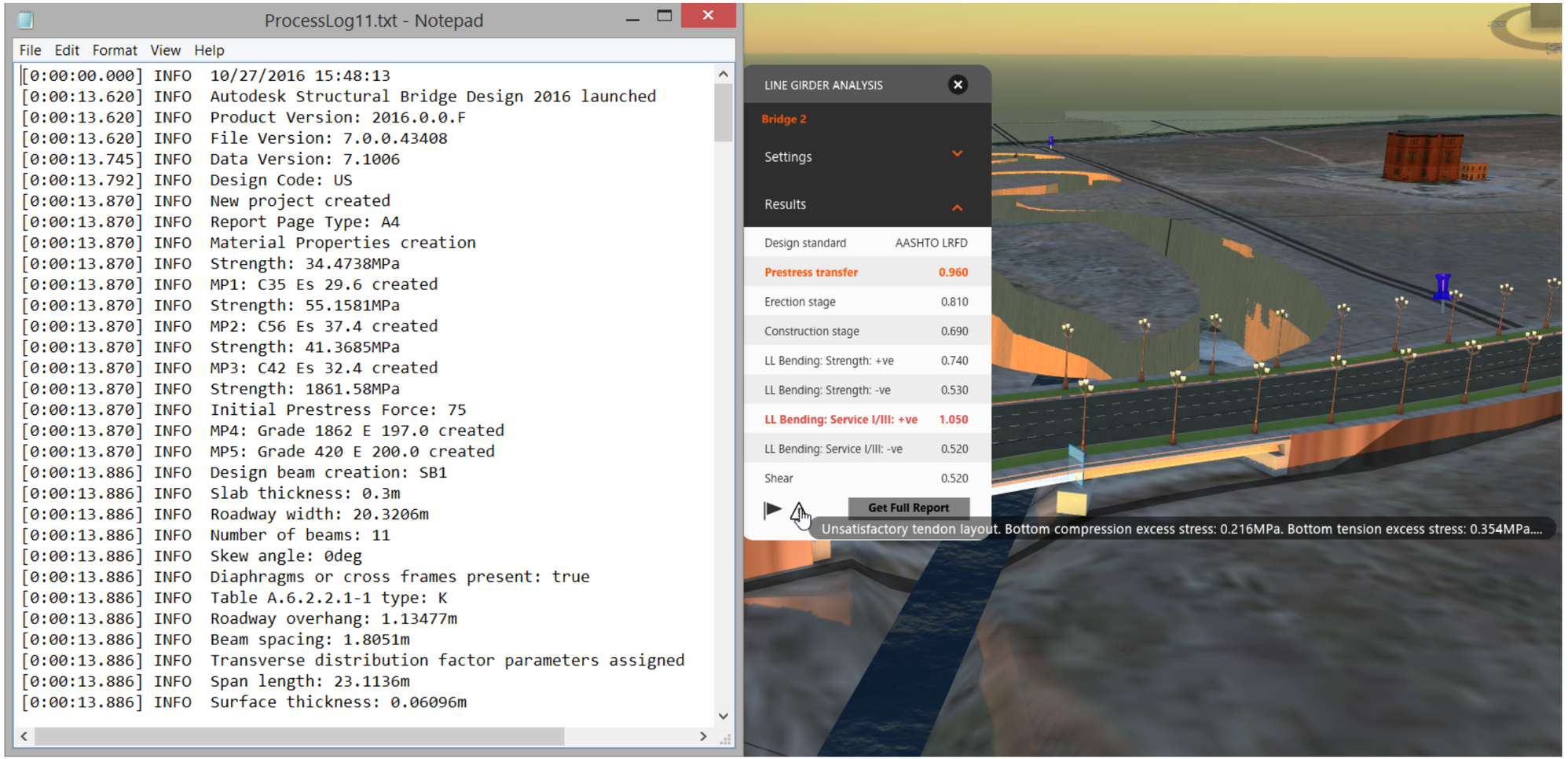
Section details:

Ref 1 "Section 1"
at 0.5 x span = 0.5 x 23.1136 = 11.5568 m from left end of beam

Design Code:

AASHTO LRFD Bridge Design Specifications
Sixth Edition with 2013 Interim Revisions

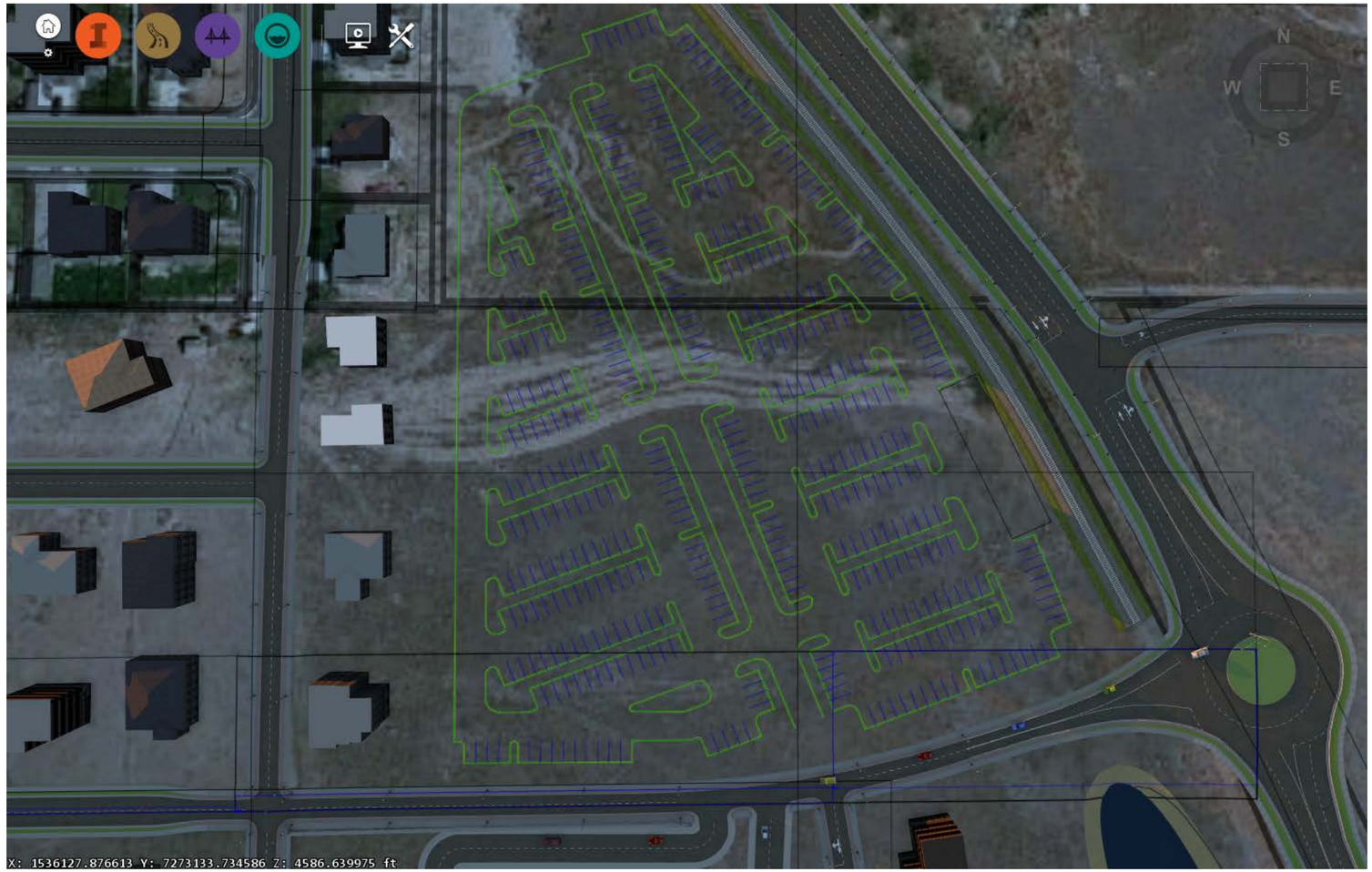
See it in Action



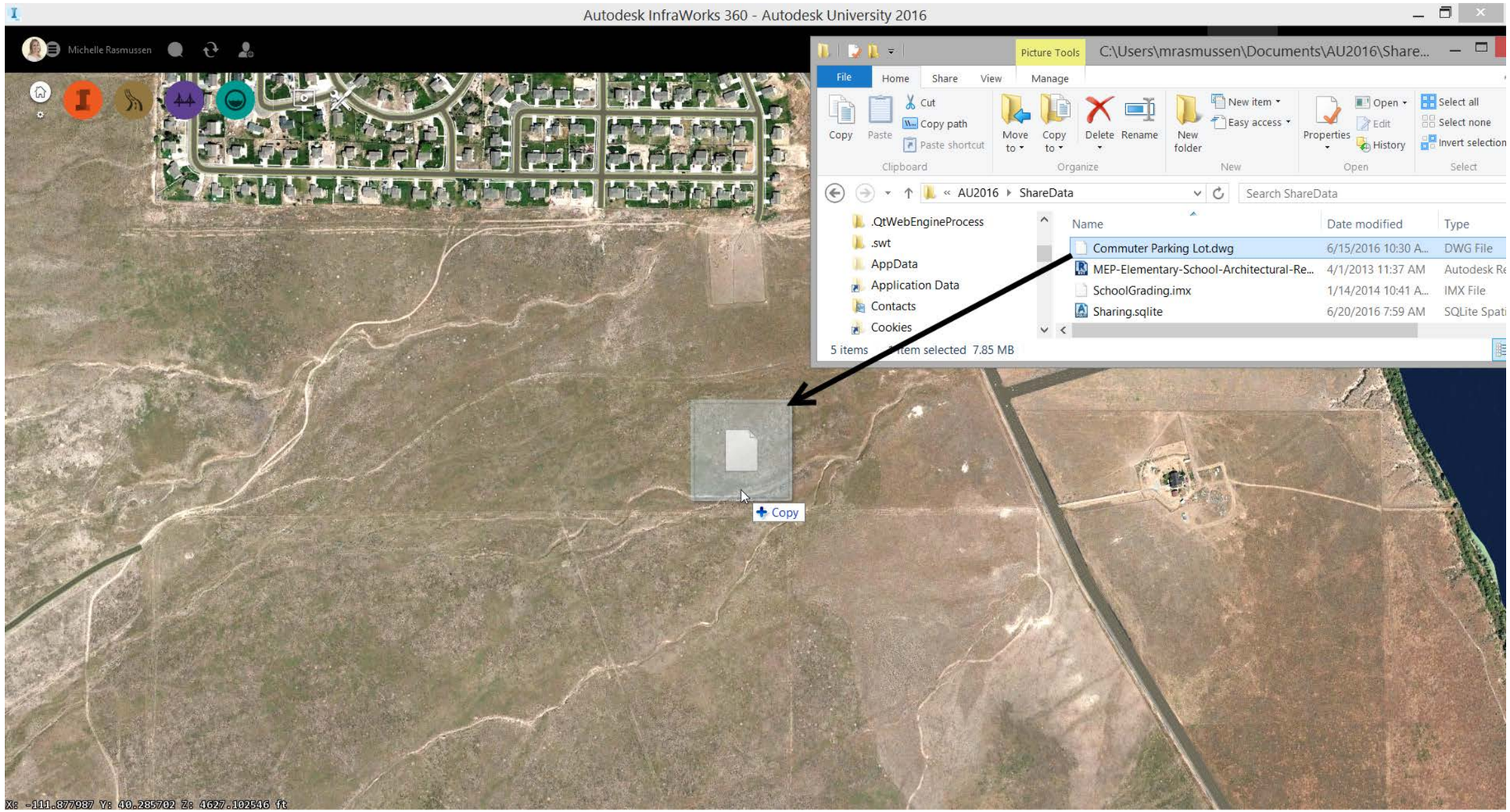
Incorporate design changes from AutoCAD Civil 3D

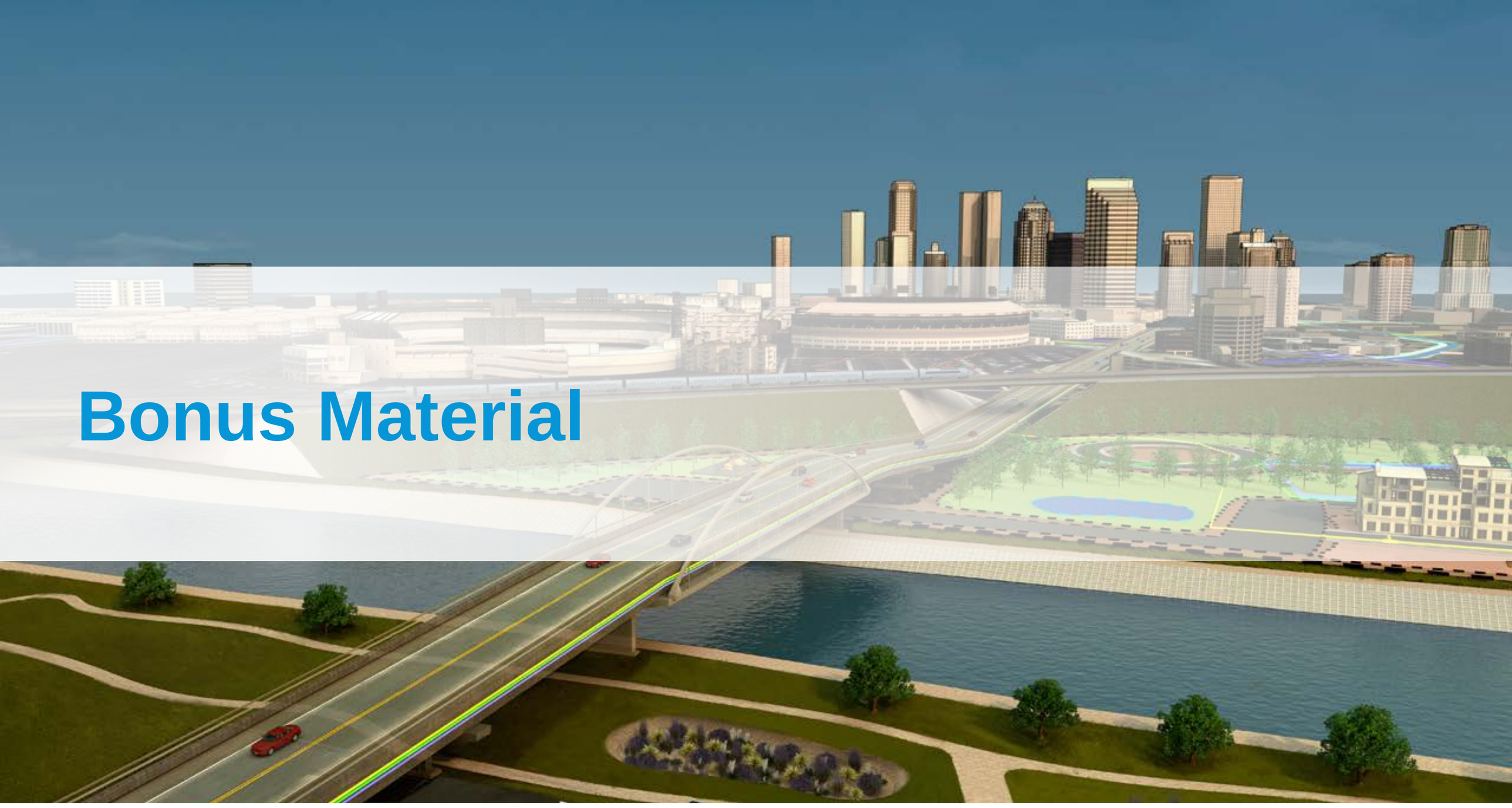
Overlay or Import

- Import
  - Corridors
  - Surfaces
  - Pipes
  - Pipe Networks
- Overlay
  - Linework



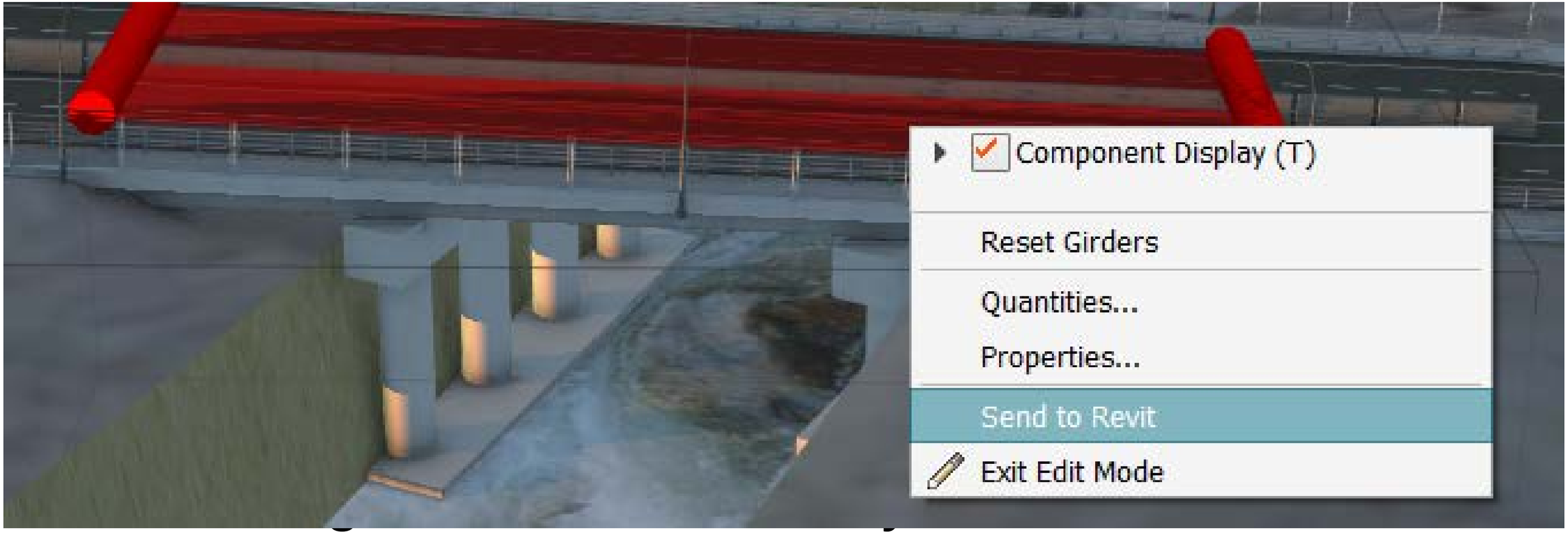
See it in Action





Bonus Material

Take the Bridge into Revit



See it in Action

Take the Design into Navisworks

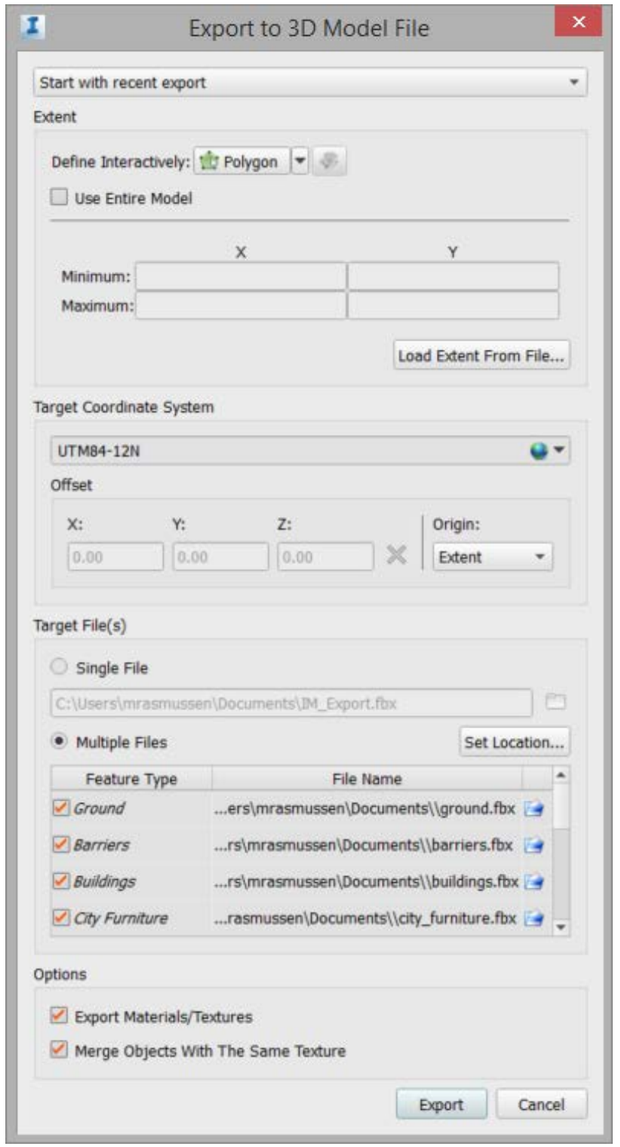
- Two options:
  - First, take it into AutoCAD Civil 3D.
  - Export a 3D Model which you can append to the Navisworks file.

Screencast

Export the Autodesk InfraWorks 360 Model to Navisworks

Export an FBX file

- Define the area to export
- Set the Target Coordinate System
- Determine if you want one file or many
- Click Export.



See it in Action

How did I do?

At the beginning of this class, I said you will be able to do the following:

- Create engineered roads of the proposed design.
- Add bridges to design roads using Bridge Design for InfraWorks 360.
- Verify the structural strength of the bridge girders.
- Incorporate design changes from AutoCAD Civil 3D

Bonus Material:

- Take the Bridge into Revit
- Take the Design into Navisworks

Let Autodesk Know What You Thought

- Your class feedback is critical. Fill out a **class survey** now.
- Use the AU mobile app or fill out a class survey online.
- Give feedback after each session.
- AU speakers will get feedback in real-time.
- **Your feedback results in better classes and a better AU experience.**

Workout With Me and Pinky & Proppy

- When: Today at 6:00
- Where: Canyon Ranch Spa
- Cost: $25 which goes to charity

- Party Bus: 9:00 pm
- Cost: $75