

2D Hydraulic Modeling Webinar Series

SMS 14 New Release Feature Highlights &

Example Bridge and Culvert Applications

August 11, 2026

AQUAVEO®



**TRANSPORTATION
HYDRAULICS
— SOLUTIONS —**

2D Hydraulic Modeling Webinar Series Objectives

- Highlight best practices in 2D modeling for transportation hydraulics
- Showcase new features and capabilities in SMS/SRH-2D
- Share examples of 2D modeling applications
- Compare SRH-2D and HEC-RAS 2D modeling approaches
- Provide an open forum for questions and other insights

Agenda

- 2D Hydraulic Modeling Webinar Series Page and Resources
- Current version of SMS/SRH-2D
- Training opportunities
- **SMS 14 New Release Feature Highlights**
- **Bridge and Culvert Modeling Examples**

2D Hydraulic Modeling Webinar Series Page

<https://aquaveo.com/software/sms/srh2d-hydraulic-modeling-webinar-series>

- Sign up to receive future webinar invites
- SMS Hot Keys and Tips
- Sample Theme file
- Presentation slides and recording links
- PDH certificate
- Modeling resources



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Transportation Hydraulics Webinars Modeling Resources Mailing List

2D Hydraulic Modeling Webinar Series

Aquaveo LLC and Transportation Hydraulics Solutions LLC have partnered to deliver a new **2D Hydraulic Modeling Webinar Series** designed to help engineers enhance their modeling capabilities and understanding of transportation hydraulics.

This ongoing series will:

- **Highlight best practices** in 2D modeling for transportation hydraulics, with emphasis on detailed bridge and culvert hydraulics and bridge scour analyses.
- **Showcase new features and capabilities** in SMS/SRH-2D for transportation-related hydraulic applications.
- **Compare SRH-2D and HEC-RAS 2D modeling approaches** for bridge hydraulics and scour analysis, explaining best practices and potential differences in results.
- **Provide an open forum** for both new and experienced 2D modelers to ask questions, share insights, and suggest ideas for future improvements and developments.

Webinars are offered quarterly.
To receive invitations to upcoming sessions, please **sign up for the 2D Modeling Webinar Series mailing list** (see form to the right).

Questions or suggestions for future webinar topics?
Email Scott Hogan: scott.hogan@transportationhydraulics.com.

Webinar Resources

- [SMS Hot Keys and Helpful Tips](#)
- [Sample Theme File](#)

2D Modeling Webinar Series Mailing List

Please sign up to receive invites to future webinars

First Name *

Last Name *

Email Address *

☐ I'm not a robot

Submit

Webinar Recording Links, Slides and PDHs Certs.

Training Opportunities

2D Hydraulic Modeling For Transportation Hydraulics (2DHM)

- Virtual Course September 8-11
- Additional virtual and in-person courses available on request



Applied Bridge Scour Training:

From Modeling to Mitigation: An Applied Bridge Scour Master Class

- October 27-29: Lakewood CO
- Virtual Course: December 1-3, 8-10



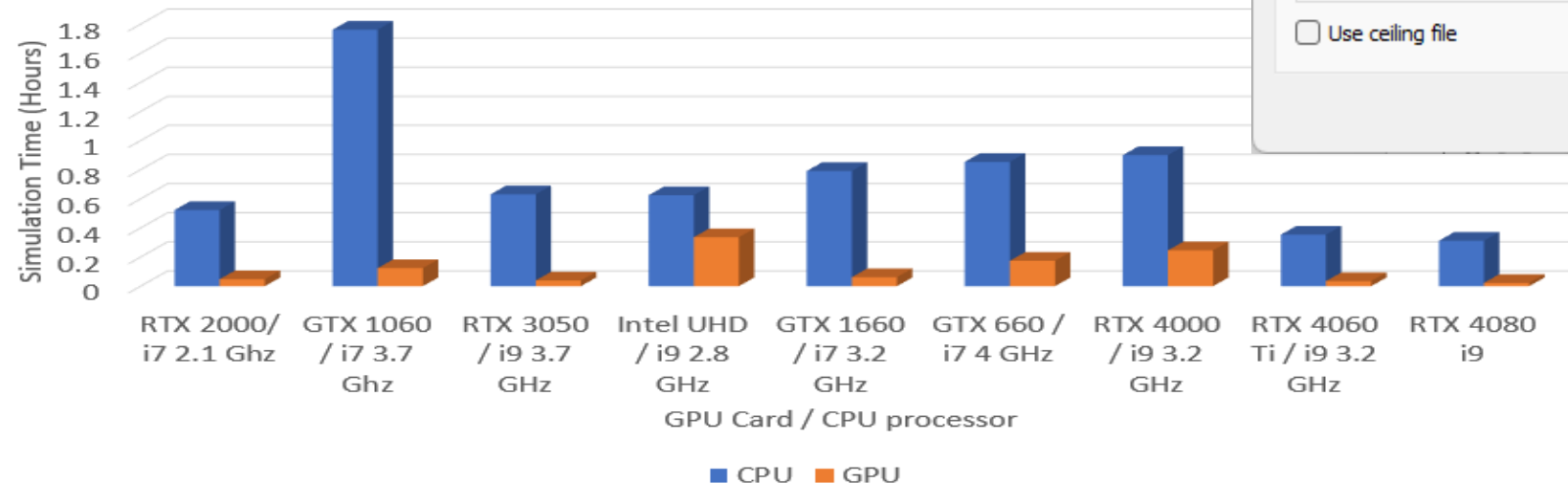
SMS Current Release

- SMS 14.0.3 / SRH-2D v4.0 Build date: August 4, 2026
- New and updated features
 - GPU processing
 - Quick Display Options
 - Undo /redo support
 - Simulation Summary Reports
 - Updates to the Project Explorer folder/tree
 - NLCD coverage for SRH-2D material types
 - Variable Contour Range Display
 - Profile plots along any arc
 - Enhancements to 3D Structures
 - Feature extraction improvements
 - Hydraulic structure summaries
 - Map coverage elevation overrides
 - Select item in project
 - Tool Favorites

SMS 14 Feature Highlights

GPU computing

- Select under Model Control
- Approximately 5-15x speedup (dependent on GPU)
- Refer to May 13, 2026 [webinar](#) for more details



SRH2D Model Control

General Output Advanced Sediment

Simulation description:

Description

Case name:

Case

Compute device:

NVIDIA RTX 2000 Ada Generation Laptop GPU

Start time (hours):

0.0

Time step (seconds):

2.0

End time (hours):

7.0

Initial condition

Automatic

☐ Use ceiling file

OK Cancel Help

SRH-2D GPU Performance Evaluation

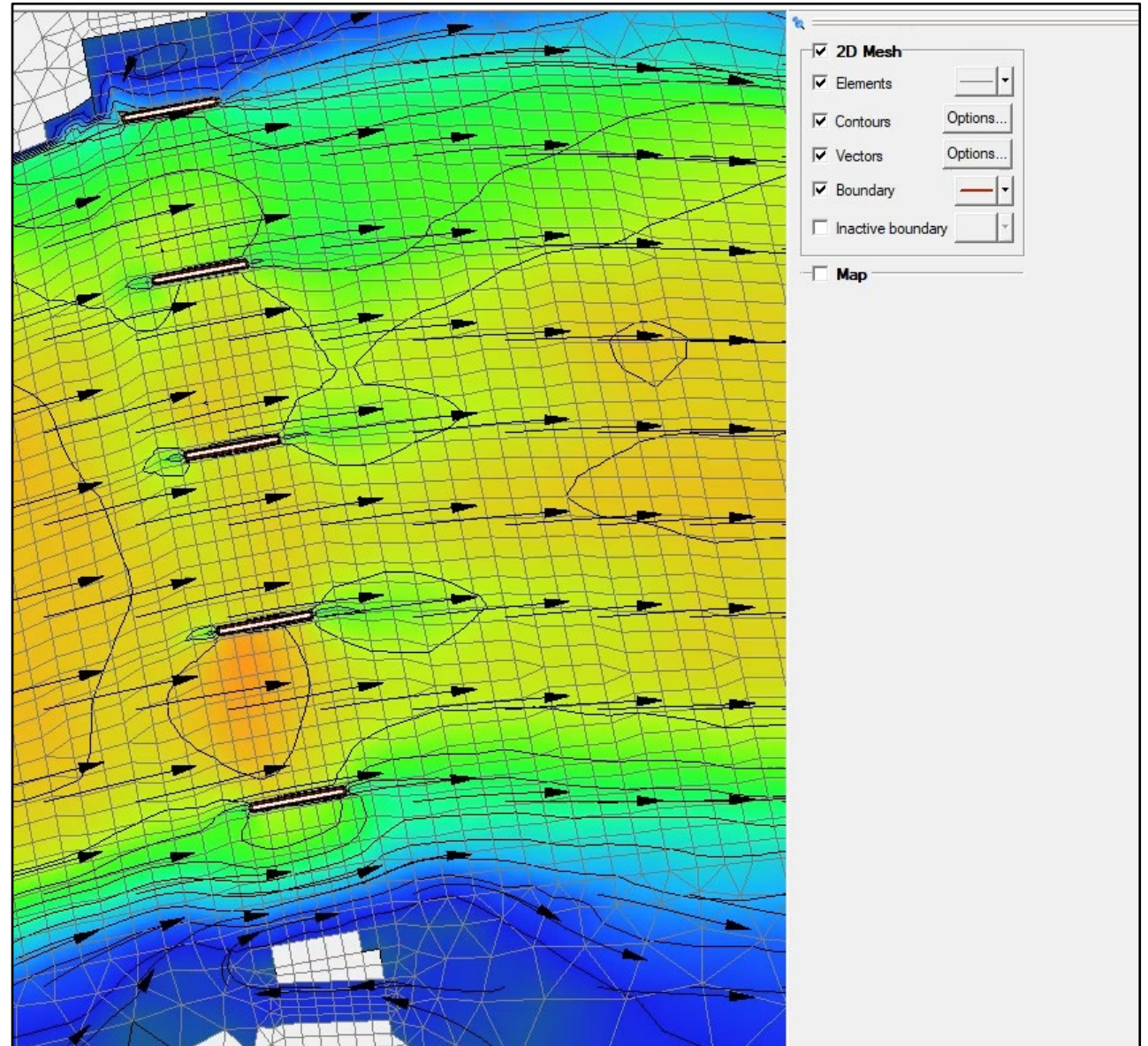
Key Findings

- Observed GPU acceleration reached 18.6x.
- Average speedup across valid test cases was approximately 7.7x
- Highest acceleration factors were observed on newer RTX 4080 and RTX 4060 Ti hardware.
- Lower-end or older GPUs provided smaller gains and in isolated cases showed little or no benefit.
- Performance gains varied by mesh size, wet element count, and problem complexity.
- GPU acceleration appears most valuable for large production models and long-duration simulations.

SMS 14 Feature Highlights

Quick Display Options

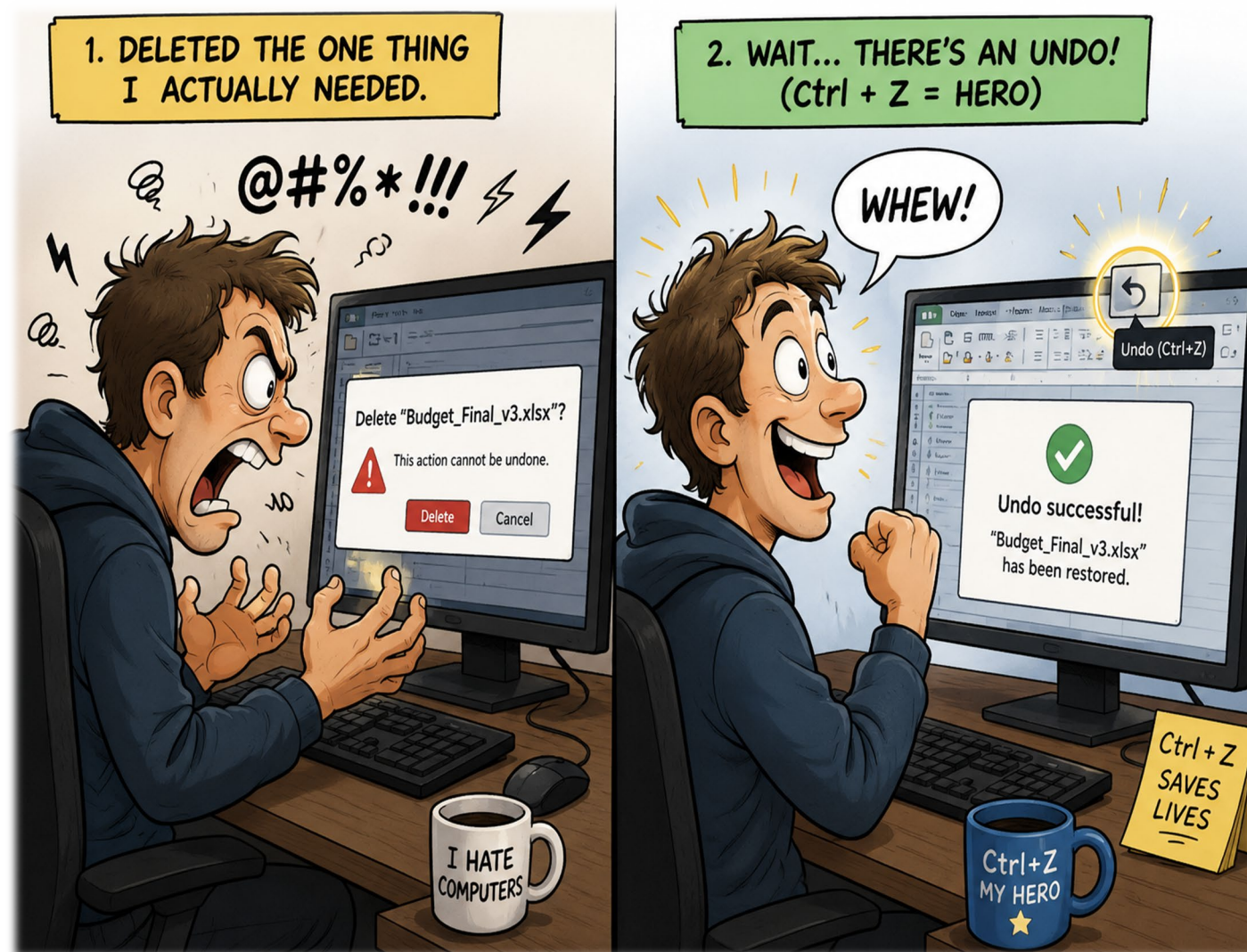
- New feature
- Pinned to upper rt corner
- Readily turn mesh and map features on and off



SMS 14 Feature Highlights

Undo To the Rescue

- Undo – Ctrl + z
- Redo – Ctrl + y
- Currently limited to Map Coverage data

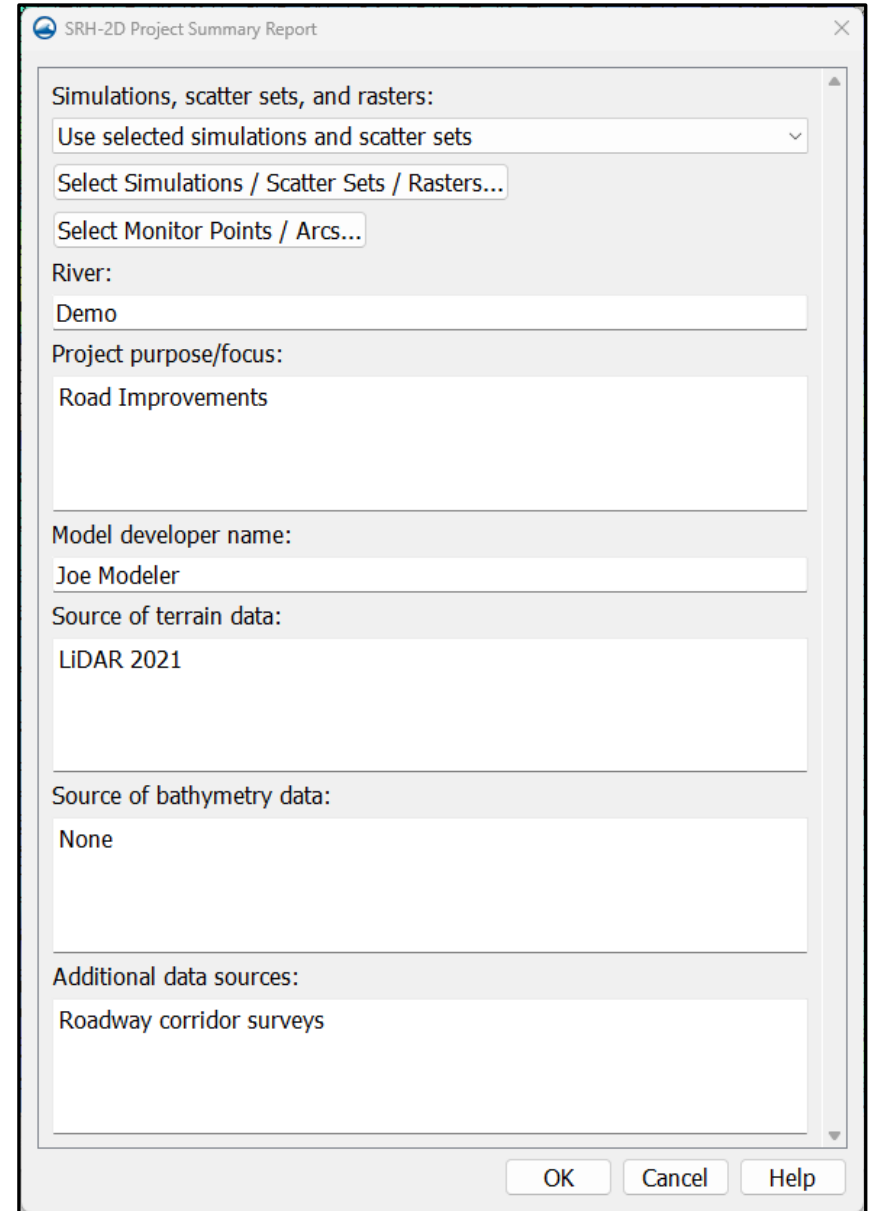


SMS 14 Feature Highlights

Simulation Summary Reports

- Updated from SMS 13.4
- Right click Simulation
- Select Tools → Summary Report
- Includes
 - Project information
 - User selected Simulations
 - User selected Monitoring pts / lines
 - User selected Terrain
- Saved as an interactive HTML format
- Can be saved to a PDF format

Tutorial: [SRH-2D Reports](#)



The screenshot shows the 'SRH-2D Project Summary Report' dialog box. It contains several sections for user input:

- Simulations, scatter sets, and rasters:** A dropdown menu set to 'Use selected simulations and scatter sets', with buttons for 'Select Simulations / Scatter Sets / Rasters...' and 'Select Monitor Points / Arcs...'.
- River:** A text field containing 'Demo'.
- Project purpose/focus:** A text field containing 'Road Improvements'.
- Model developer name:** A text field containing 'Joe Modeler'.
- Source of terrain data:** A text field containing 'LIDAR 2021'.
- Source of bathymetry data:** A text field containing 'None'.
- Additional data sources:** A text field containing 'Roadway corridor surveys'.

At the bottom right are 'OK', 'Cancel', and 'Help' buttons.

SMS 14 Feature Highlights

Simulation Summary Reports

SRH-2D Project Summary Report

Project file name: temp.sms

Report generation date: 10 August 2026 17:24:11

Contents

- 1 Project summary
- 2 Terrain data
 - 2.2 Summary of raster data
- 3 Mesh summary
- 4 Summary of boundary conditions
- 5 Summary of monitor coverages
- 8 3D Structures
 - 8.1 Map of all 3D Structures
 - 8.2 Bridges
- 9 Materials roughness summary
- 10 Simulation summary

[Collapse all](#)

▼ **Project summary**

- Project name: temp
- River: Demo River
- Project purpose/focus: Bridge / Road Improvements
- Model developer name: Joe Modeler
- Source of terrain data: Lidar 2021
- Source of bathymetry: None
- Source of additional survey data: Roadway Corridor Surveys
- **Version of SMS:** 14.0.3
- **Project datum:**
 - Horizontal: D_NORTH_AMERICAN_1983
 - Vertical: NAVD88

▼ **Terrain data**

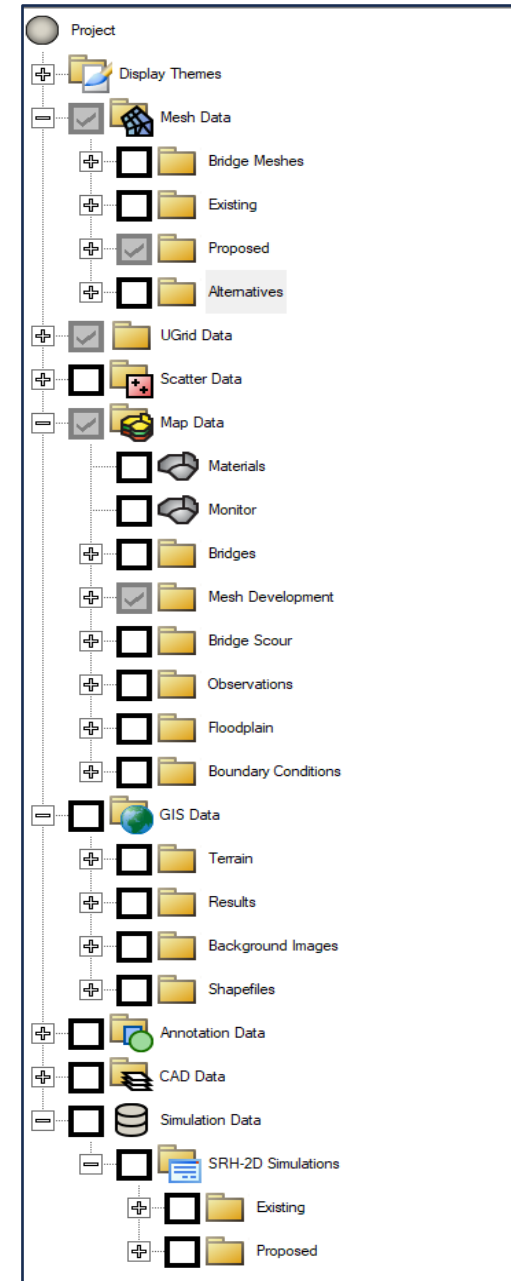
Summary of raster data

		Rasters	
	Minimum	Maximum	Resolution (cols x

SMS 14 Feature Highlights

Updates to the Project Explorer folder tree

- Additional folder options are available in multiple locations

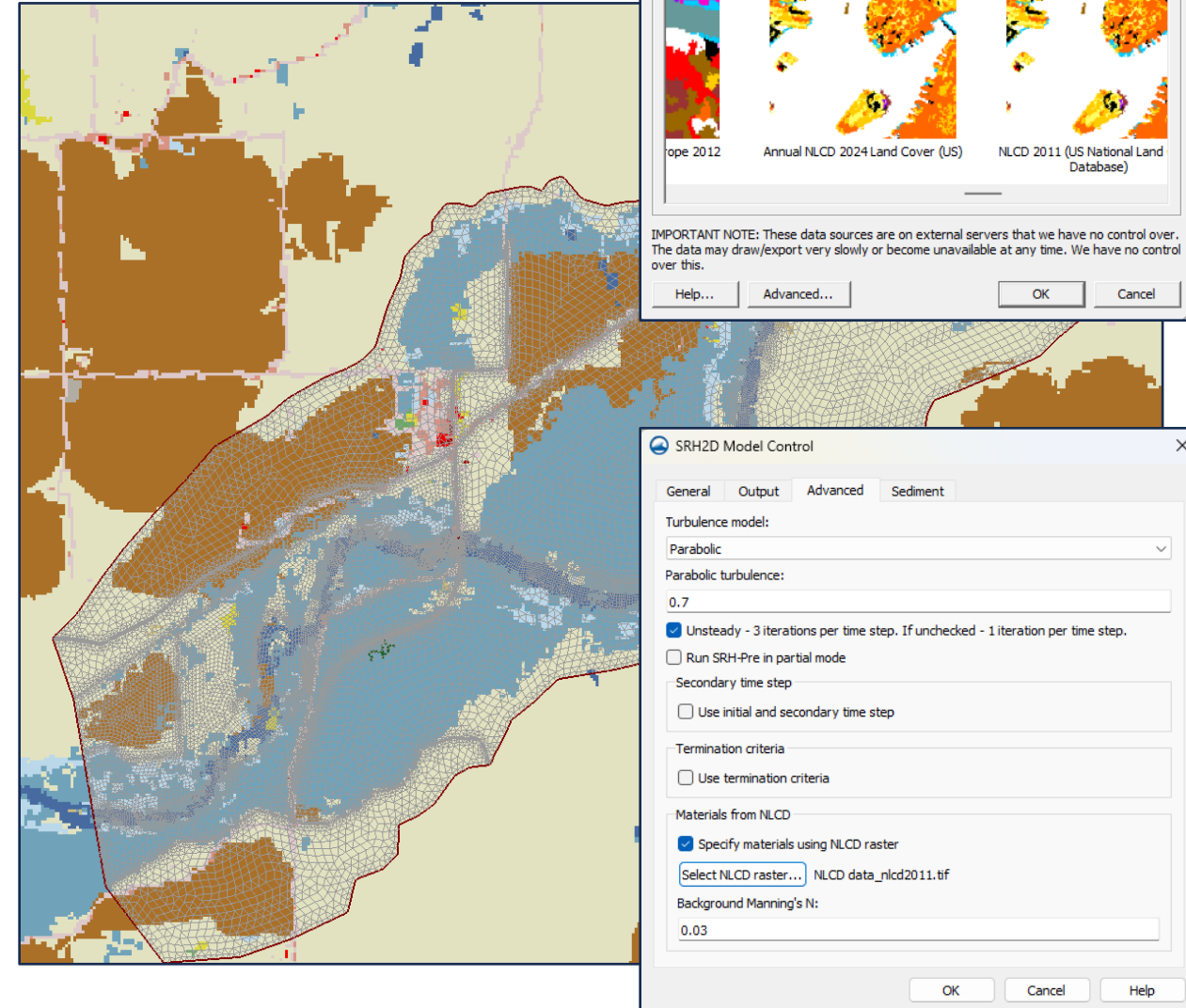


SMS 14 Feature Highlights

NLCD coverage for SRH-2D material types

- Use the Import from Web Tool
 - Frame download area
 - Select the NLCD Land Cover data
- Edit Model Controls
 - Advanced tab
 - Specify materials using NLCD raster
- Overlapping user specified material coverages will override NLCD

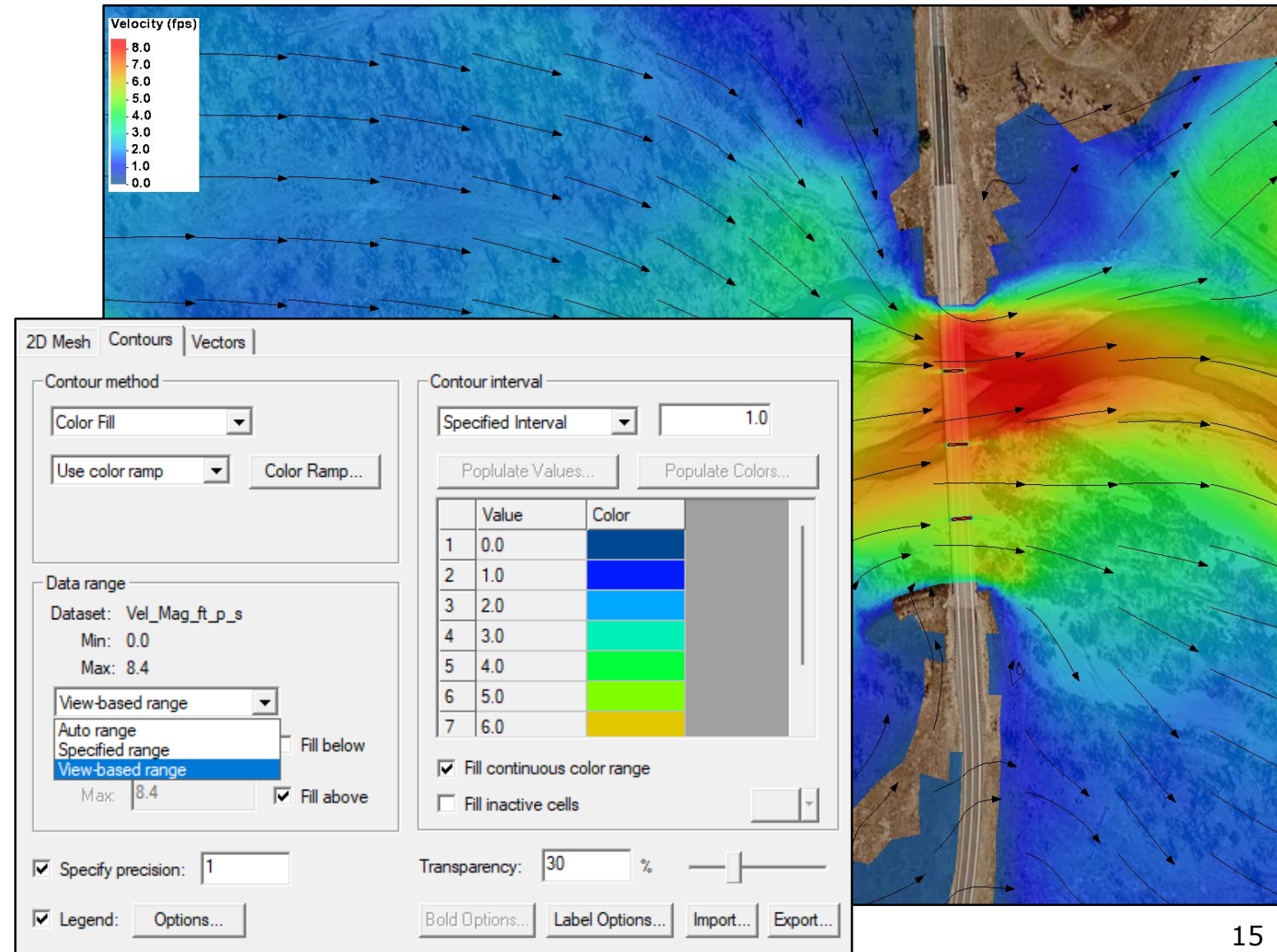
Tutorial: [SRH-2D Using NLCD](#)
 NLCD Manning's n values [table](#)



SMS 14 Feature Highlights

Variable Contour Range Display

- Open Display Options
 - Select the View-based Range
 - Update Theme if using Themes

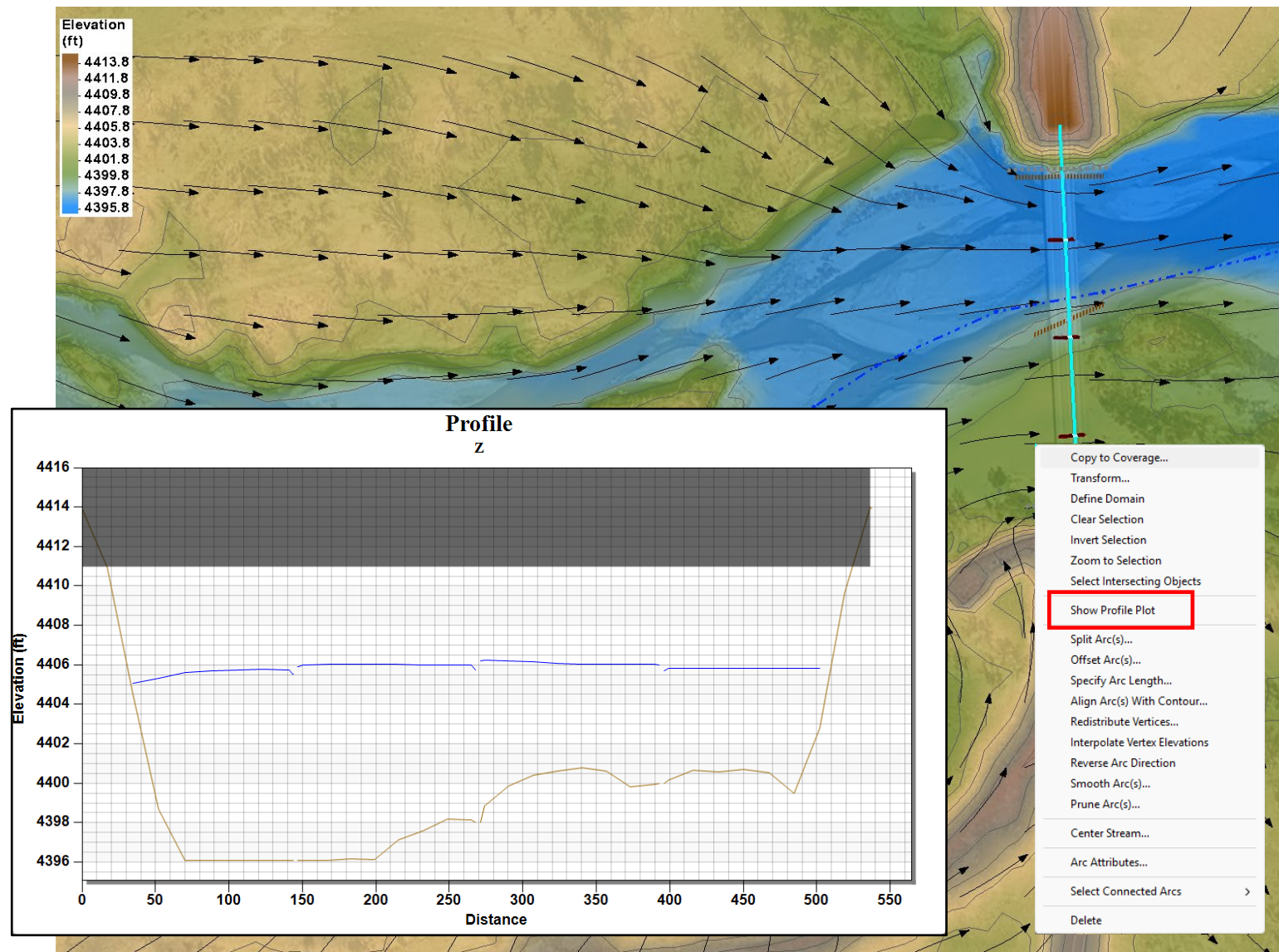


SMS 14.0 Sample Theme
file [download](#)

SMS 14 Feature Highlights

Profile plots along any arc

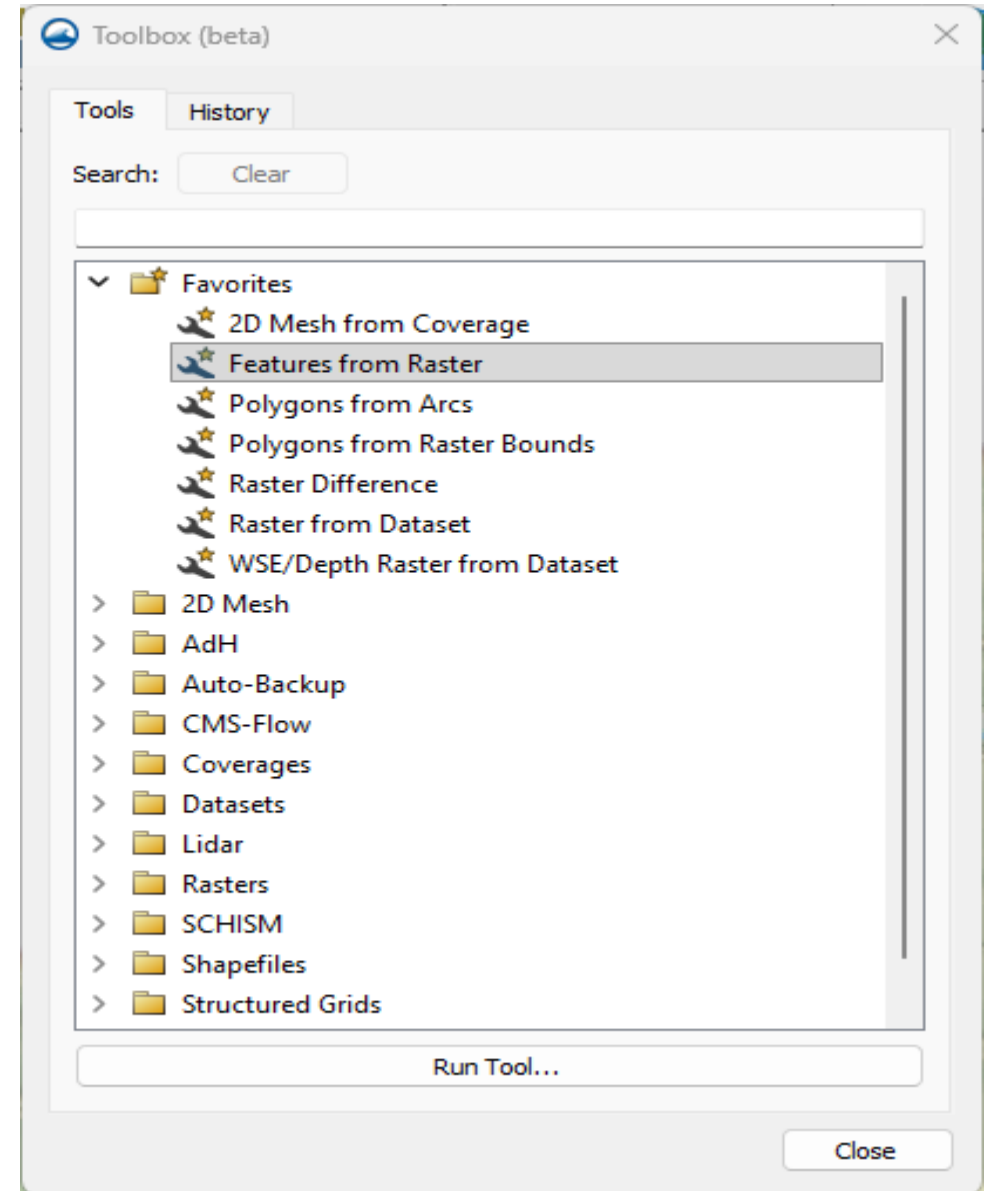
- Rt Click on any arc
- Select *Show Profile Plot*
- The active dataset is the default
- Other data sets may be added (rt click – plot data)



SMS 14 Feature Highlights

Toolbox Favorites

- Rt click on Tool → Add to favorites
- Click on History tab to rerun any previous tools (settings are preserved and can be modified)

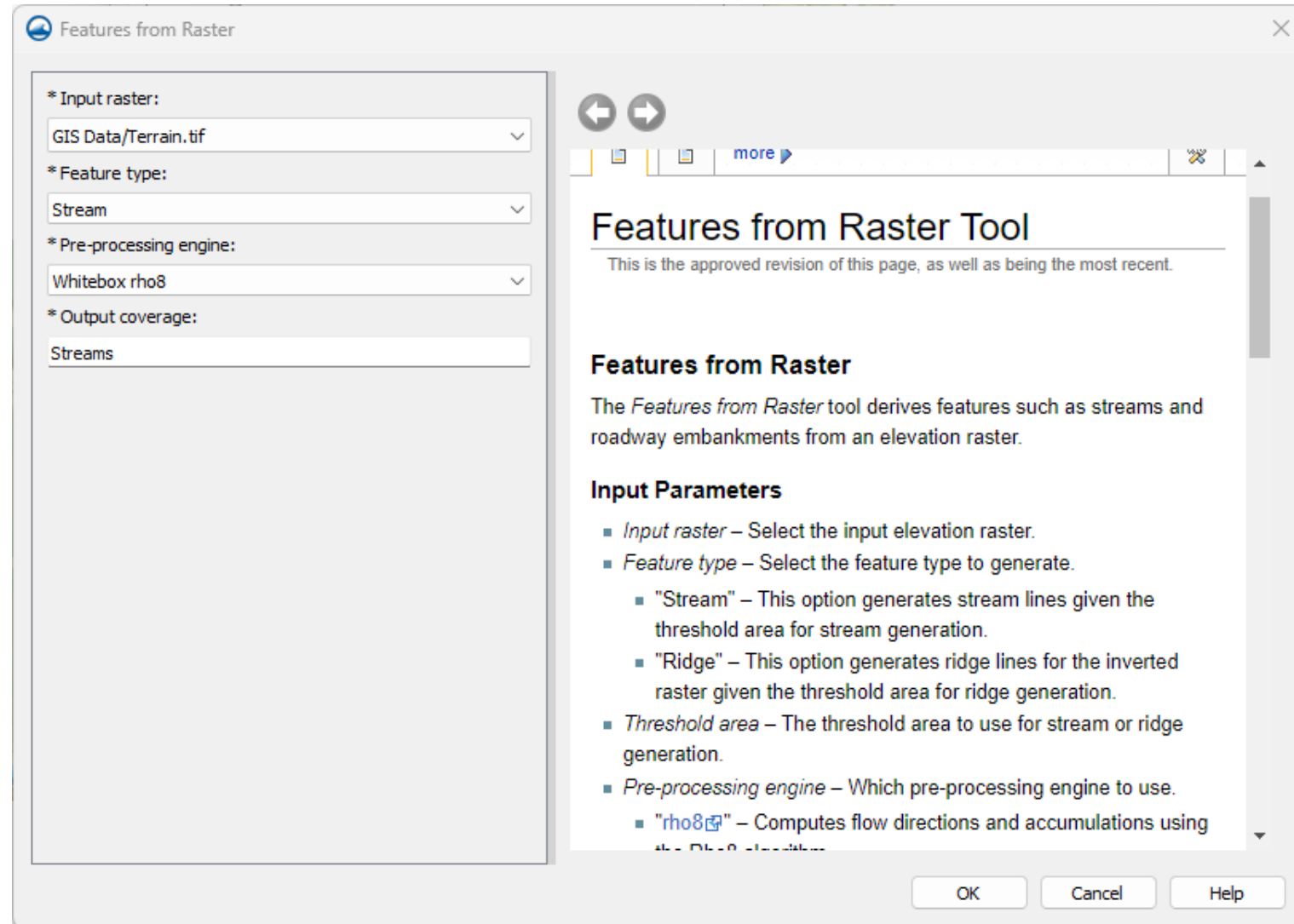


SMS 14 Feature Highlights

Feature Extraction Improvements

Auto-generate breaklines for streams and ridges

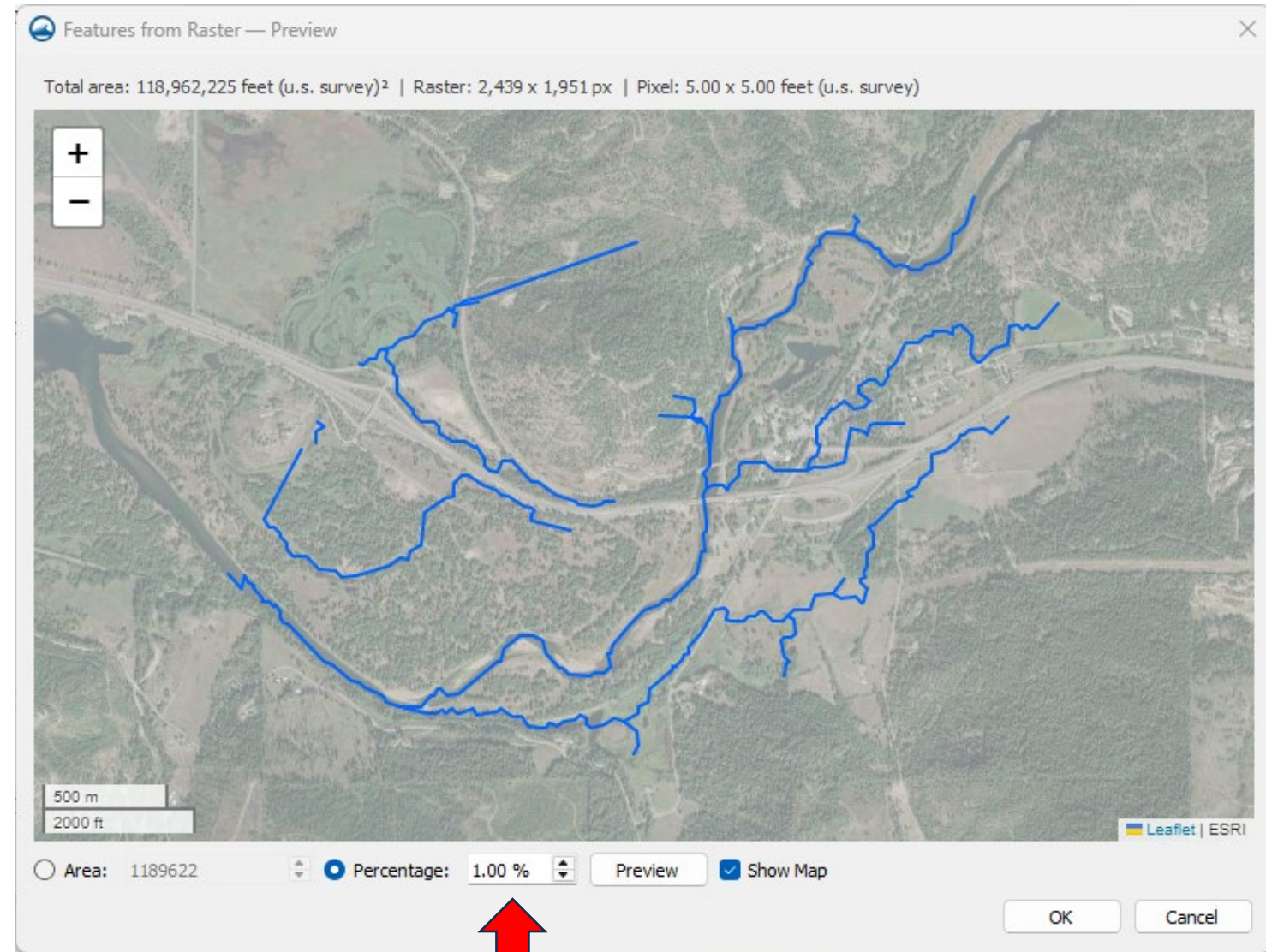
- From Toolbox, run Features from Raster
- Select Input Raster
- Set Feature Type (Stream or Ridge)
- Name output coverage
- Run (OK)



SMS 14 Feature Highlights

Feature Extraction Improvements

- In the Preview window change the % or area or area and Preview
- Select OK when the desired density of breaklines is shown
- Repeat for Ridges (Use run tool from History option)



SMS 14 Feature Highlights

Enhancements to 3D Structures

Edit 3D Structure

Profiles

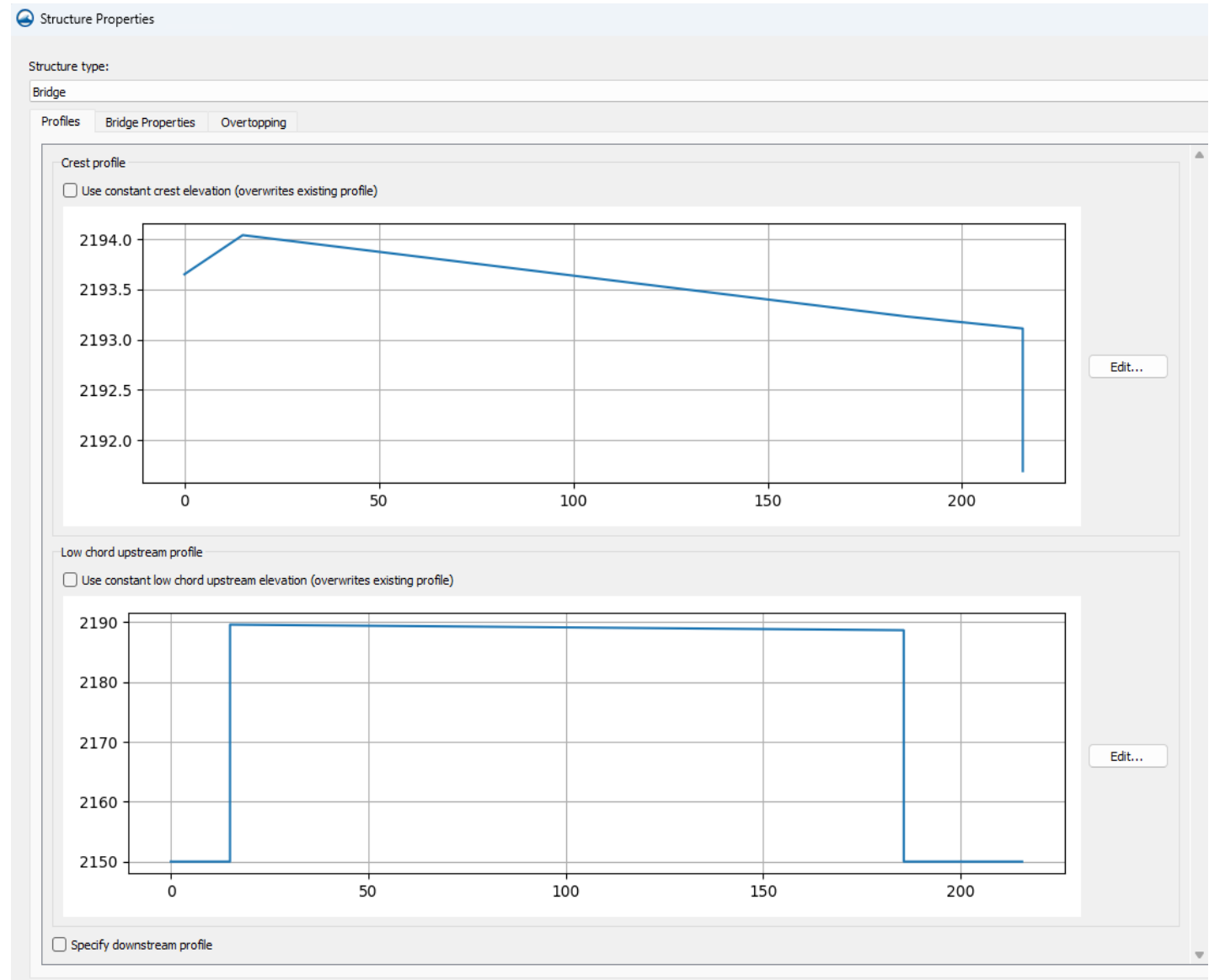
- Vertical walls may be used in low chord profile

IF

- At least 3 elements are used through the bridge

THEN

- Voids in the mesh are not needed to represent vertical abutments



SMS 14 Feature Highlights

Enhancements to 3D Structures

Bridge Properties

- Use 0.05 for default Manning's ceiling roughness for girder bridges (SMS 13.4 and up)
- Element width around piers – 1 pier width recommended
- Number of side elements
 - Minimum of 3
 - 5 or more recommended for scour analysis

Structure Properties

Structure type:
Bridge

Profiles Bridge Properties Overtopping

☐ Assign properties to individual arcs
Bridge width (upstream to downstream): 30.0
Bridge ceiling manning roughness coefficient: 0.05

Arc properties
Pier type: Wall
Wall width: 3.0
Wall pier length: 25.0
Pier end type: Round
☐ Specify number of segments on bridge center line
☐ Specify number of segments on bridge faces
☐ Has abutments

Element width around piers: 3.0
Wall pier number of side elements: 5

Bridge 2D mesh generation
Bridge wrapping width: 20.0
☒ Wrap upstream
☒ Wrap downstream
Select elevation raster ... Pre-Helene_Merged_exported.tif
Preview bridge mesh... Preview bridge mesh (compatibility mode)...

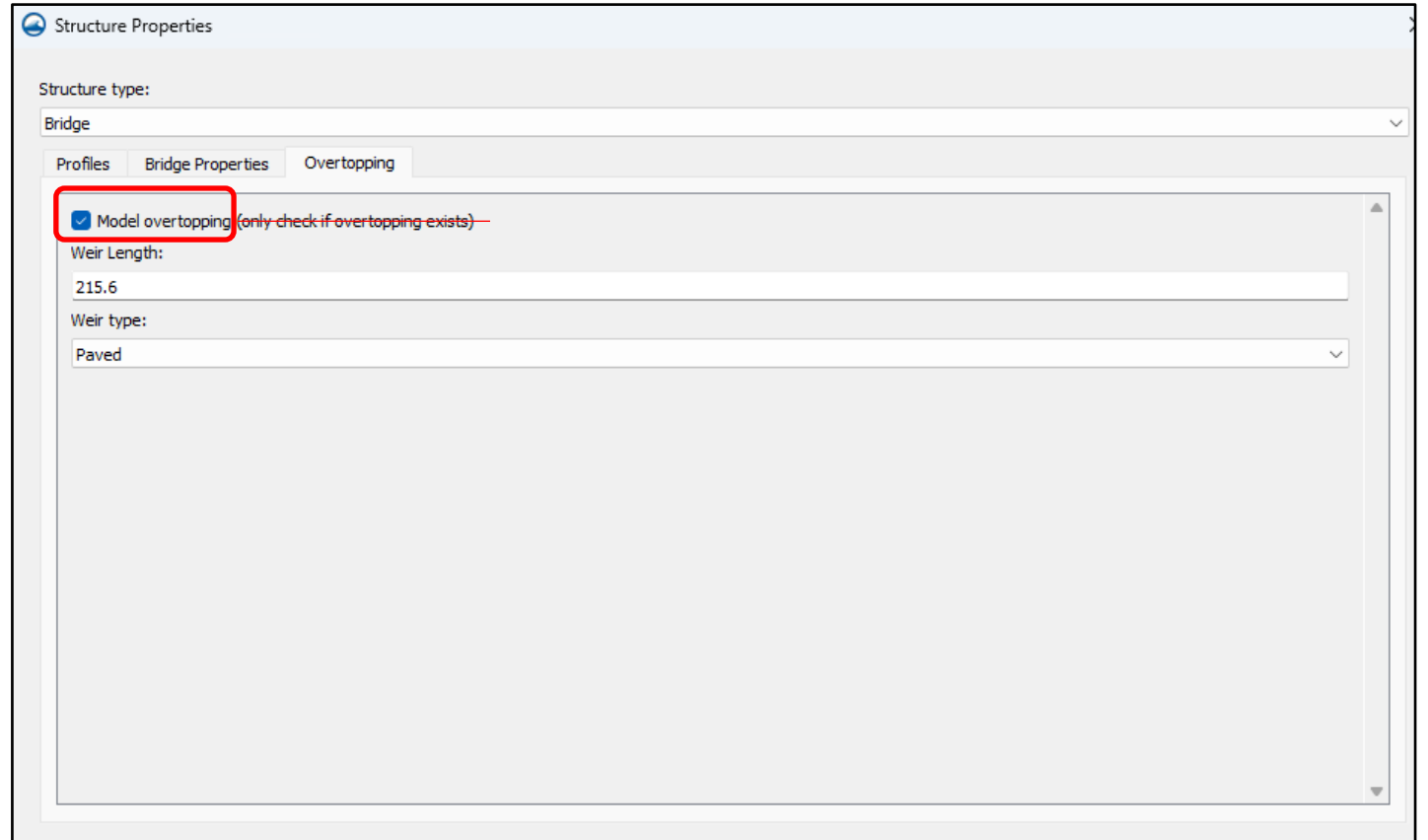
Add data to SMS on OK
☐ Add 3D Bridge UGrid
☐ Add "structure mesh" coverage
☐ Add "structure mesh" 2D mesh

SMS 14 Feature Highlights

Enhancements to 3D Structures

Overtopping

- Always check overtopping option to use 3D Structure Summary
- For **bridges** use the length of the deck for weir length
- For **culverts** use the width of the culvert (with walls) for the weir length



The screenshot shows the 'Structure Properties' dialog box with the 'Overtopping' tab selected. The 'Structure type' is set to 'Bridge'. The 'Model overtopping' checkbox is checked and highlighted with a red rectangle. The 'Weir Length' is set to 215.6, and the 'Weir type' is set to 'Paved'.

Structure Properties

Structure type:
Bridge

Profiles Bridge Properties Overtopping

☒ Model overtopping (only check if overtopping exists)

Weir Length:
215.6

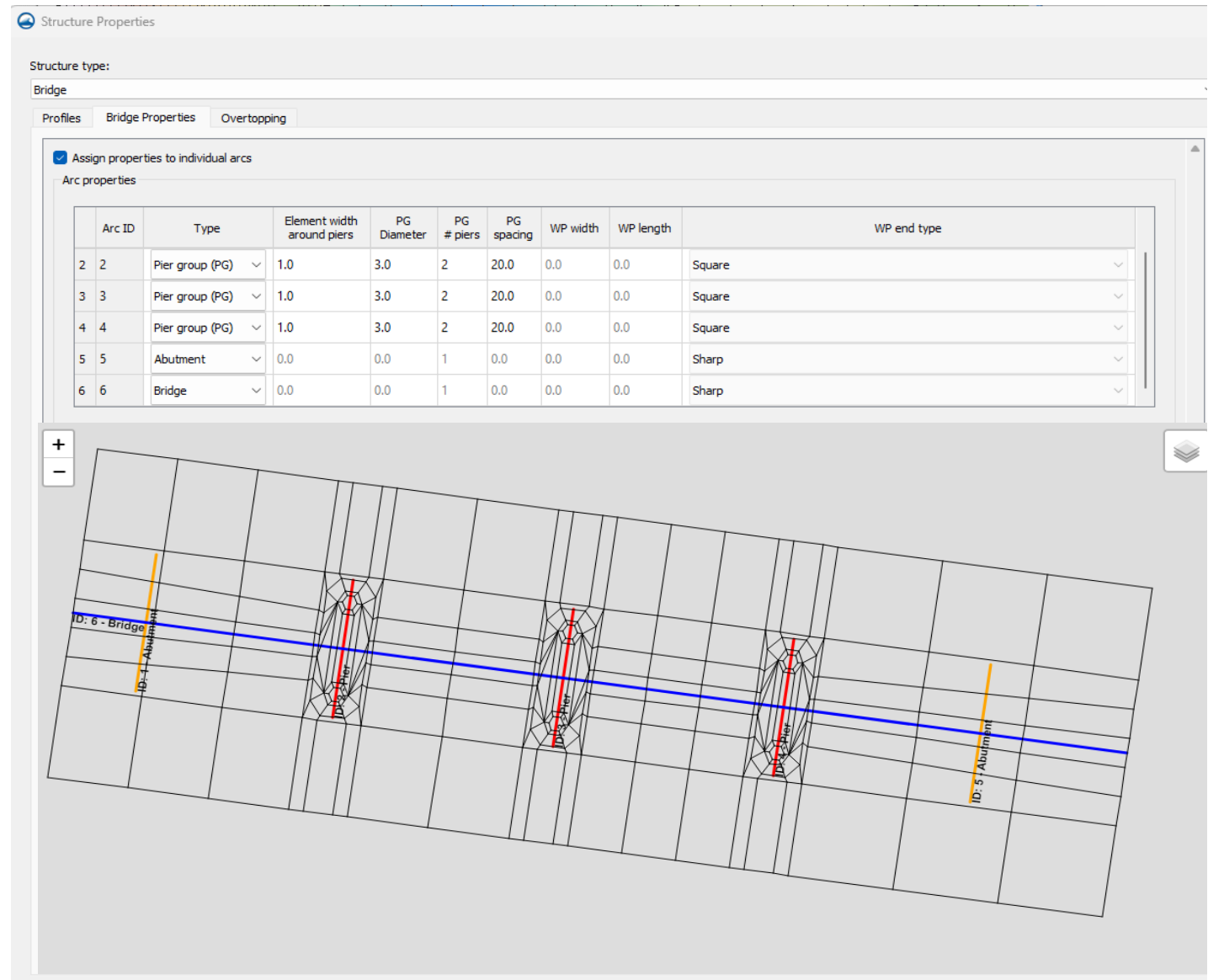
Weir type:
Paved

SMS 14 Feature Highlights

Enhancements to 3D Structures

Bridge Properties (cont'd)

- Assign properties to individual arcs
 - Best for pier groups
 - Piers with differing sizes and characteristics
 - Allows number of elements through bridge to be specified
- Preview bridge mesh
 - Some iterations may be needed with mesh / pier / bridge geometry
 - Mesh quality improvements still in progress



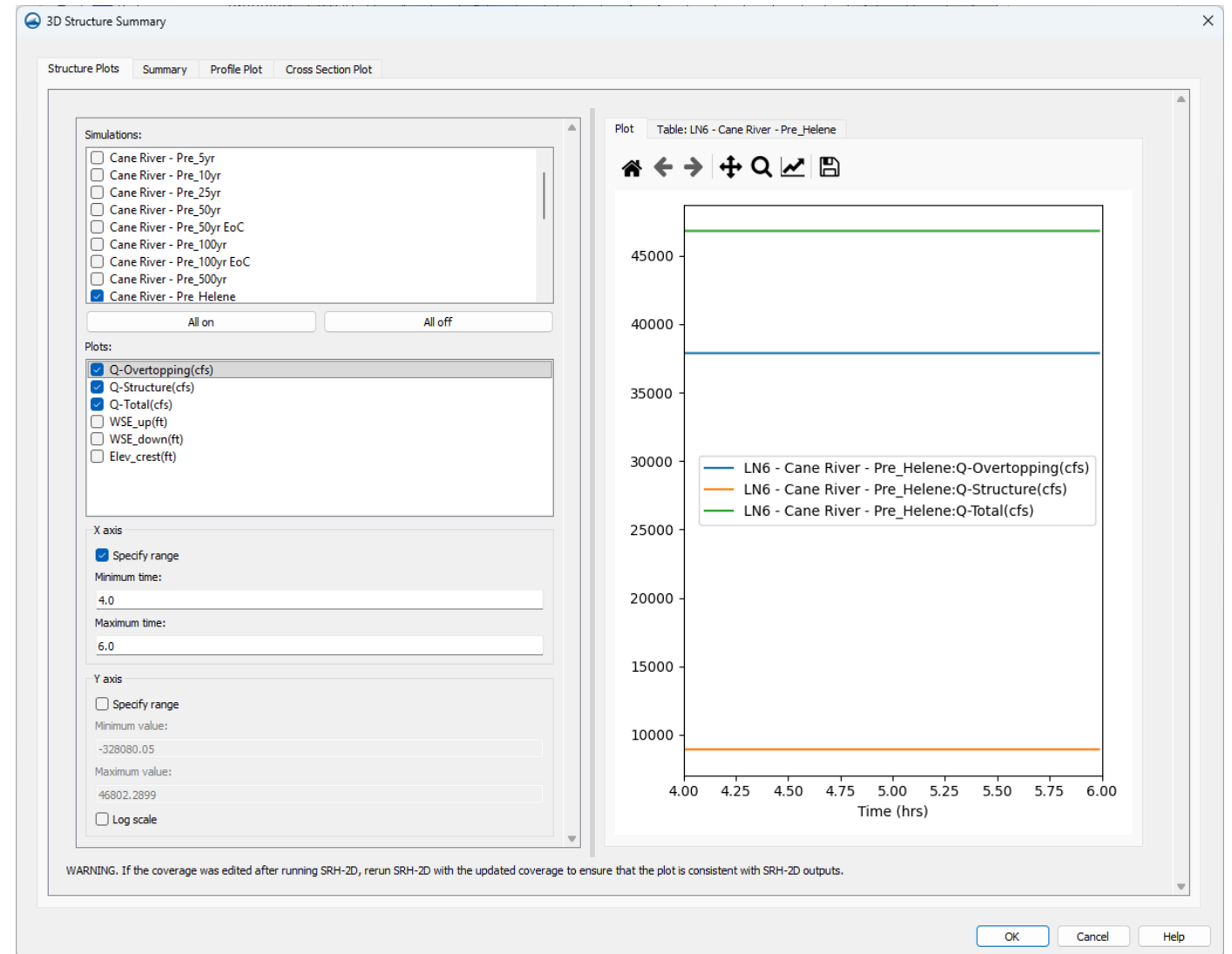
SMS 14 Feature Highlights

Hydraulic Structure Summaries – 3D Structures

Rt Click 3D Structure coverage

- Select 3D Structure Summary
- **Structure Plots**
 - Discharge
 - Total flow
 - Overtopping
 - Flow through structure
 - WSEL
 - Upstream/Downstream
 - Crest elevation

** Structure overtopping option must be selected to use the 3D Structure Summary*



SMS 14 Feature Highlights

Hydraulic Structure Summaries – 3D Structures

Rt Click 3D Structure coverage

- Select 3D Structure Summary
- Structure plots
- **Summary Table**

3D Structure Summary

Structure Plots Summary Profile Plot Cross Section Plot

	Simulation	Time(hr)	Q-Overtopping(cfs)	Q-Structure(cfs)	Q-Total(cfs)	WSE_up(ft)	WSE_down(ft)	Elev_crest(ft)
1	Cane River - Pre_2yr	6.0	0.0	5109.87711	5109.87711	2183.0659	2182.2269	2193.5849
2	Cane River - Pre_5yr	6.0	0.0	8339.65001	8339.65001	2185.0558	2184.1601	2193.5849
3	Cane River - Pre_10yr	6.0	0.0	10899.8402	10899.8402	2186.4328	2185.319	2193.5849
4	Cane River - Pre_25yr	6.0	0.0	17999.5139	17999.5139	2189.3853	2187.9054	2193.5849
5	Cane River - Pre_50yr	6.0	390.89581	25888.3169	26279.2127	2194.3051	2189.7048	2193.5849
6	Cane River - Pre_50yr EoC	6.0	25818.286	11648.3495	37466.6355	2205.225	2203.3106	2193.5849
7	Cane River - Pre_100yr	6.0	15718.505	16754.2011	32472.7061	2201.8174	2197.4646	2193.5849
8	Cane River - Pre_100yr EoC	6.0	35521.291	9301.07857	44822.3696	2209.6204	2208.6208	2193.5849
9	Cane River - Pre_500yr	6.0	36181.609	8416.92597	44598.535	2210.6503	2209.8434	2193.5849
10	Cane River - Pre_Helene	6.0	37873.886	8927.93284	46801.8188	2210.9107	2210.0226	2193.5849
11	Bent Creek - Pre_10yr	6.0	0.0	11176.981	11176.981	2186.6158	2185.4163	2193.5849

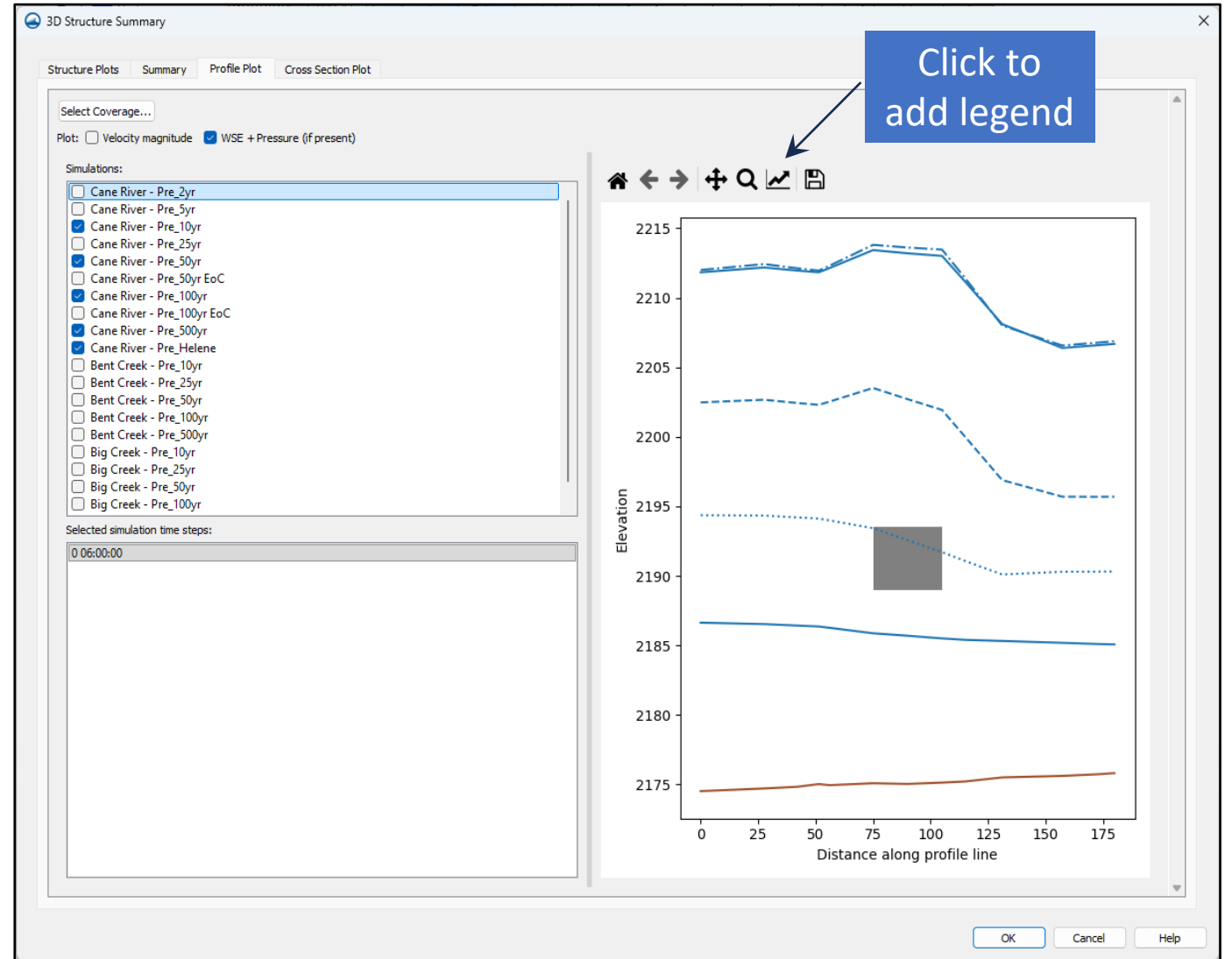
SMS 14 Feature Highlights

Hydraulic Structure Summaries – 3D Structures

Rt Click 3D Structure coverage

- Select 3D Structure Summary
- Several plot options
- Summary Table
- **Profile plot**
 - WSE
 - WSE + Pressure
 - Velocity magnitude

*A default profile alignment and length are assumed, but user may select a different profile arc under **Select Coverage***

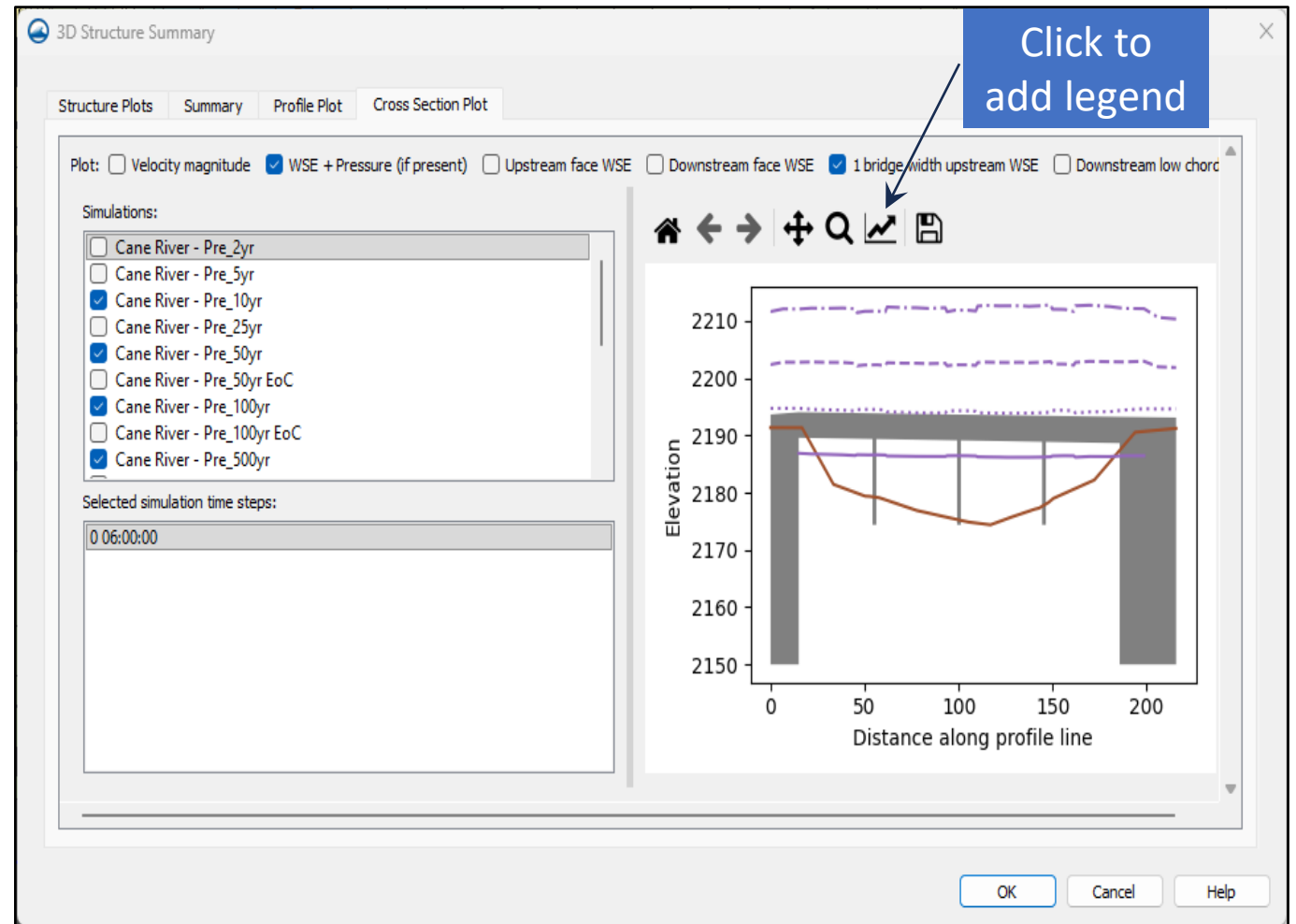


SMS 14 Feature Highlights

Hydraulic Structure Summaries – 3D Structures

Rt Click 3D Structure coverage

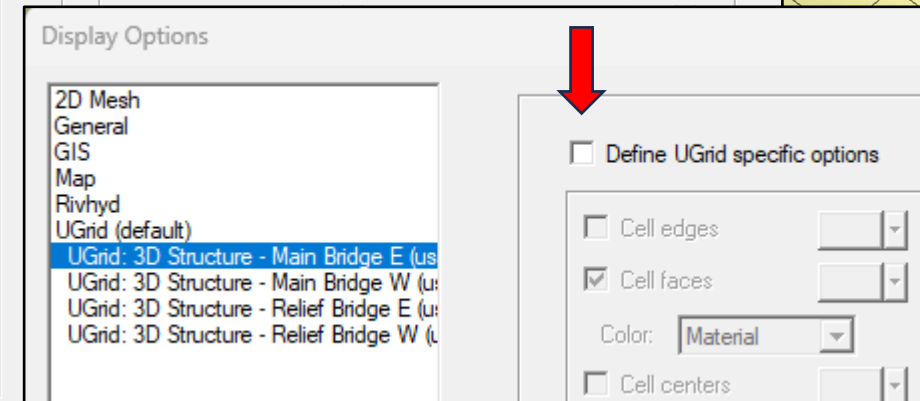
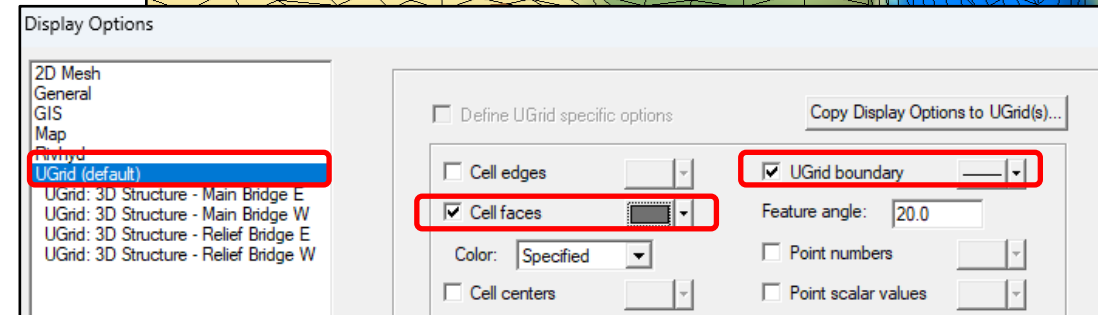
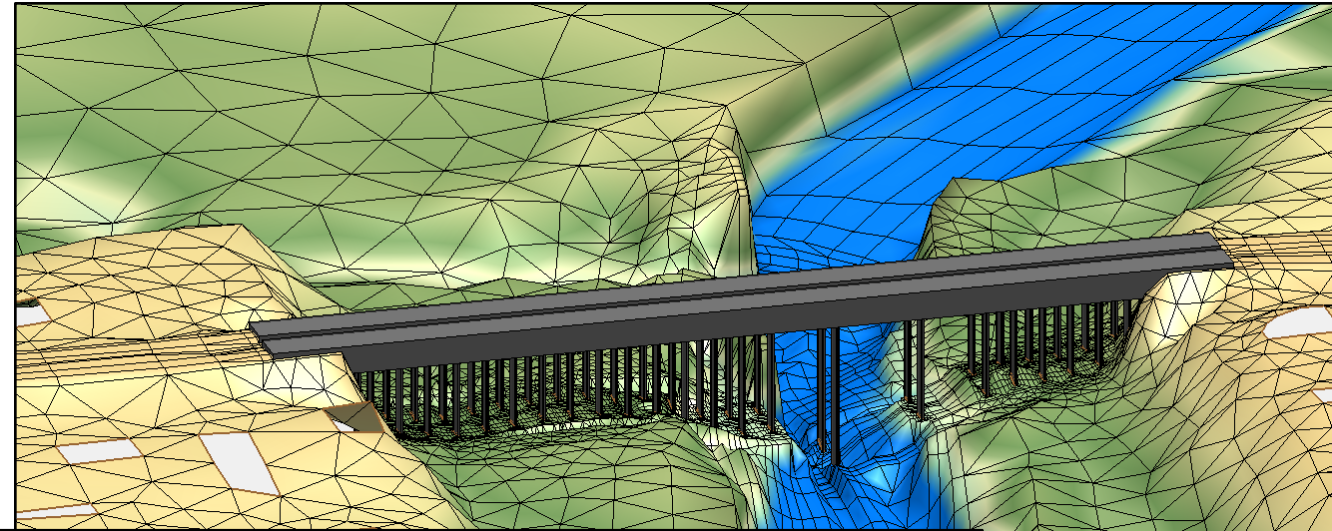
- Select 3D Structure Summary
- Several plot options
- Summary Table
- Profile plot
- **Cross section plot**
 - Several WSEL options



SMS 14 Feature Highlights

3D Structures UGrid Display Options

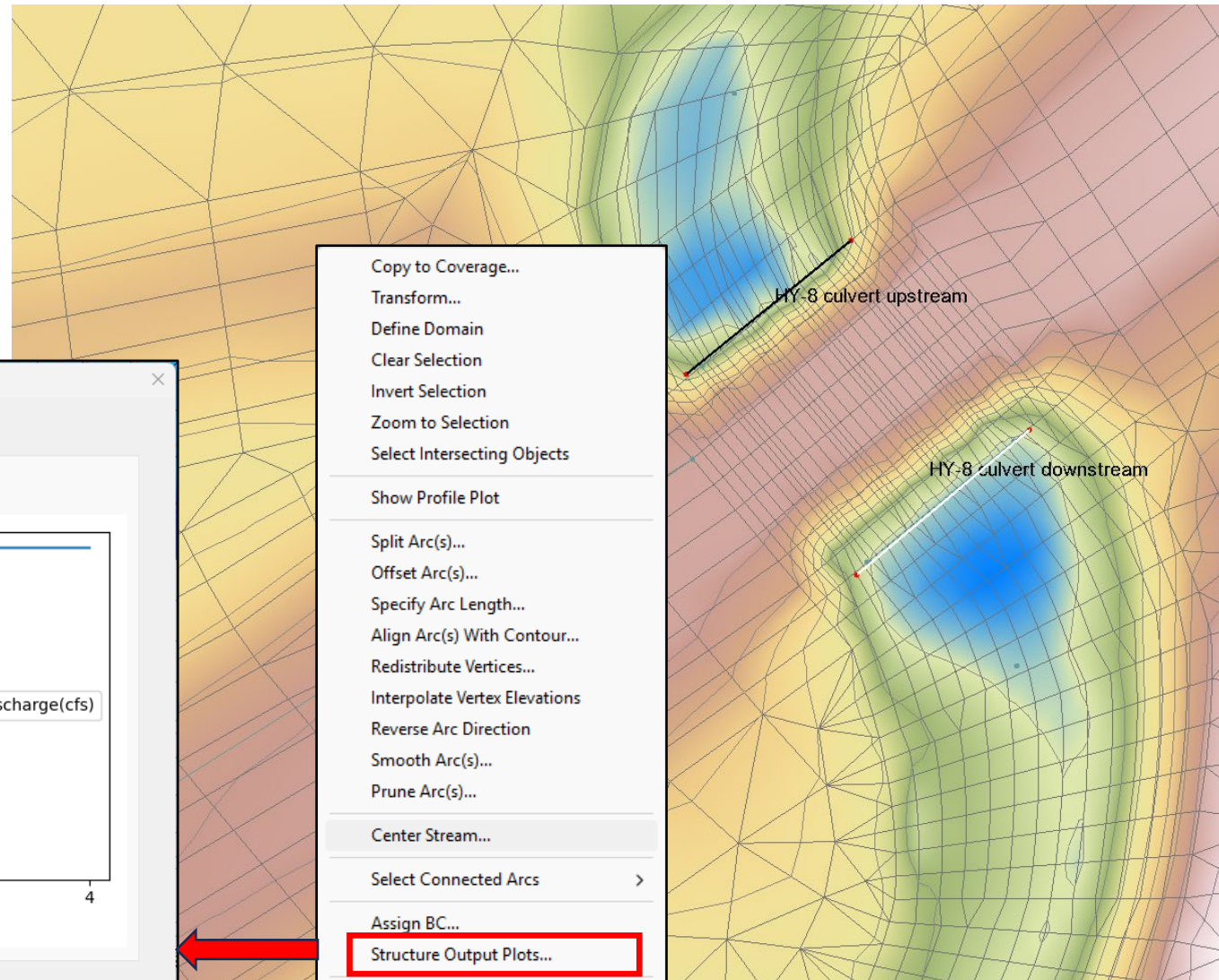
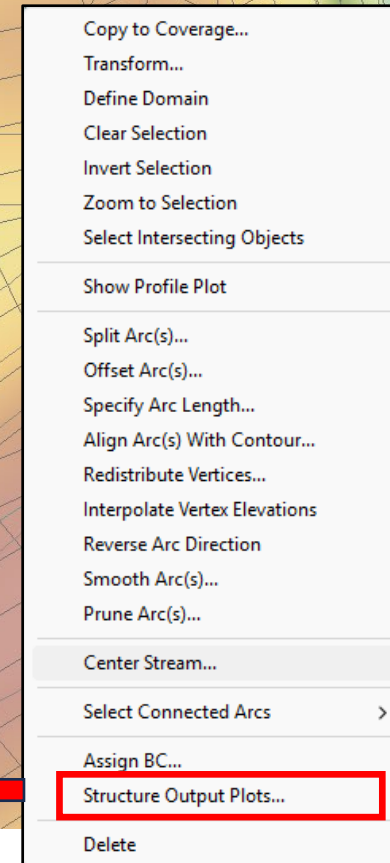
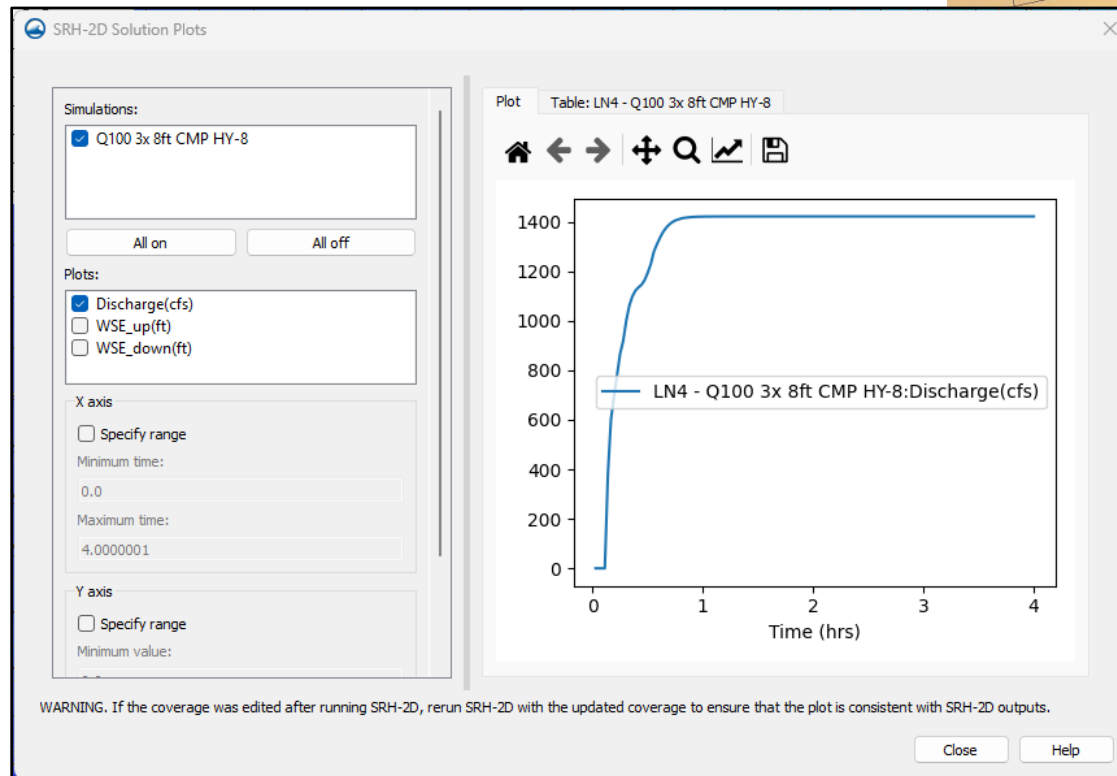
- Updated UGrid features
- Select UGrid (default)
- Recommended settings
 - Turn on Cell faces
 - Set a specified color
 - Turn on UGrid boundary
 - Turn everything else off
- Select each UGrid
 - Define UGrid specific options should be **deselected**



SMS 14 Feature Highlights

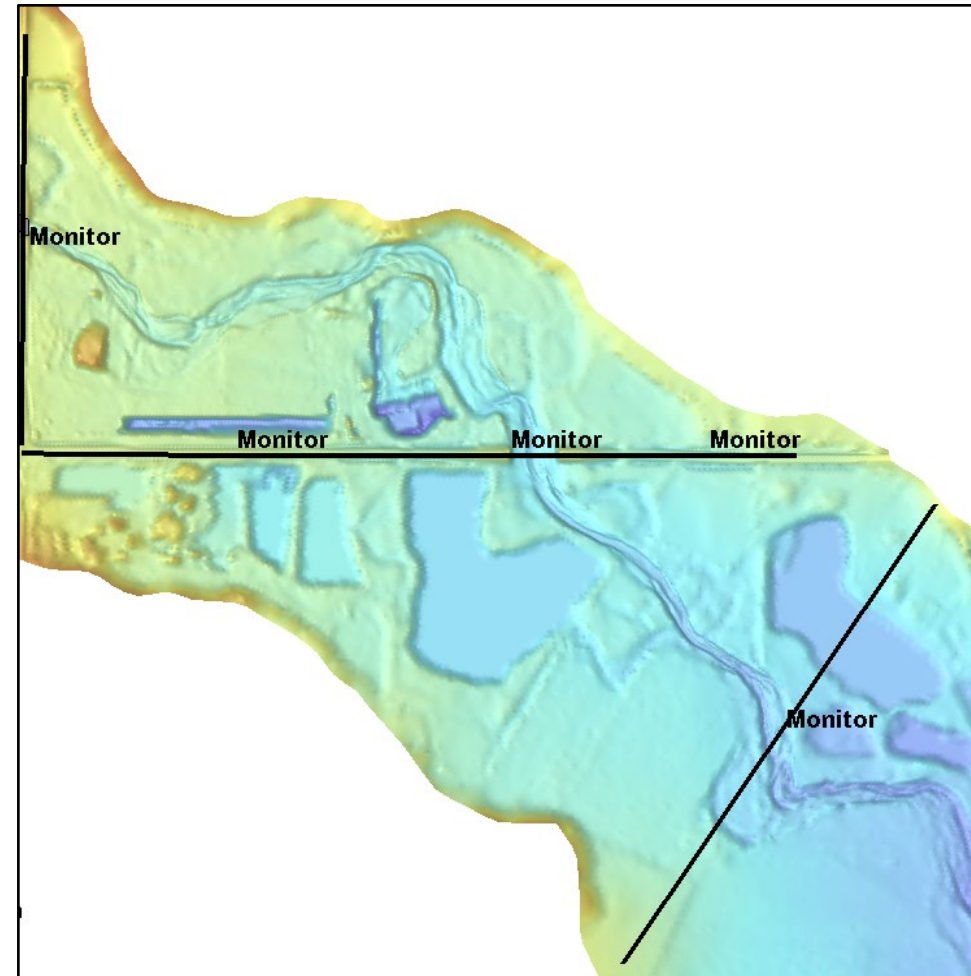
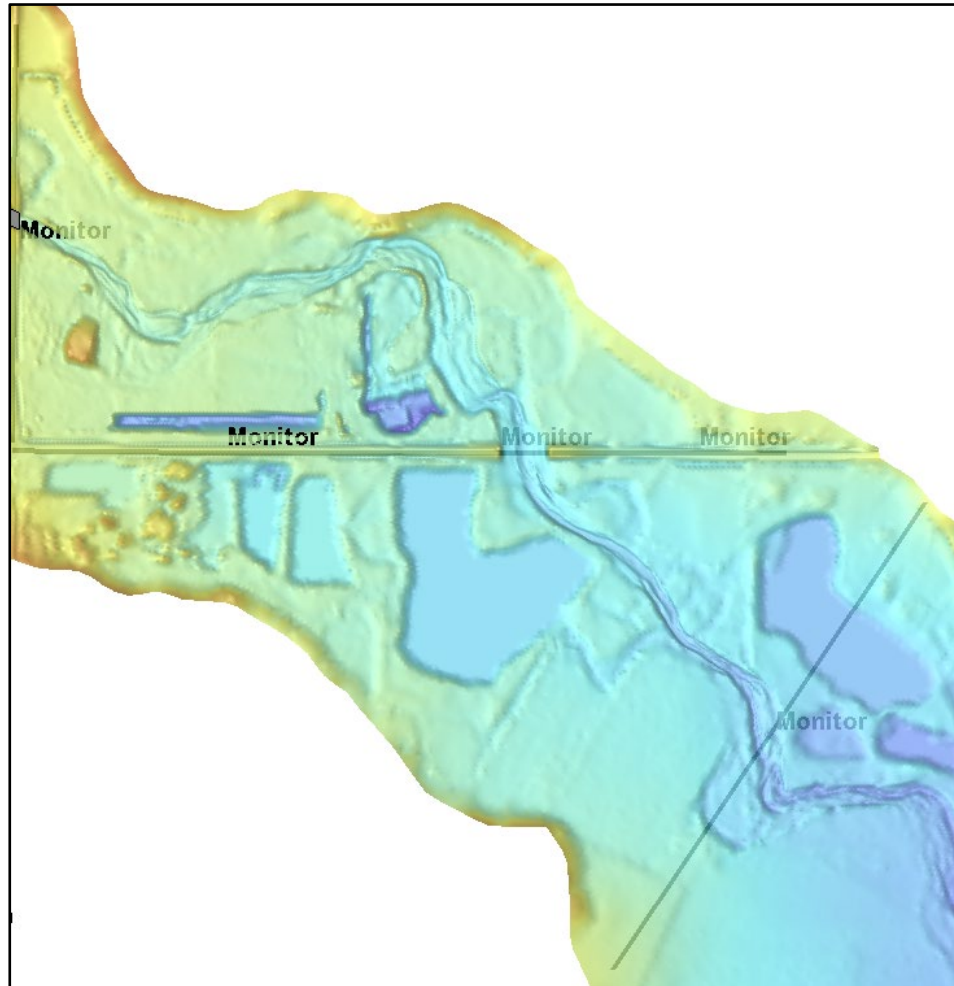
Hydraulic Structure Summaries – 1D Structures

- Select one of the structure arcs
- Rt Click → Structure Output Plots



SMS 14 Feature Highlights

Map Coverage Elevation Overrides

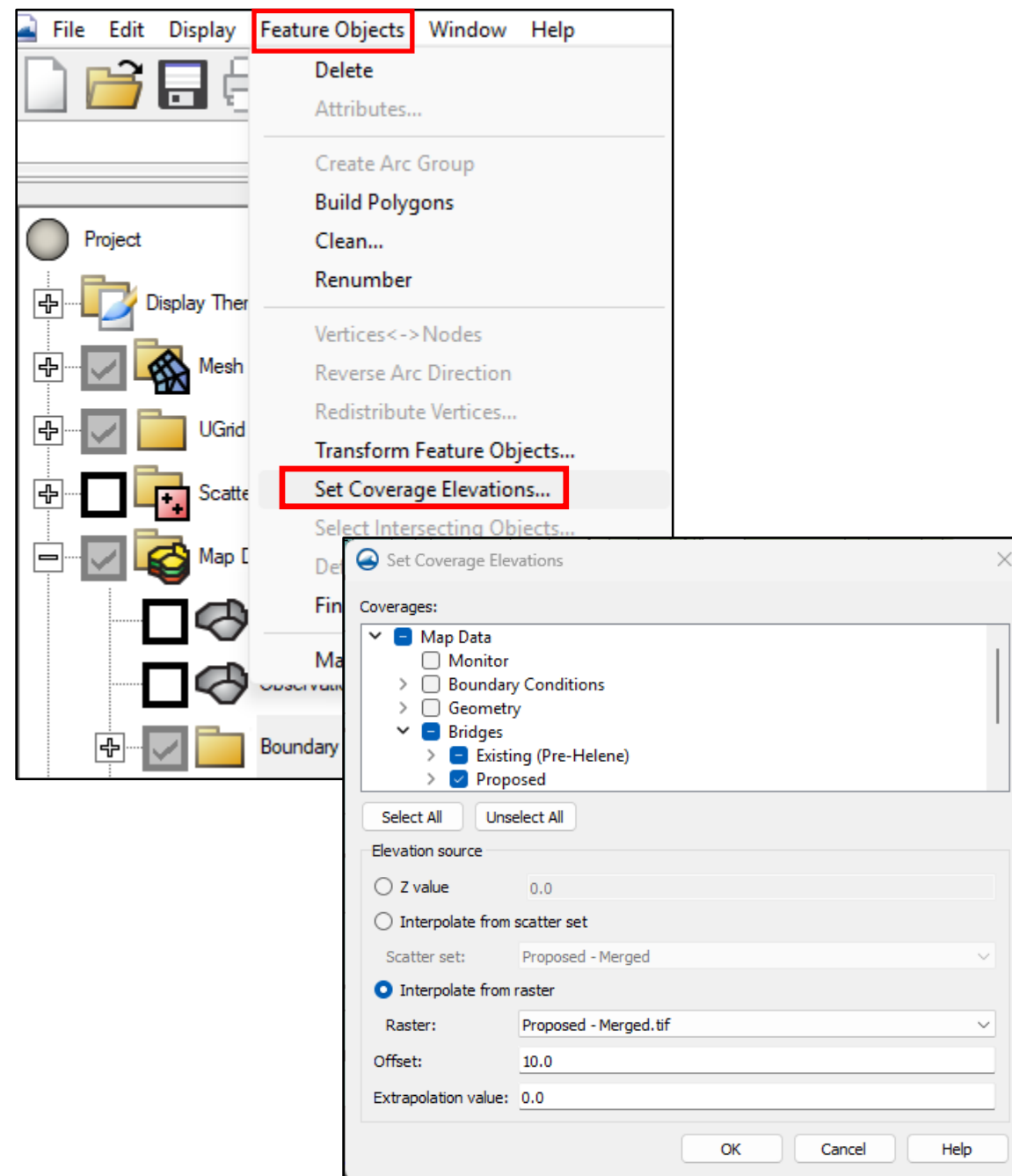


SMS 14 Feature Highlights

Map Coverage Elevation Overrides

With a map coverage active

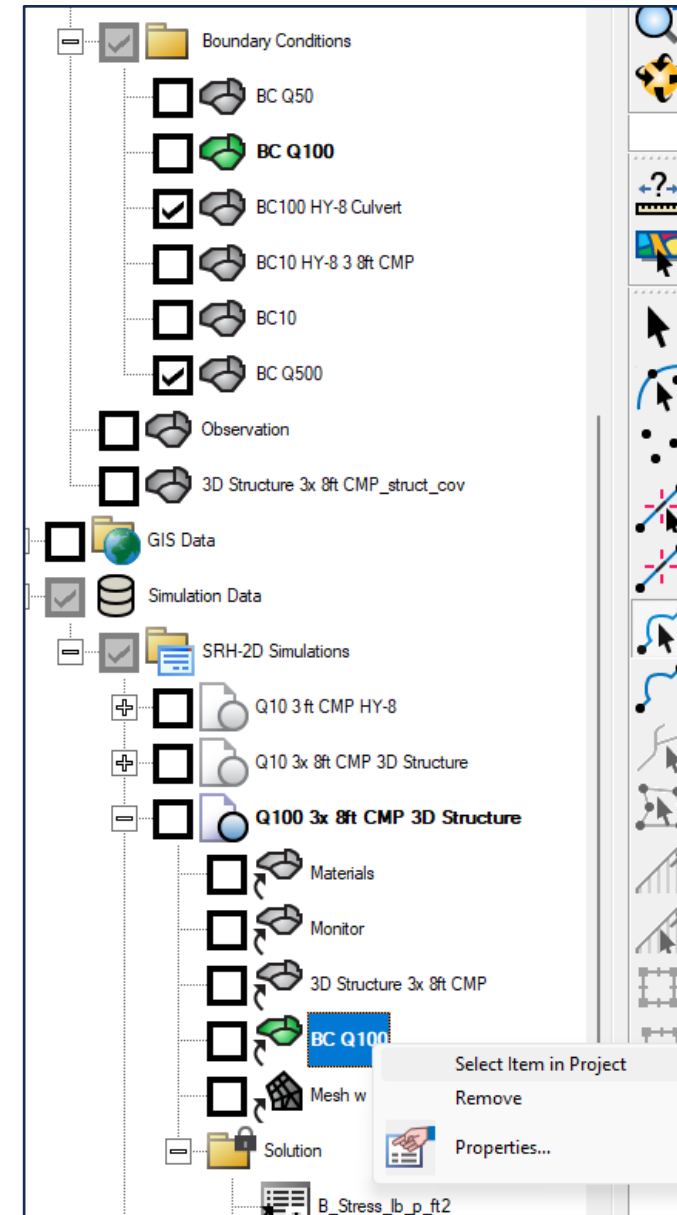
- Feature Objects → Set Coverage Elevations
- *Or* Rt Click on a coverage → Set Coverage Elevations
- Set Coverage Properties
 - Select coverages
 - Select elevation source



SMS 14 Feature Highlights

Select Item in Project Explorer

- Rt click on item in a simulation
- → Select Item in Project
- SMS jumps to that item and makes it active

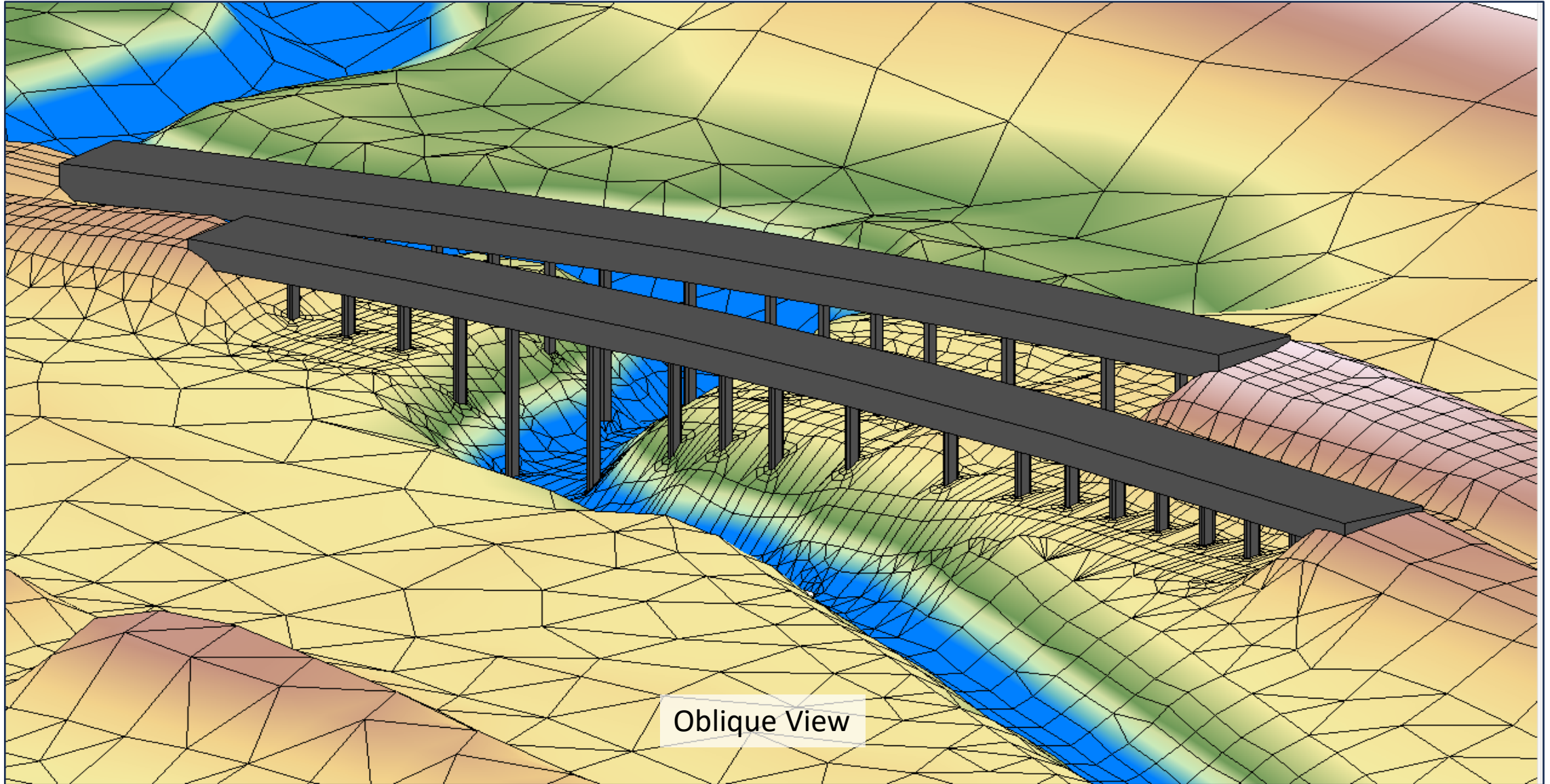


Questions



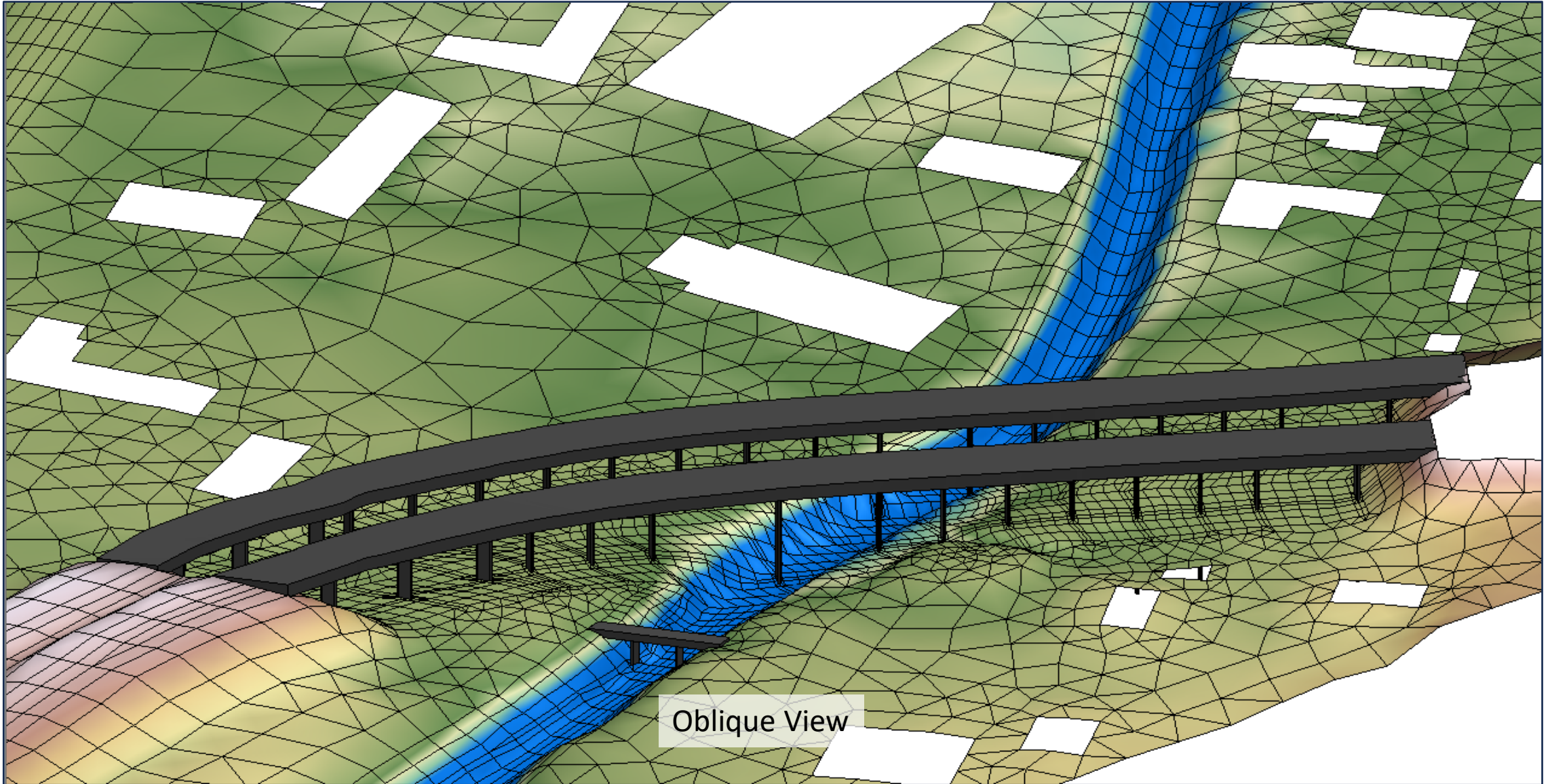
SMS 14 Bridge and Culvert Example Applications

Parallel Bridges



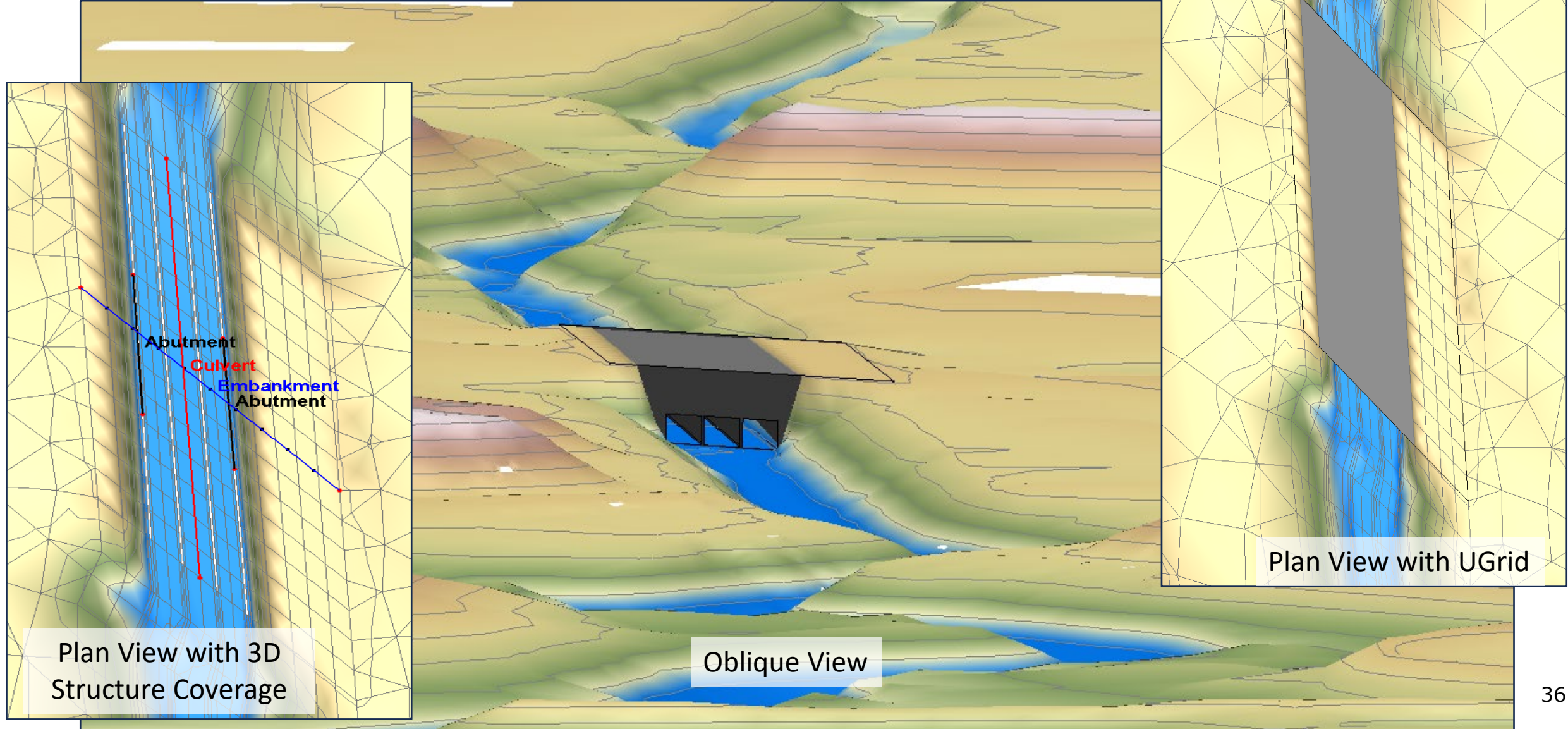
SMS 14 Bridge and Culvert Example Applications

Curved Bridges



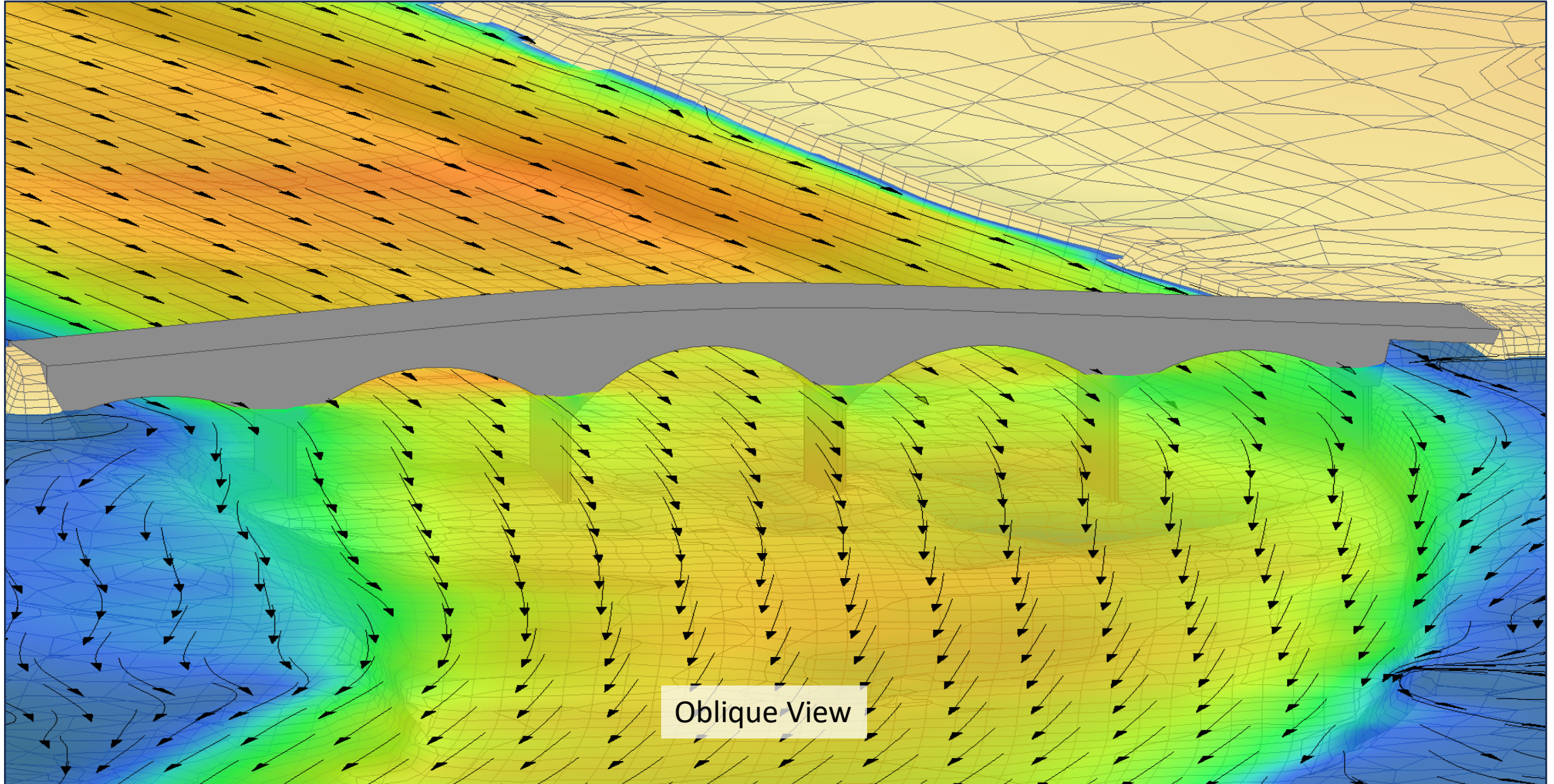
SMS 14 Bridge and Culvert Example Applications

Skewed Multiple Barrel Box Culverts



SMS 14 Bridge and Culvert Example Applications

Multiple Arched Bridge





THANK YOU for participating!
Please contact us with any questions

Scott Hogan, PE

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