SUPPLEMENT TO QUICK CHECK GUIDEBOOK EXAMPLE CASES

ILLINOIS DEPARTMENT OF TRANSPORTATION BUREAU OF BRIDGES AND STRUCTURES

HYDRAULICS UNIT

Prepared By:

2IM Group, LLC and Hanson Professional Service Inc.





DATE: December 2021

SUPPLEMENT to QUICK CHECK GUIDEBOOK



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SUPPLEMENT to QUICK CHECK GUIDEBOOK

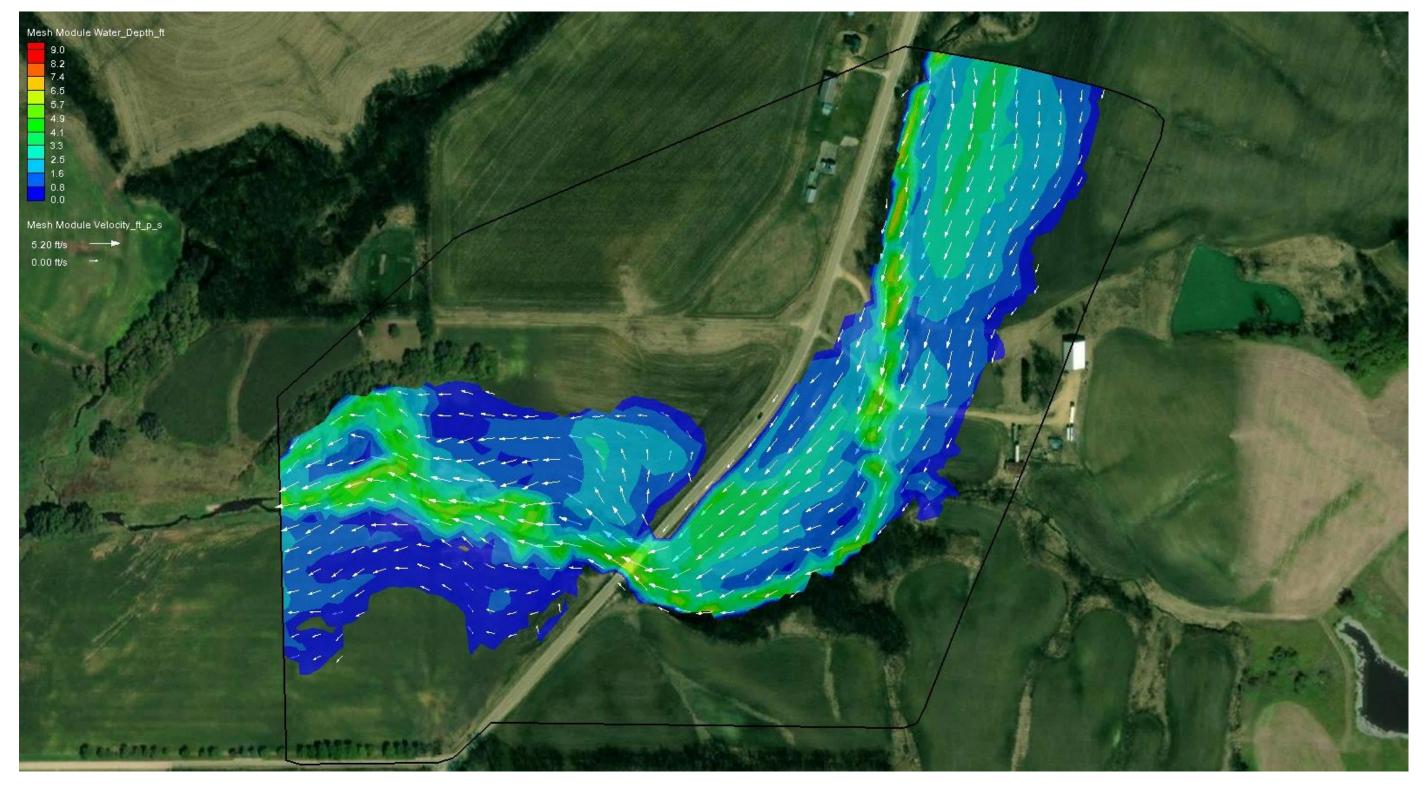


043-0040 – IL 78 over Plum River – District 2 – 2-span Bridge 155 feet

Date: 09/07/2021									
County: Jo Davie	ess								
Route: IL-78	D'								
Watercourse: Plu ESN: 043-0040	Im River				Ctanatura	Tuna. 🕅	Dridaa	□ Culvert	
	205 Sa M	I: (0000)	arac)		Structure	Type: 🖂	Bridge		
Drainage Area: 13	5.95 Sq. M	11. (8,928 8	acres)						
Hydrology Metho	d (check a	all that app	olv):						
□FIS ⊠Stream		□HEC-HN		R-20 □1	Rational M	Iethod [Other:		
Discharges/ Flows									
Y	2	5	10	25	50	100	200	500	
Analyzed			\boxtimes		\boxtimes	\boxtimes	\boxtimes	\boxtimes	
BC ID:	923	1,680	2,270	3,080	3,720	4,380	5,077	6,050	
BC ID:									
BC ID:									
BC ID:									
Source of Topogr	aphy/ Surf	face Data (check all t	hat apply):					
⊠SMS □LiD	AR 🗆 B	athymetry	Cros	s Sections	□Text	File □I	LandXML		
Mesh Generator (
Mesh Name: QC					l				
Mesh Type:	⊠Paving			Patching					
Vertices Spacing:				10.17					
Mesh Density (El	ements/ A	(cre): 3434	4 / 85.48 =	40.17					
Monitor Lines & Points Coverage:Number of Monitor Lines: 5Number of Monitor Points: 0Materials Coverage:									
Manning's "n" V	alue used:	0.060							
Boundary Conditions Coverage: Number of BC Arcs: 2									
BC ID: 1	1 1	Гуре: 🛛	Inlet-Q	$\Box Ex$	it-H	Locatio	n: NE		
BC ID: 2	2]	Гуре: 🗆	Inlet-Q	$\boxtimes Ex$	it-H	Locatio	n: NW		
BC ID:]	Гуре: 🗆	Inlet-Q	$\Box Ex$	it-H	Locatio	n:		
BC ID:	1	Гуре: 🗆	Inlet-Q	$\Box Ex$	it-H	H Location:			
BC ID:]	Гуре: 🗆	Inlet-Q	$\Box Ex$	it-H	Locatio	n:		
Exit-H Channel Calculator Normal Depth Slope (ft/ft): 0.0042 Source: 🛛 DEM 🛛 FIS Profile									
Model Control:									
Time Step (sec.): 5Simulations Length (hrs.): 12									
Output Method:									
Model Convergence: Time of Convergence at (hrs.): 1.5									
Populter									
<u>Results:</u> \boxtimes Roadway Overtopping occurs between the 200Y & 500Y									
Ghere Ratio (Mesh Density/ Time of Convergence): $40.17 / 1.5 = 27$									
Notes:									

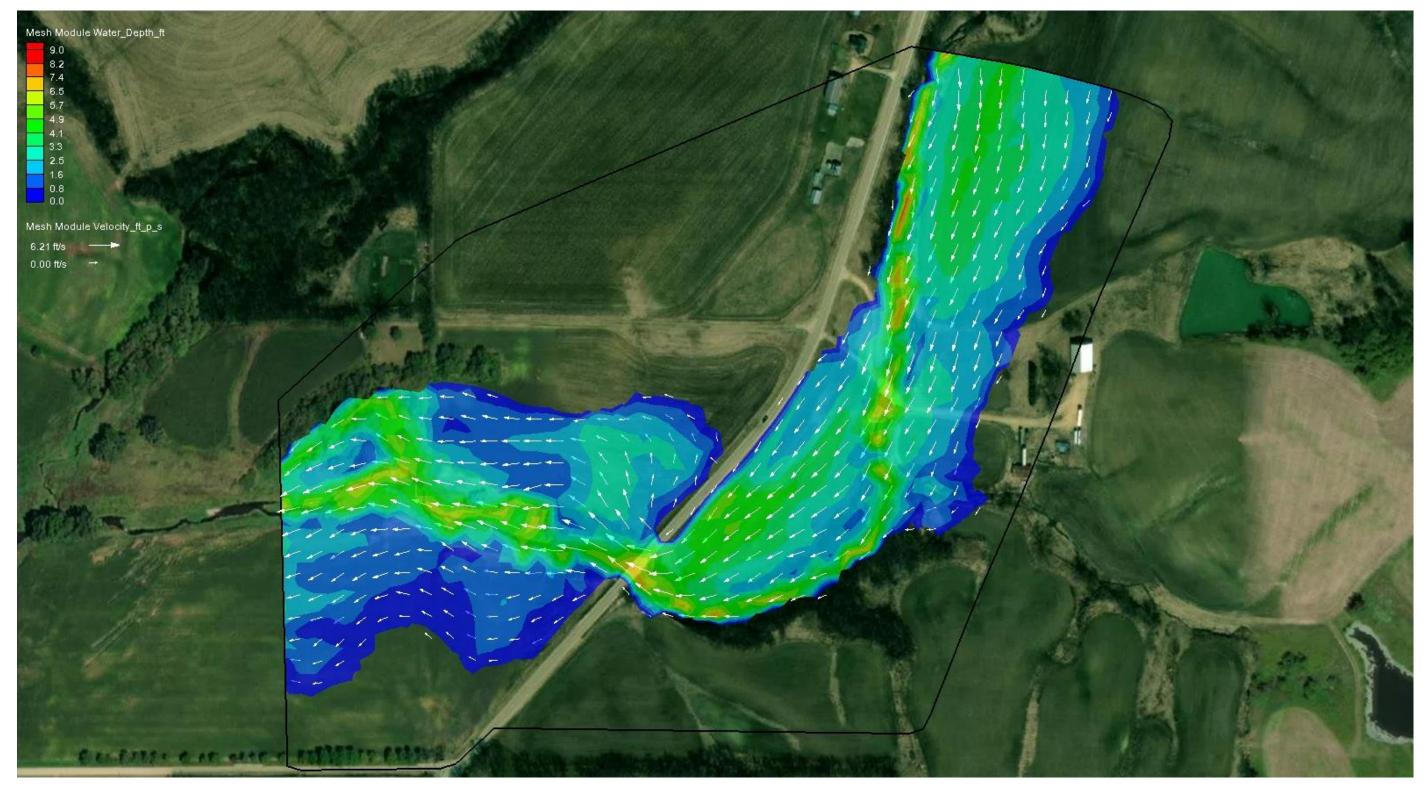


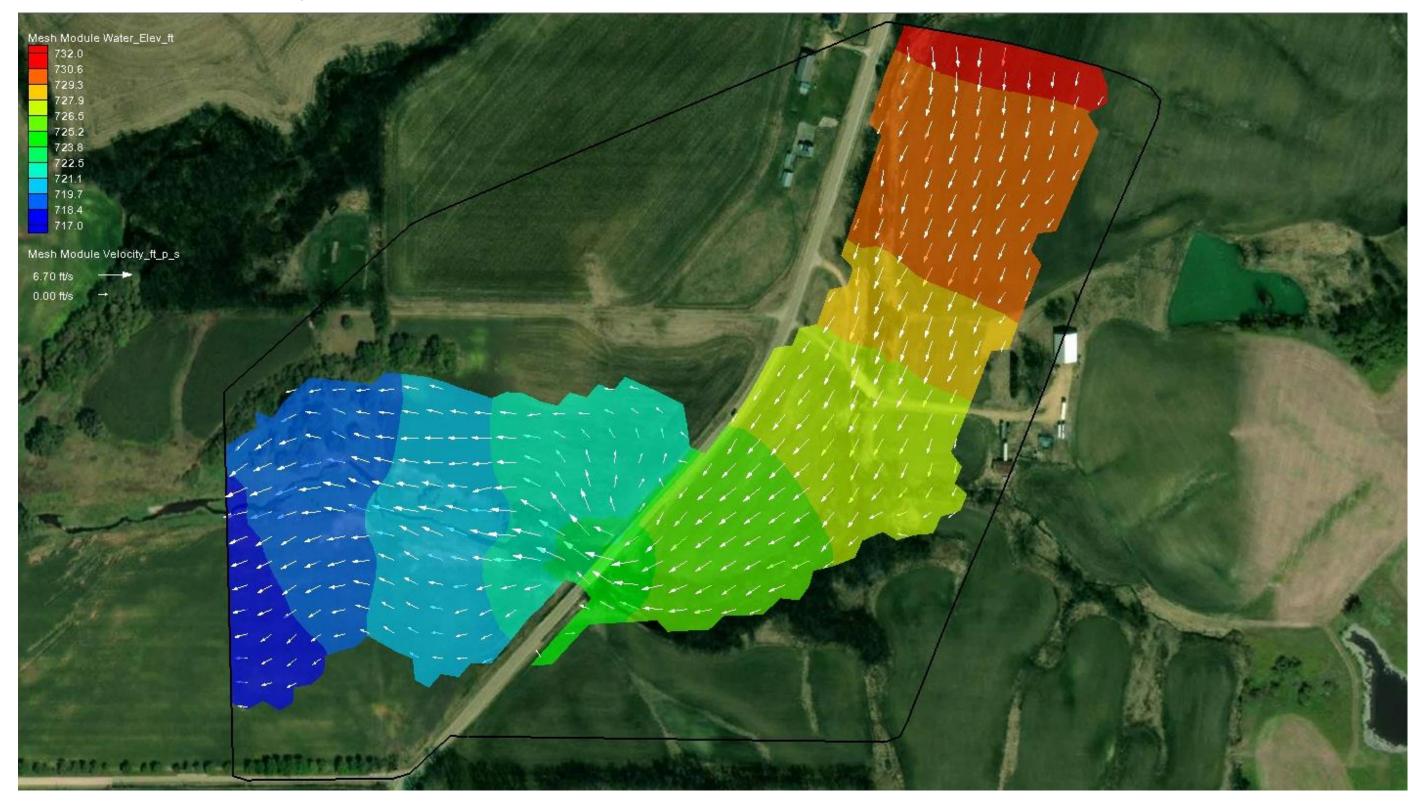
10-Year Storm – Velocity/Depth Results



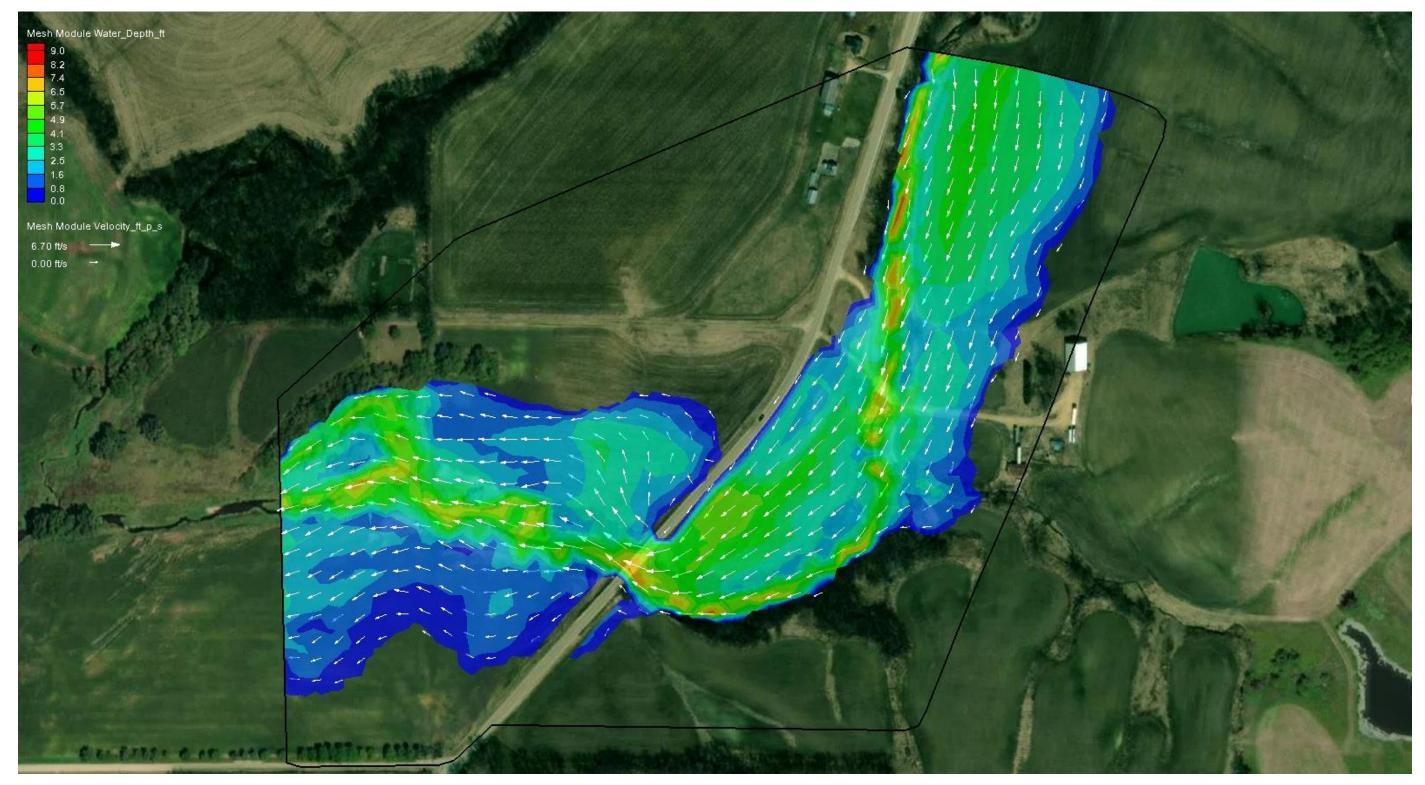


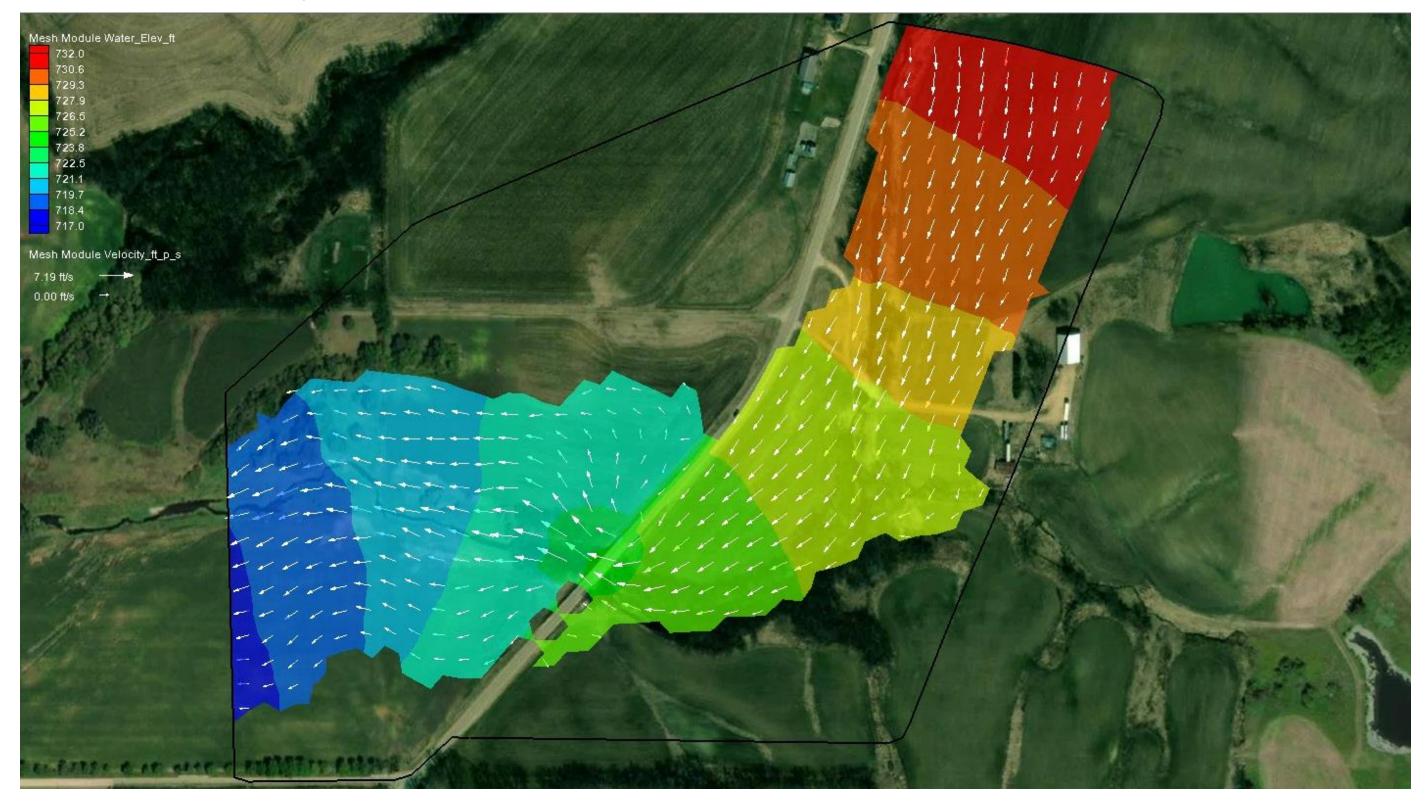
50-Year Storm – Velocity/Depth Results



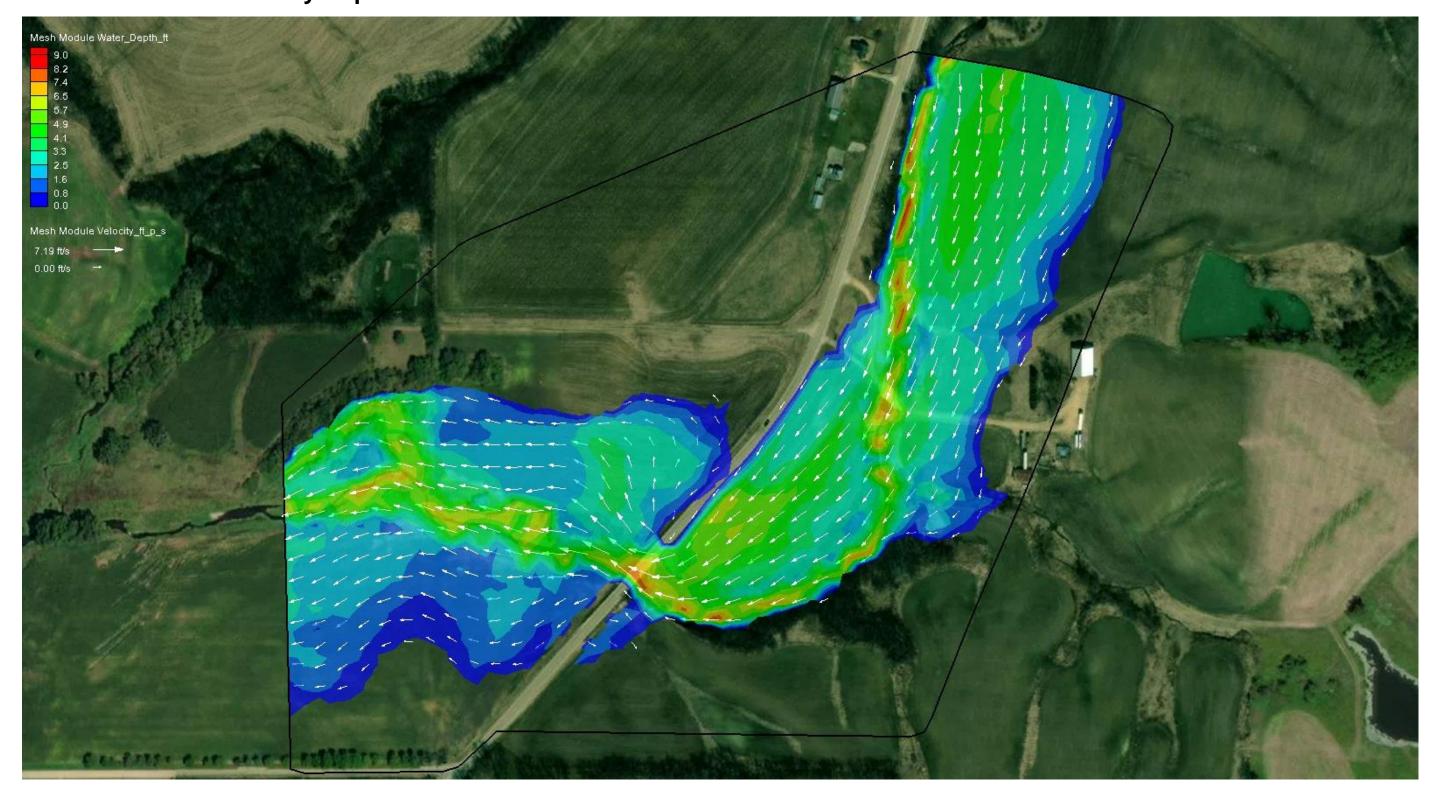


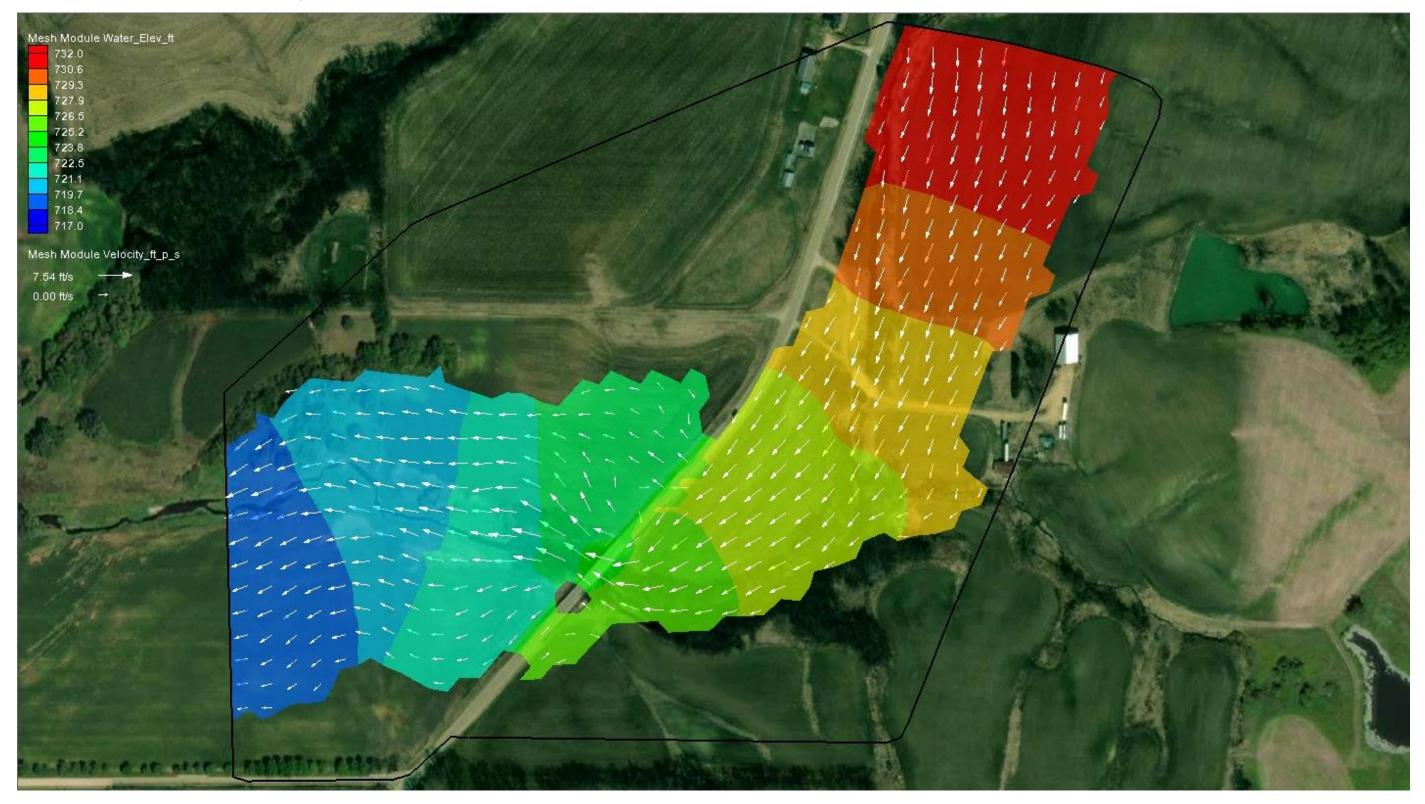
IL 78 Plum River SMS Quick Check Model 100-Year Storm – Velocity/Depth Results



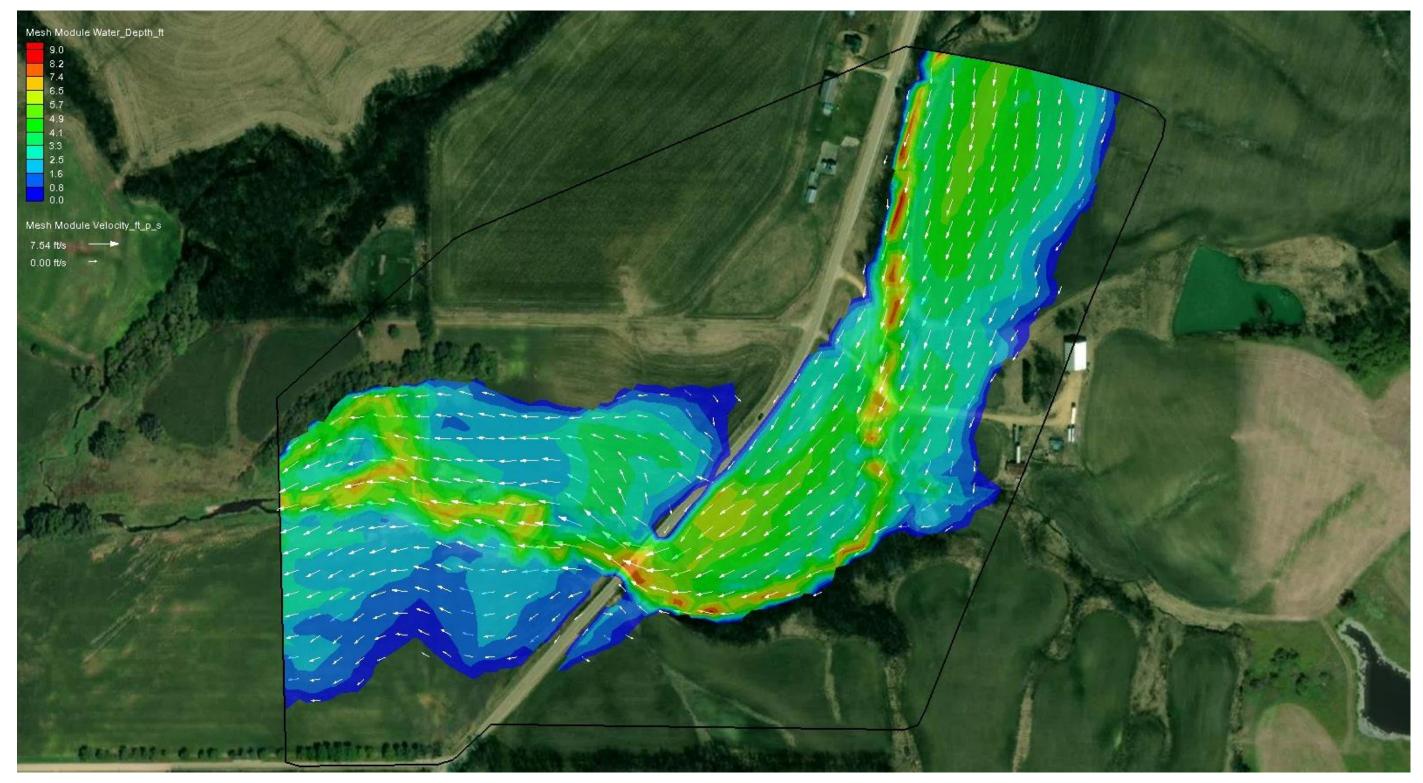


IL 78 Plum River SMS Quick Check Model 200-Year Storm – Velocity/Depth Results





IL 78 Plum River SMS Quick Check Model 500-Year Storm – Velocity/Depth Results



SUPPLEMENT to QUICK CHECK GUIDEBOOK



094-2004 – US 34 over Cedar Creek – District 4 – Twin Steel Arch Culvert

Quick Check Model

FIS

Date: 11/8/2021 County: Warren Route: US 34 Watercourse: Cedar Creek ESN: 094-2004 Drainage Area: 33.4 Sq. Mi. (21,376 acres)

Structure Type: \Box Bridge 🛛 Culvert

Hydrology Method (check all that apply):

StreamStats DHEC-HMS

Discharges/ Flows									
Y	2	5	10	25	50	100	200	500	
Analyzed			\boxtimes		\boxtimes	\boxtimes	\boxtimes	\boxtimes	
BC ID: 1	1,757	2,856	3,705	4,761	5,514	6,319	7,098	8,310	
BC ID: 2	237	385	499	641	743	851	956	1,119	
BC ID: 3	36	59	76	98	114	130	146	171	
BC ID:									
Source of Topography/ Surface Data (check all that apply):									

 \Box TR-20 \Box Rational Method \Box Other:

Source of Topography/ Surface Data (check all that apply):

 \boxtimes SMS \Box LiDAR \Box Bathymetry \Box Cross Sections □Text File

Mesh Generator Coverage:

Mesh Name: Mesh Generator Mesh Mesh Type: ⊠Paving □Patching Vertices Spacing: Max: 50 ft.; Min: 50 ft. Mesh Density (Elements/ Acre): 10,601 / 261.1 = 40.6

Monitor Lines & Points Coverage: Number of Monitor Lines: 5 Number of Monitor Points: 0

Materials Coverage: Manning's "n" Value used: 0.060

Boundary Conditions Coverage:

Number of BC Arcs: 4

BC ID: 1	Type:	⊠Inlet-Q	□Exit-H	Loc	cation: NE	
BC ID: 2	Type:	⊠Inlet-Q	□Exit-H	Loc	cation: <mark>SE</mark>	
BC ID: 3	Type:	⊠Inlet-Q	□Exit-H	Loc	cation: <mark>S</mark>	
BC ID: 4	Type:	□Inlet-Q	⊠Exit-H	Loc	cation: W	
BC ID:	Type:	□Inlet-Q	□Exit-H	Loc	cation:	
H Channel Calcul	ator Normal	Source:	\Box DEM	□FIS Profile		

Exit-H Channel Calculator Normal Depth Slope (ft/ft):

Model Control:

Time Step (sec.): 1 Simulations Length (hrs.): 4

Output Method:
Specified Frequency
Specified Times
Simulation End
Unsteady Output

Model Convergence: Time of Convergence at (hrs.): 4

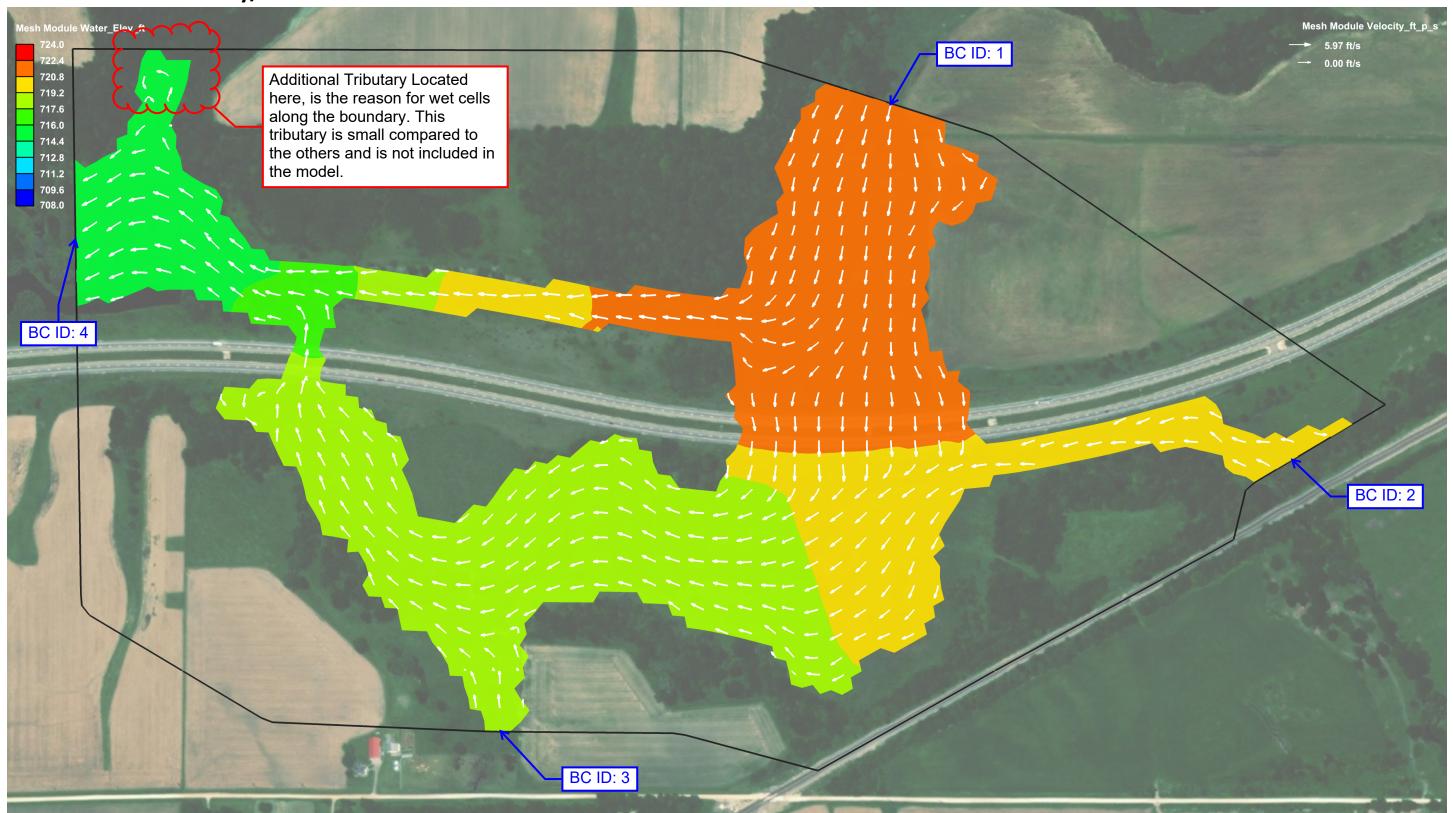
Results:

 \boxtimes Roadway Overtopping occurs between the 5Y & 10Y Ghere Ratio (Mesh Density/ Time of Convergence): 40.6 / 4 = 10

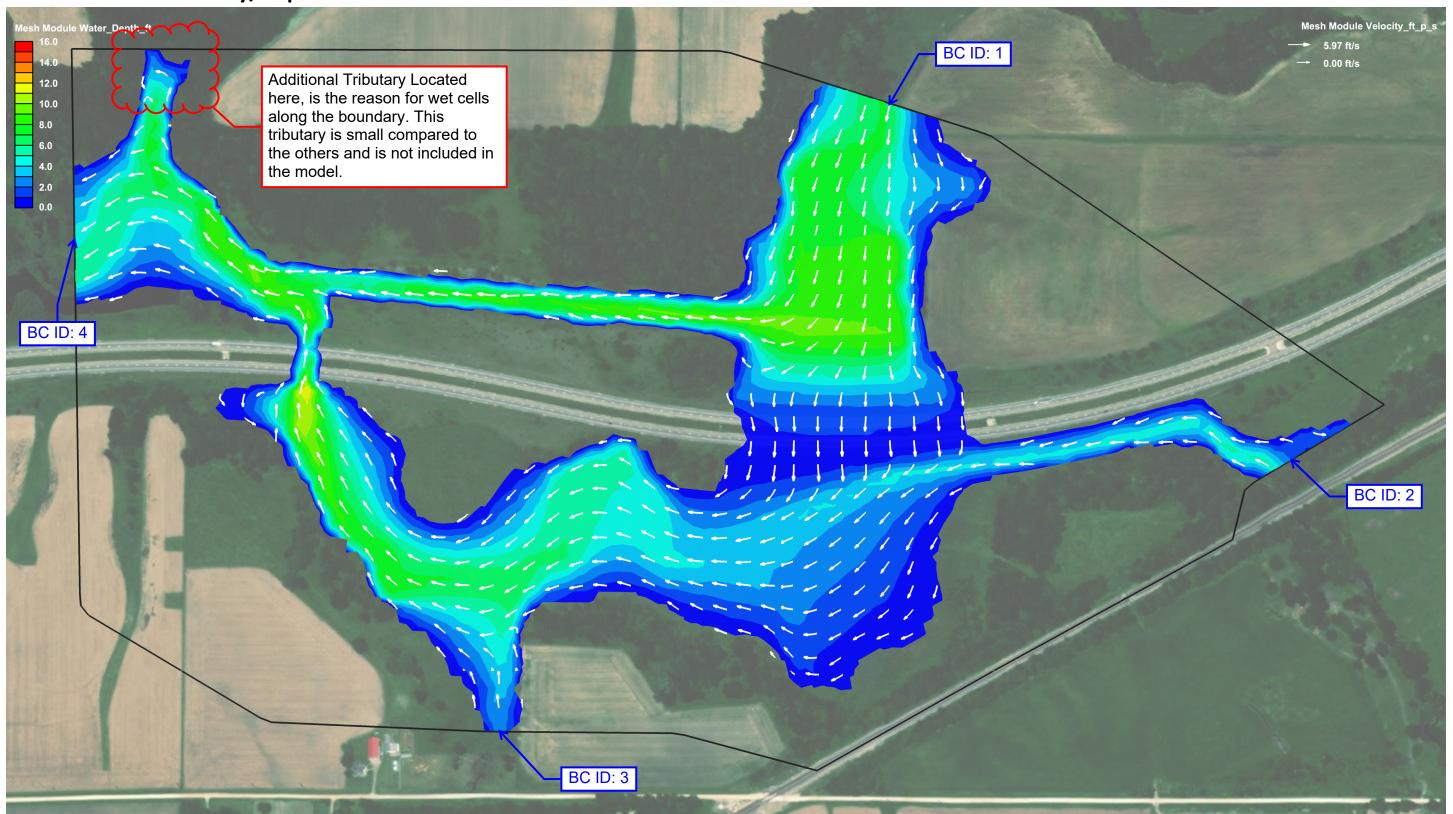
Notes: Four streamstats runs were completed, three at inflow locations and one at the system outfall. The flow at the outfall was used for the model flows but it was reduced at each of the inflow locations by the ratio of the streamstats area tributary to the inflow location over the overall streamstats area tributary to the system outfall.

Revised: June 21, 2021

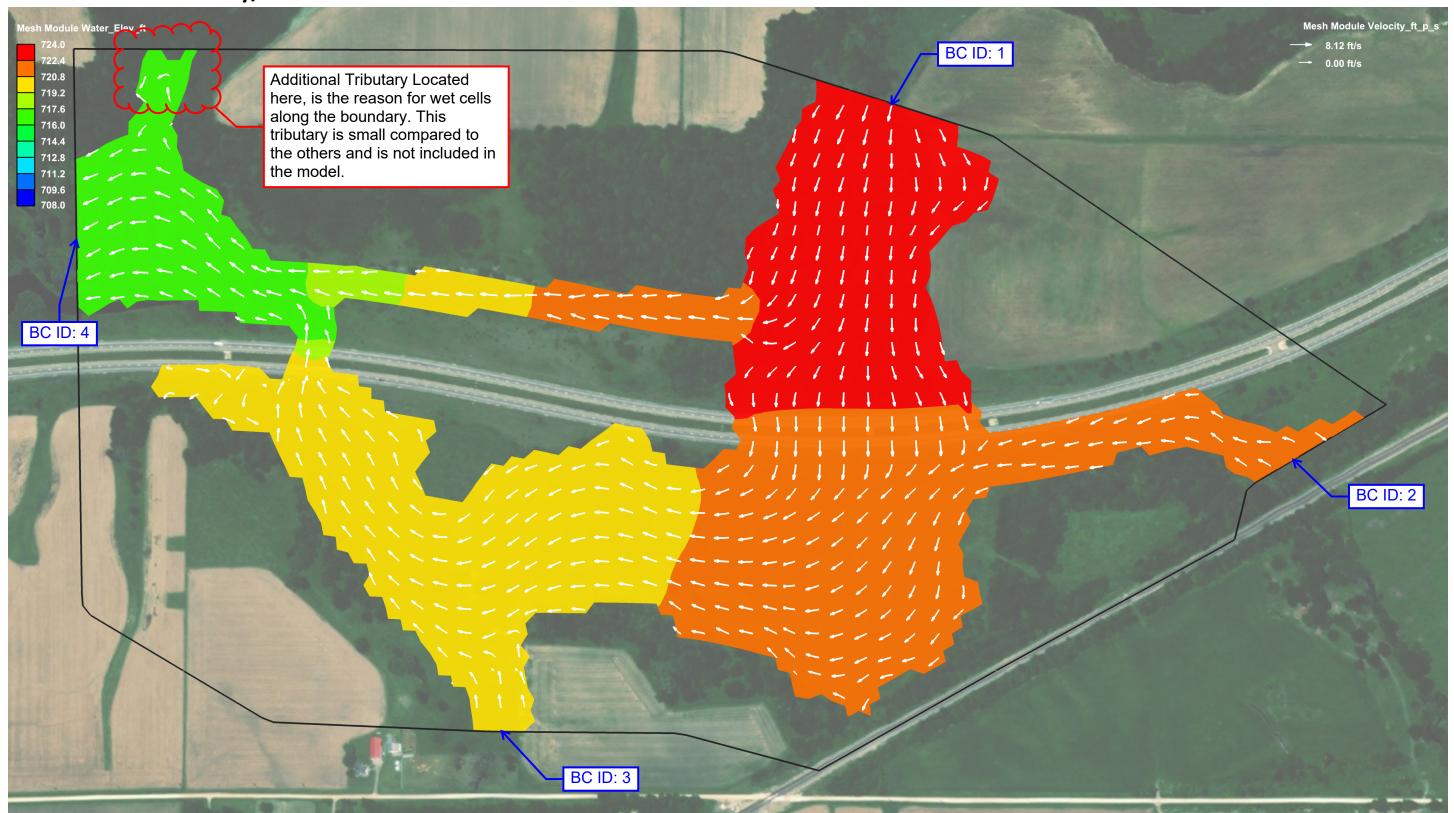
US 34 Over Cedar Creek SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



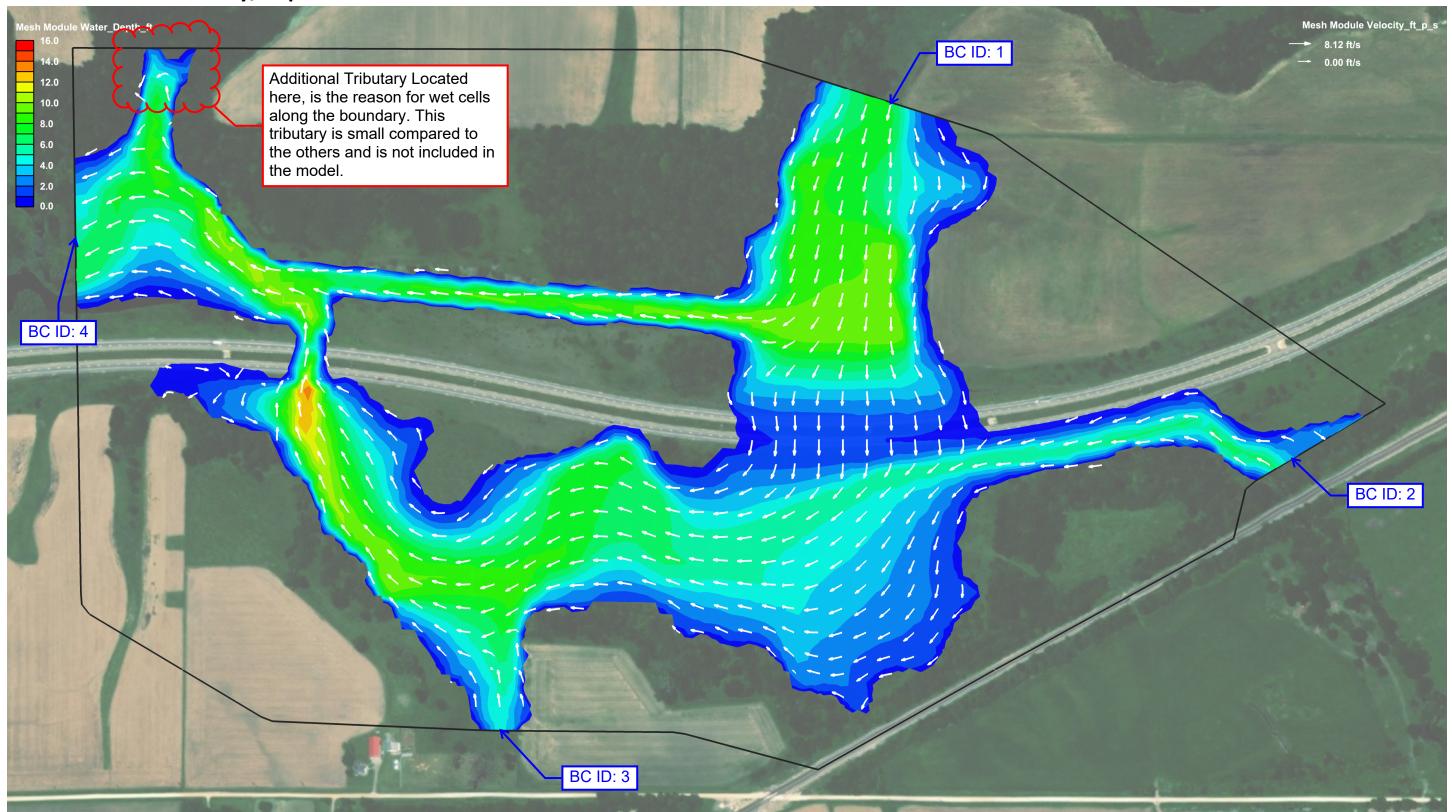
US 34 Over Cedar Creek SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



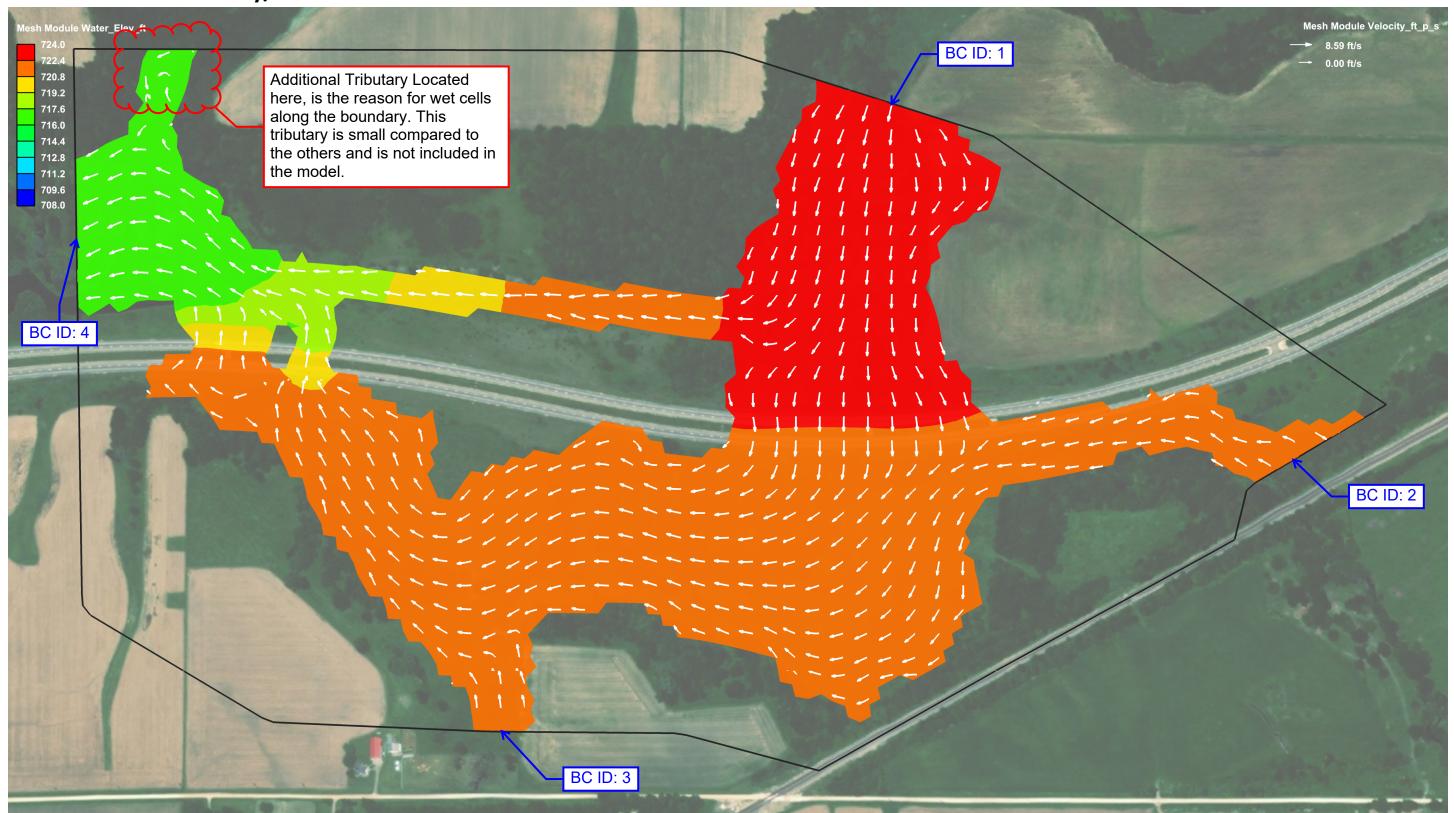
US 34 Over Cedar Creek SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



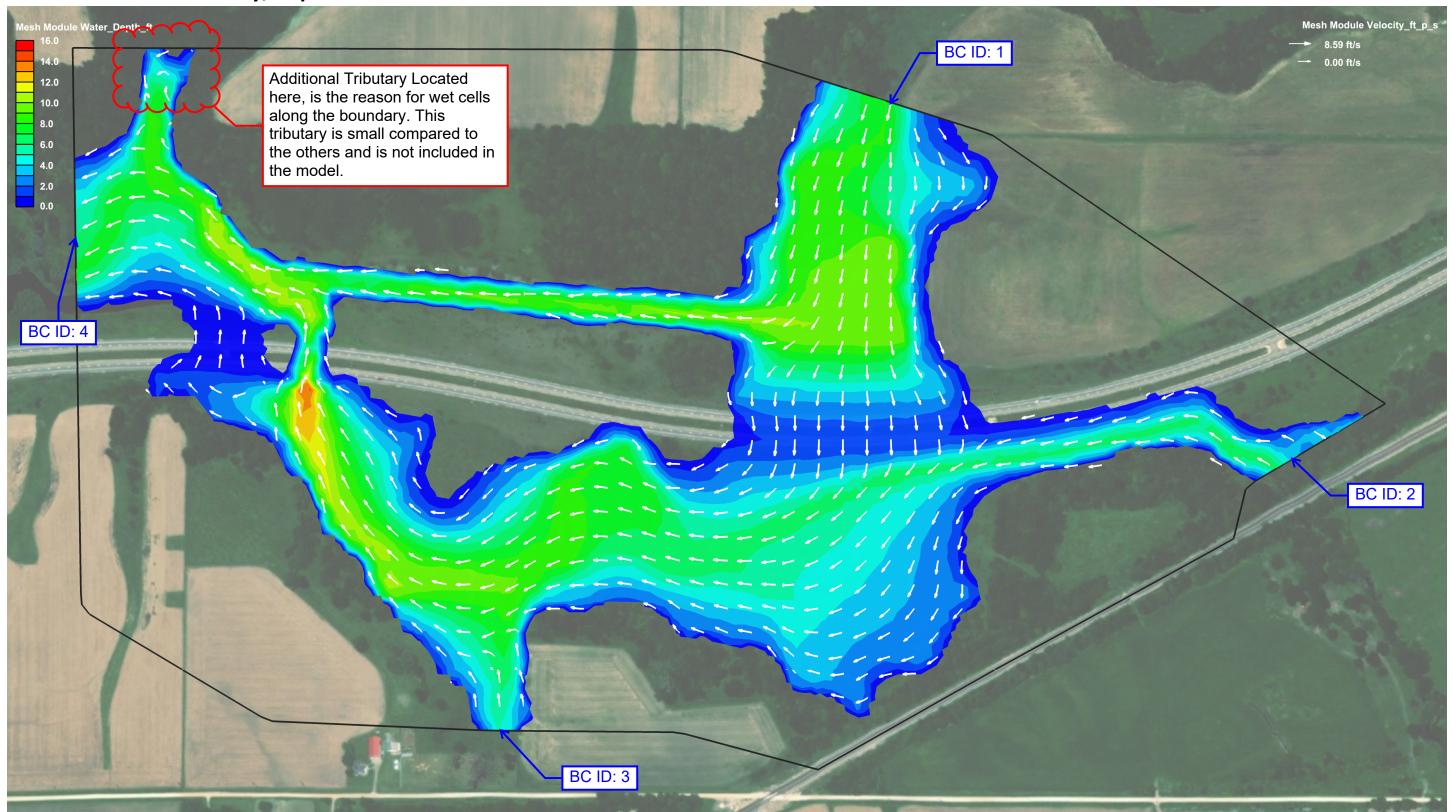
US 34 Over Cedar Creek SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



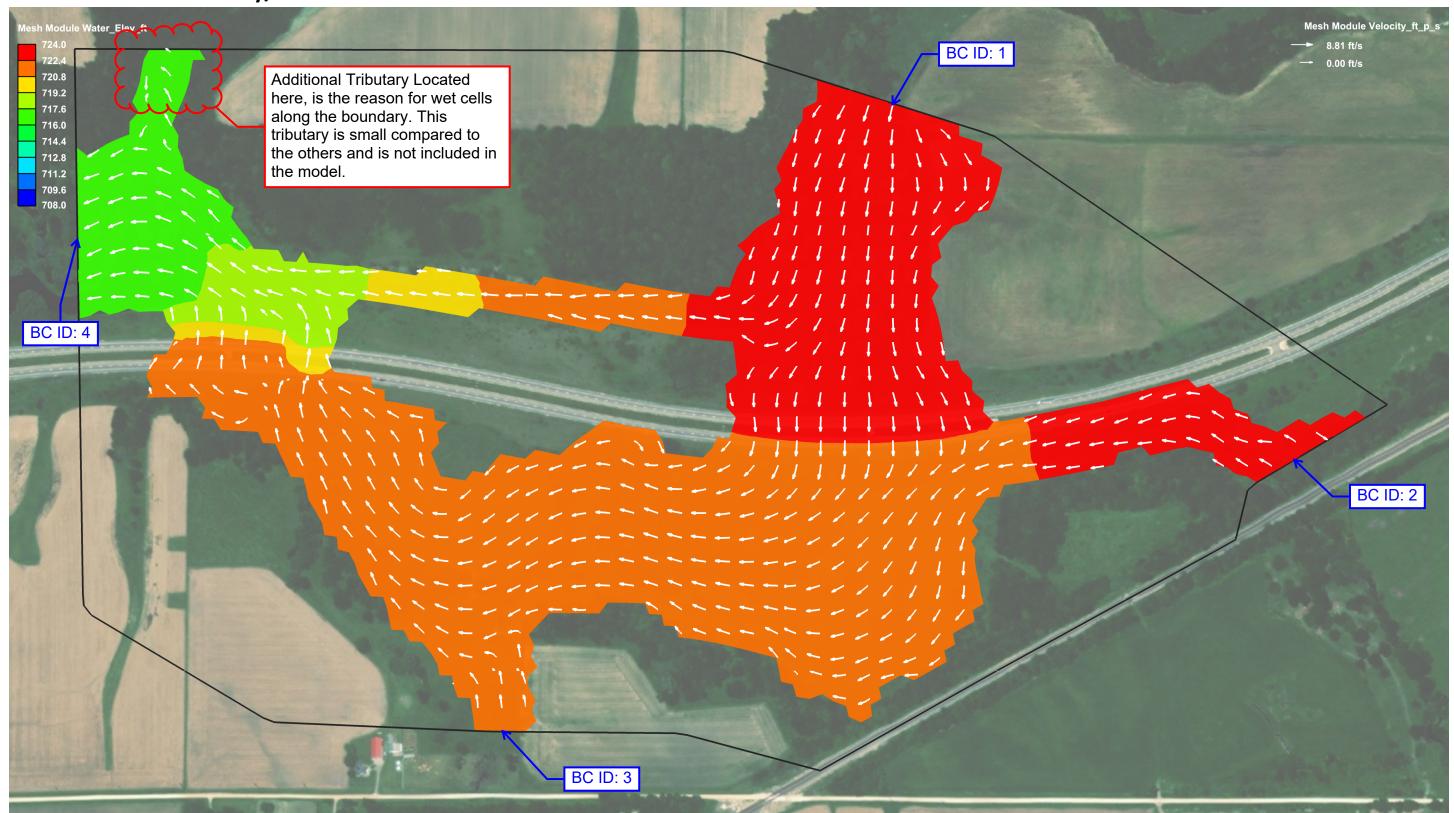
US 34 Over Cedar Creek SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



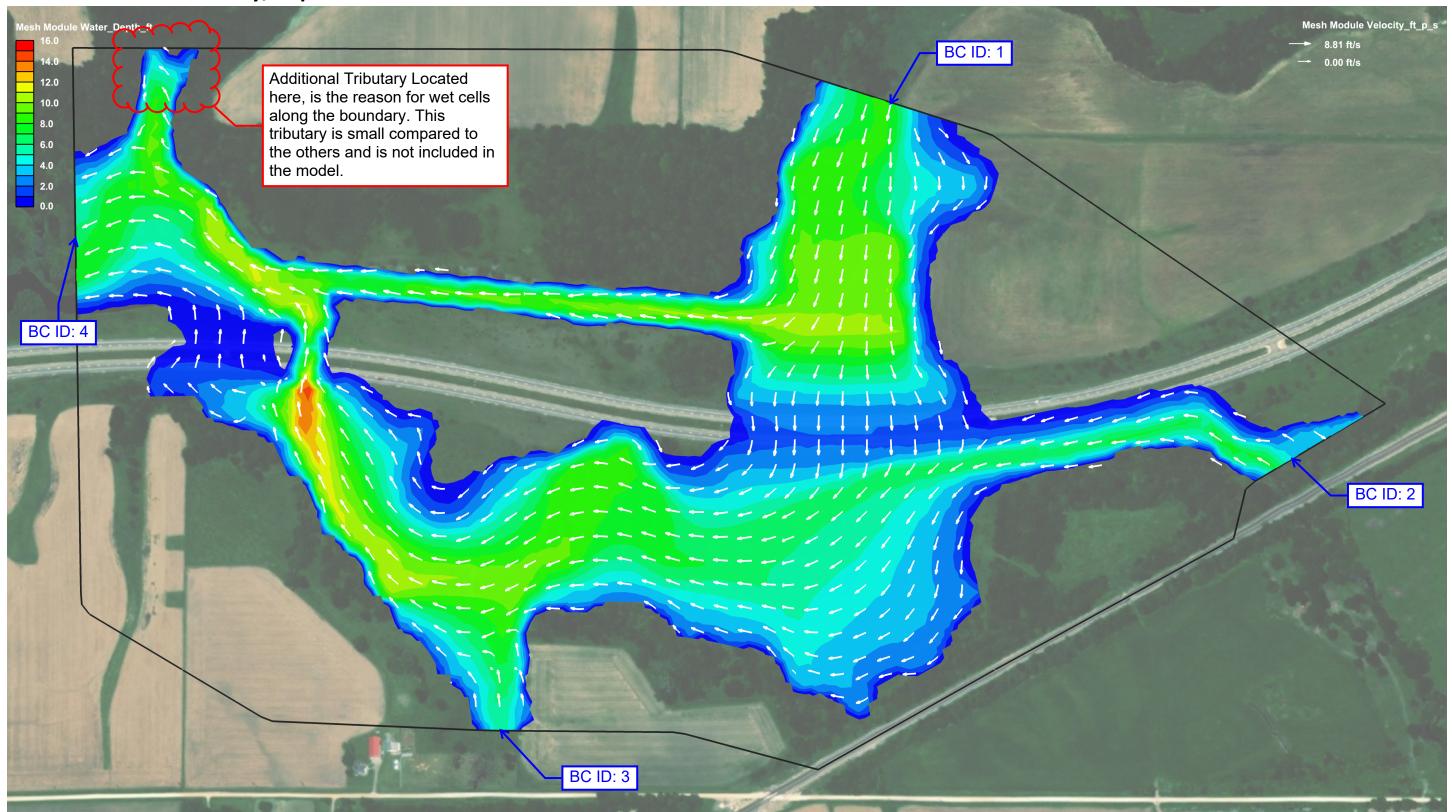
US 34 Over Cedar Creek SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



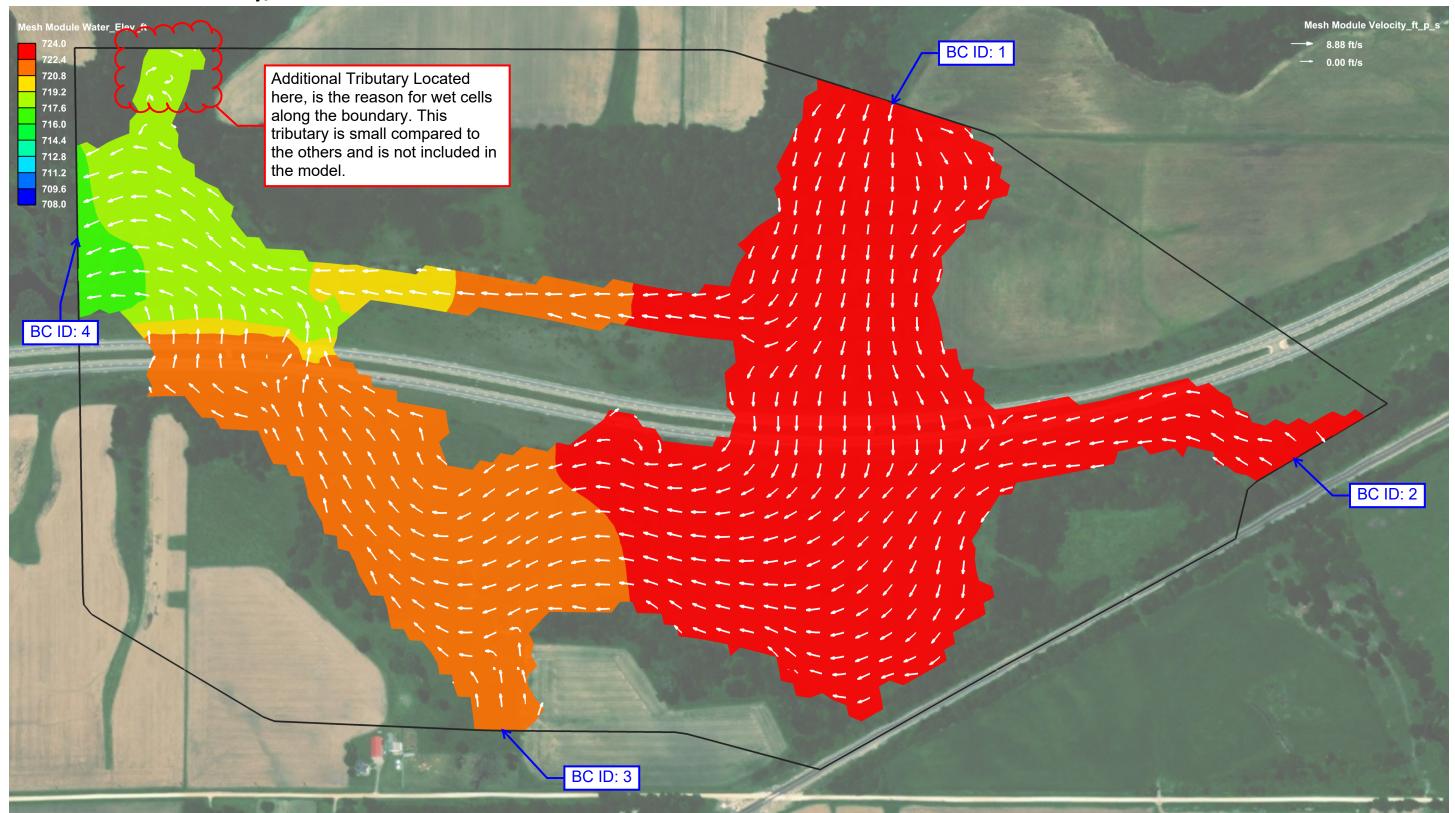
US 34 Over Cedar Creek SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



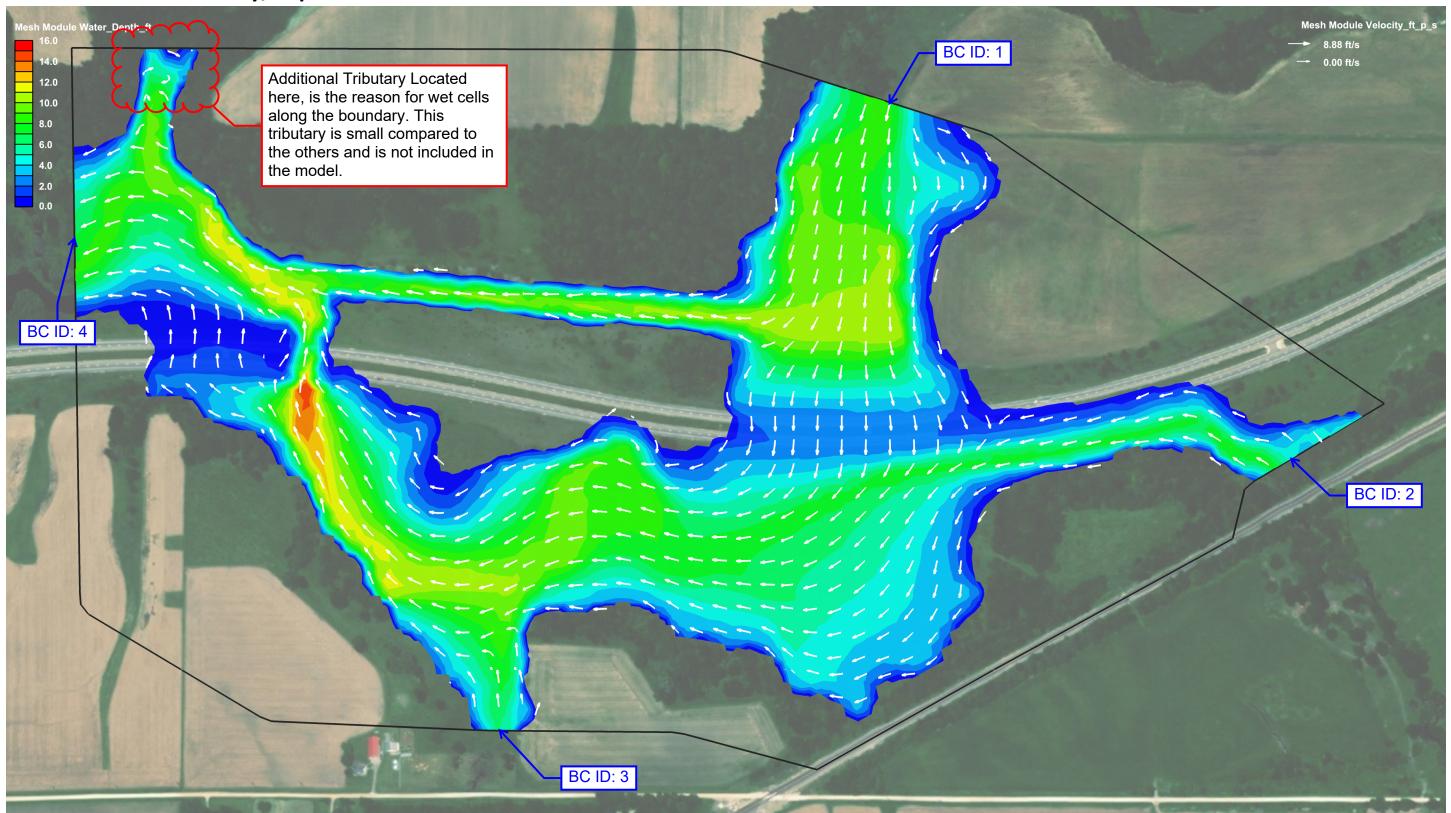
US 34 Over Cedar Creek SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



US 34 Over Cedar Creek SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



US 34 Over Cedar Creek SMS Quick Check Model 500-Year Storm - Velocity/Depth Results



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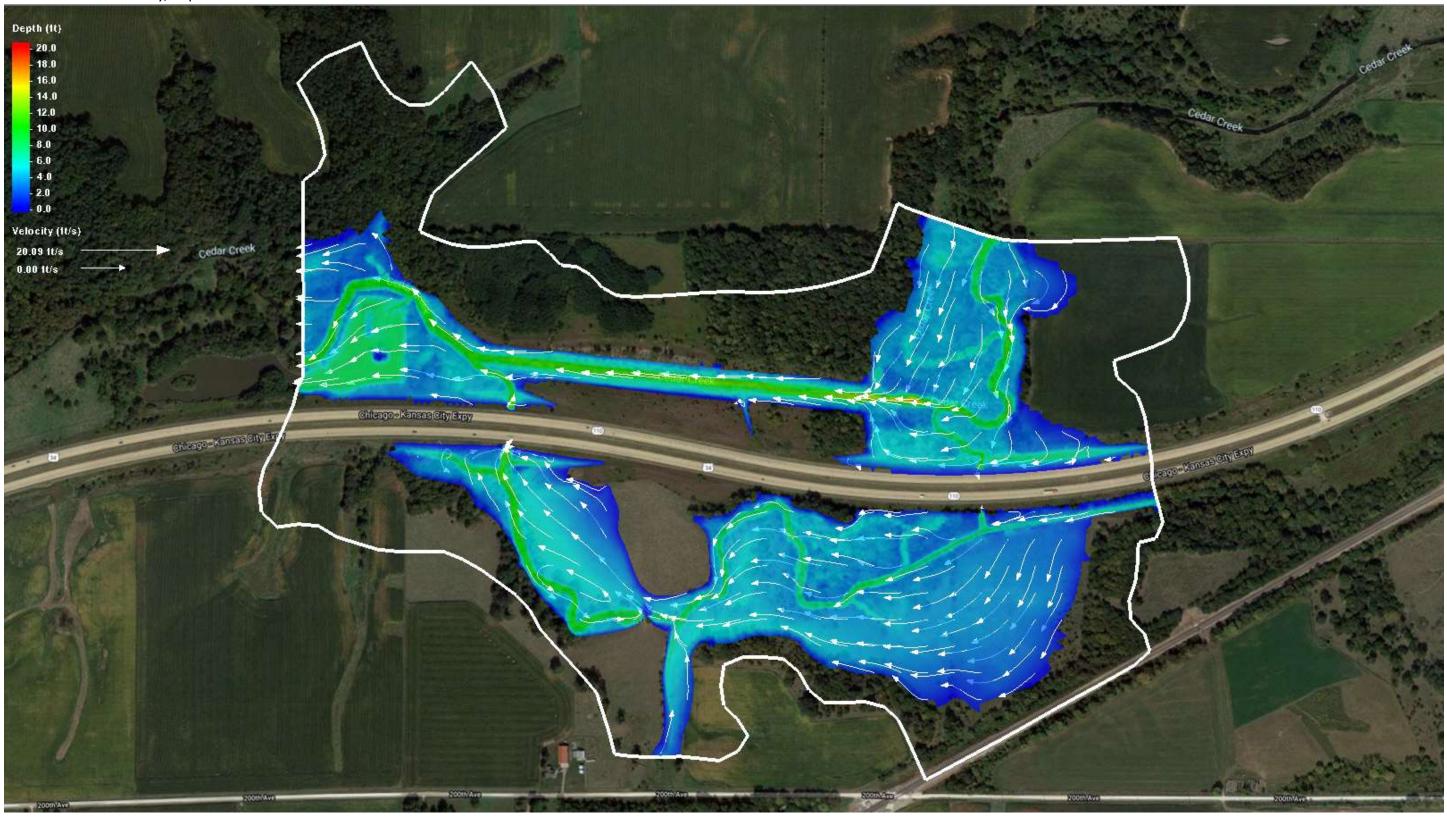


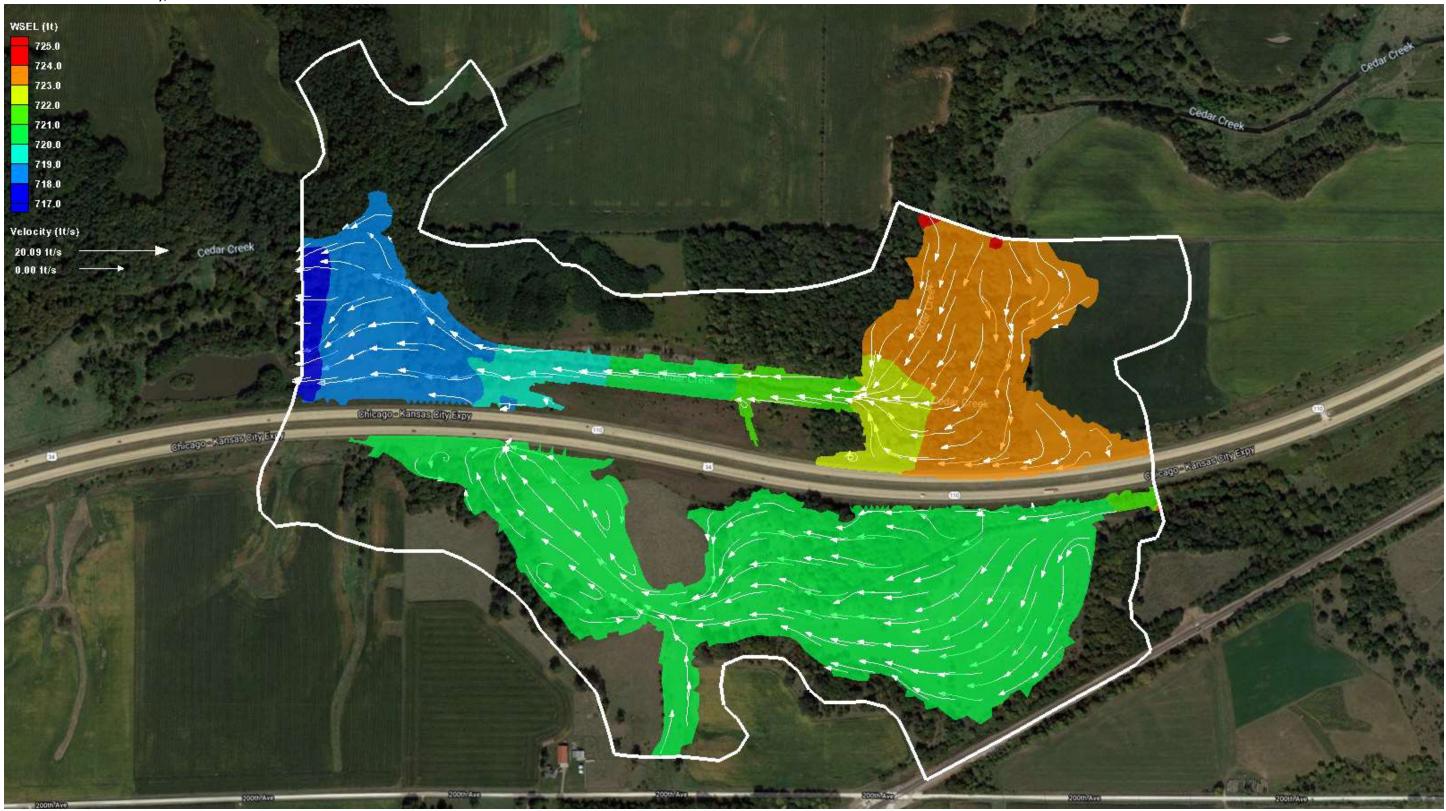
094-2004 – US 34 over Cedar Creek – District 4 – Twin Steel Arch Culvert

Detailed Model

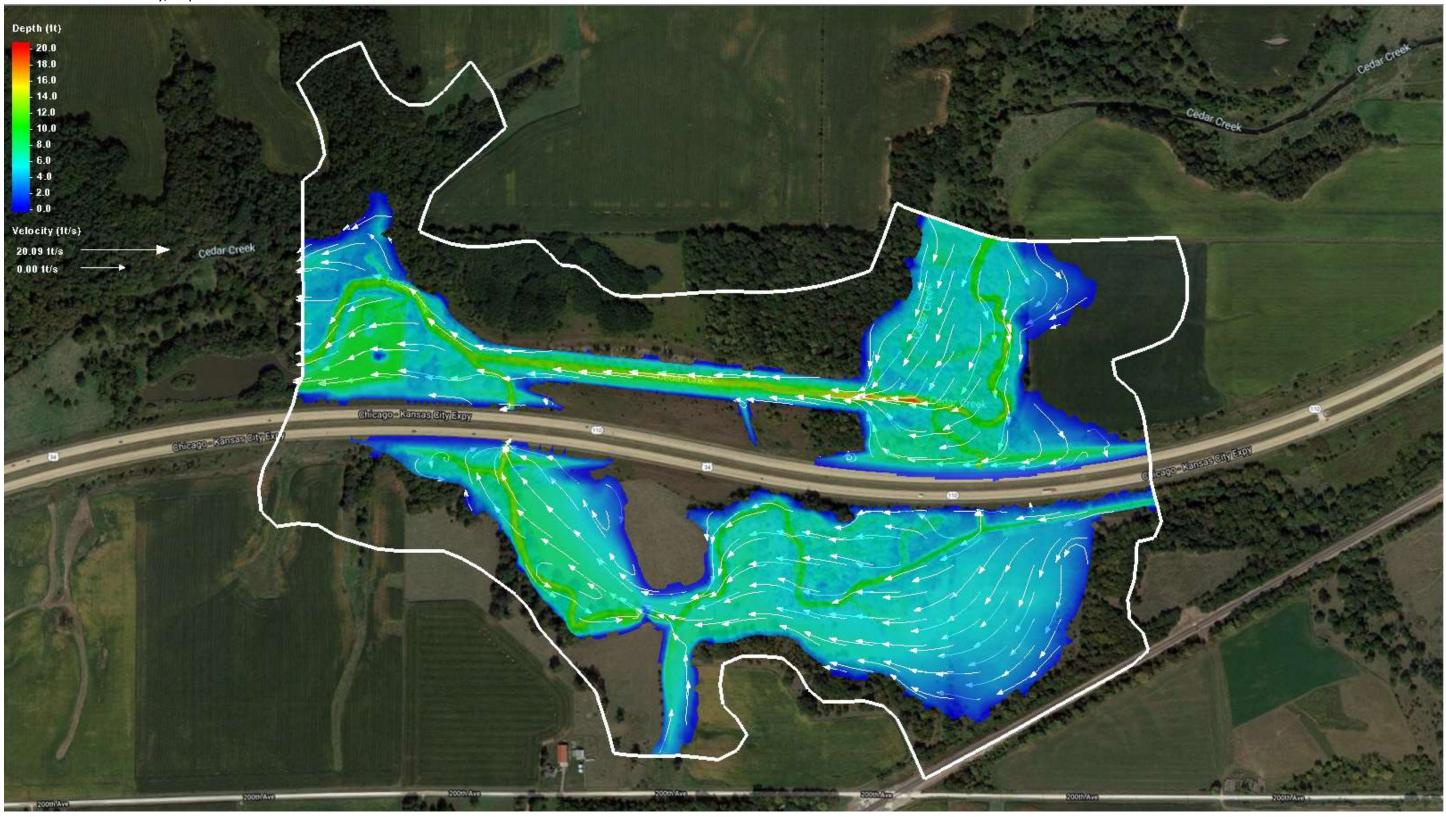


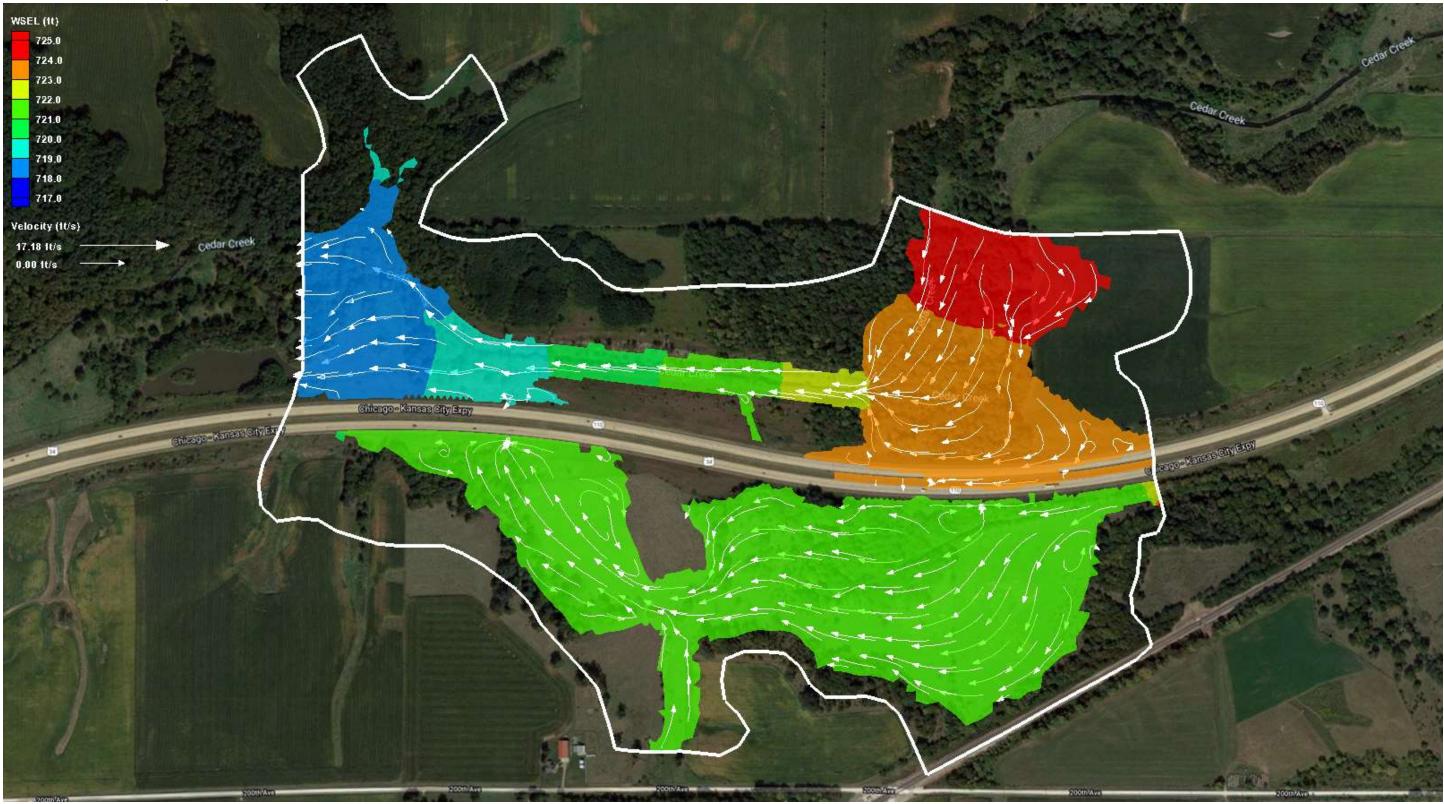
10-Year Storm – Velocity/Depth Results



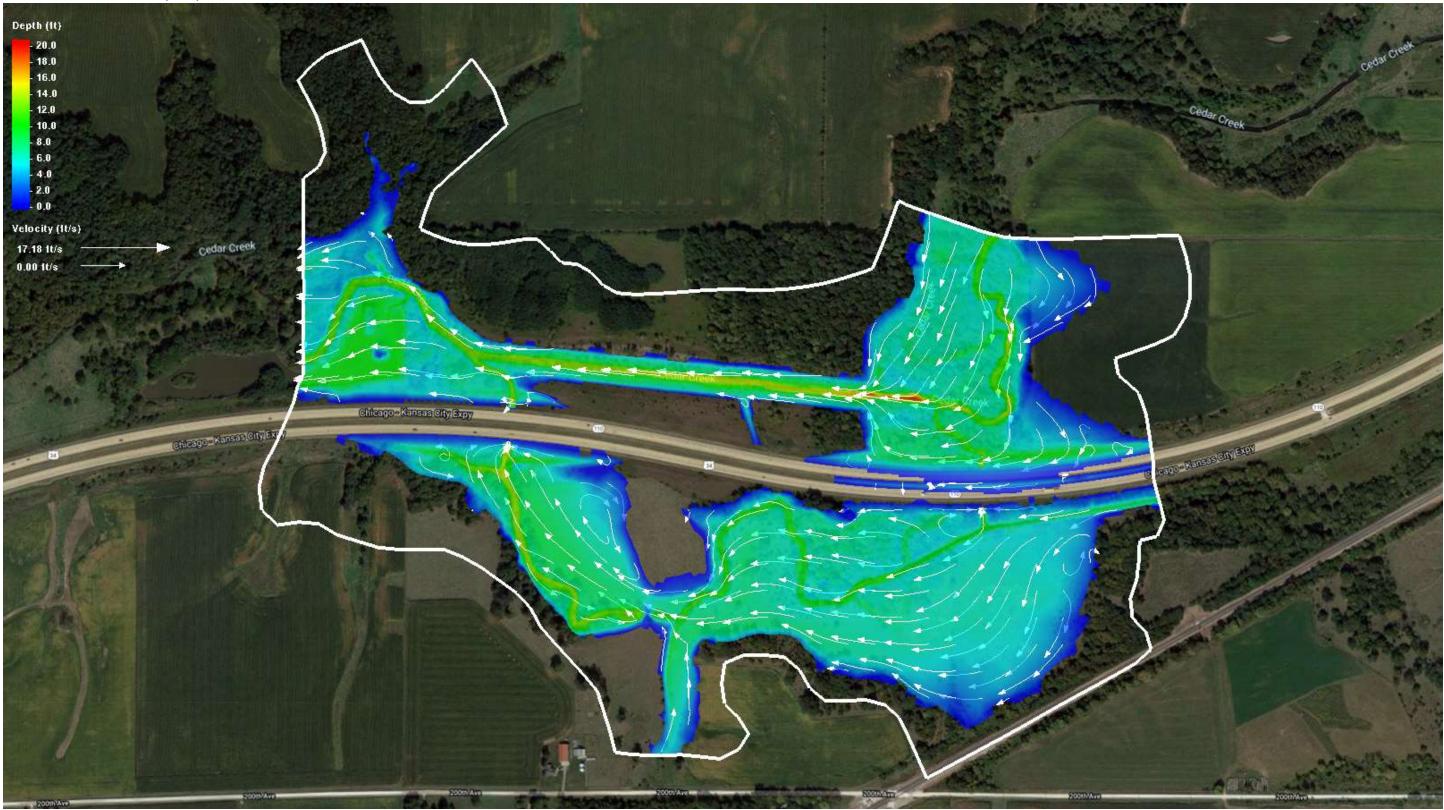


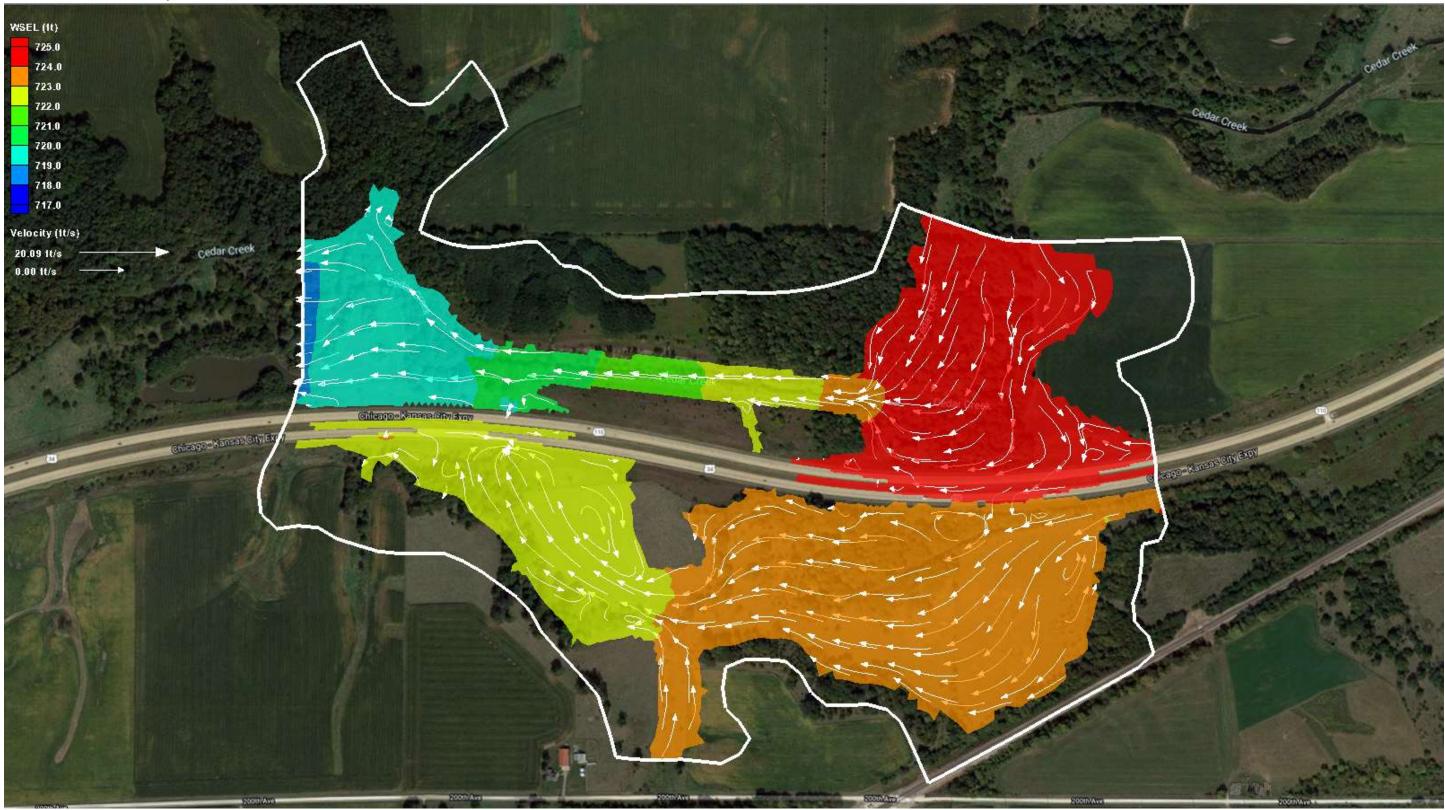
50-Year Storm – Velocity/Depth Results



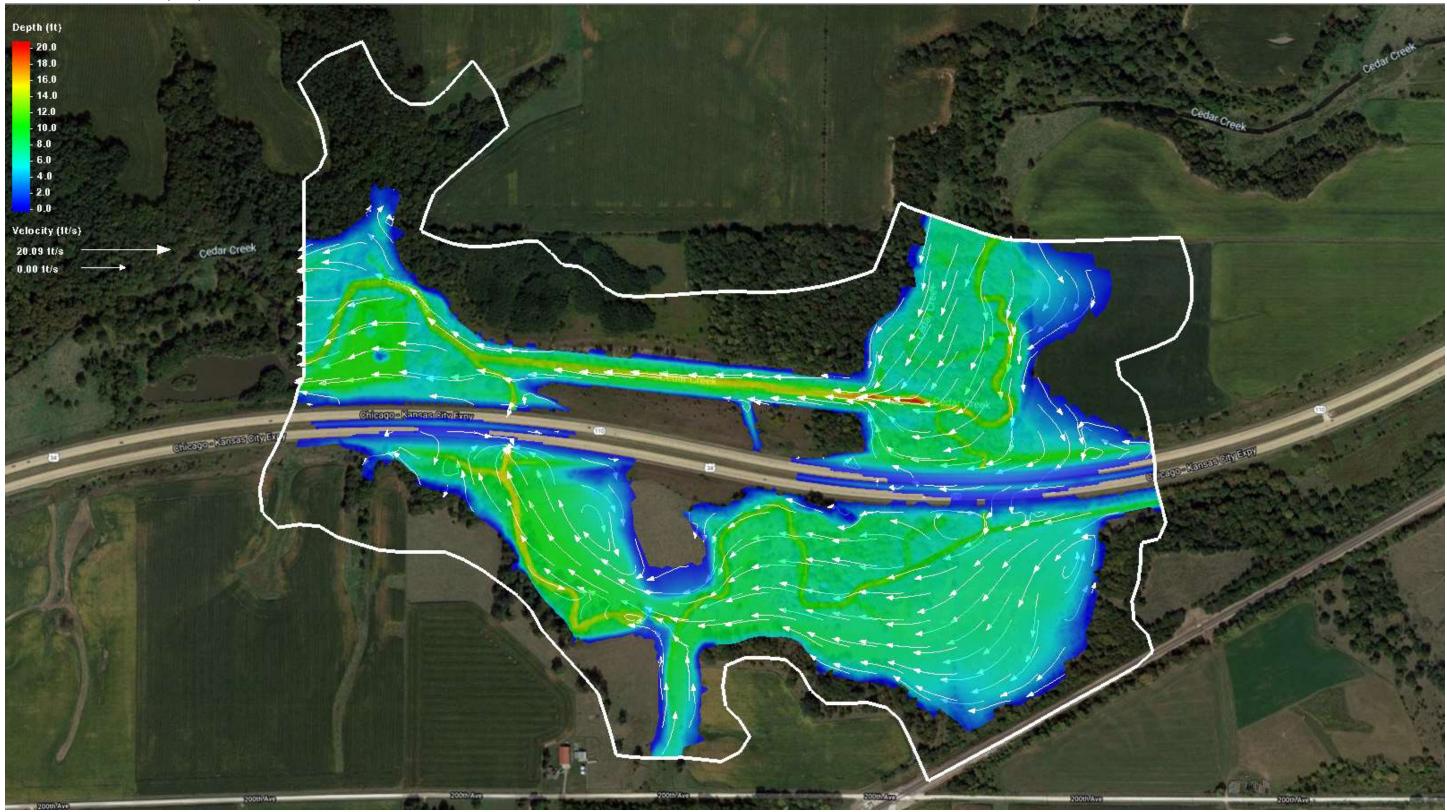


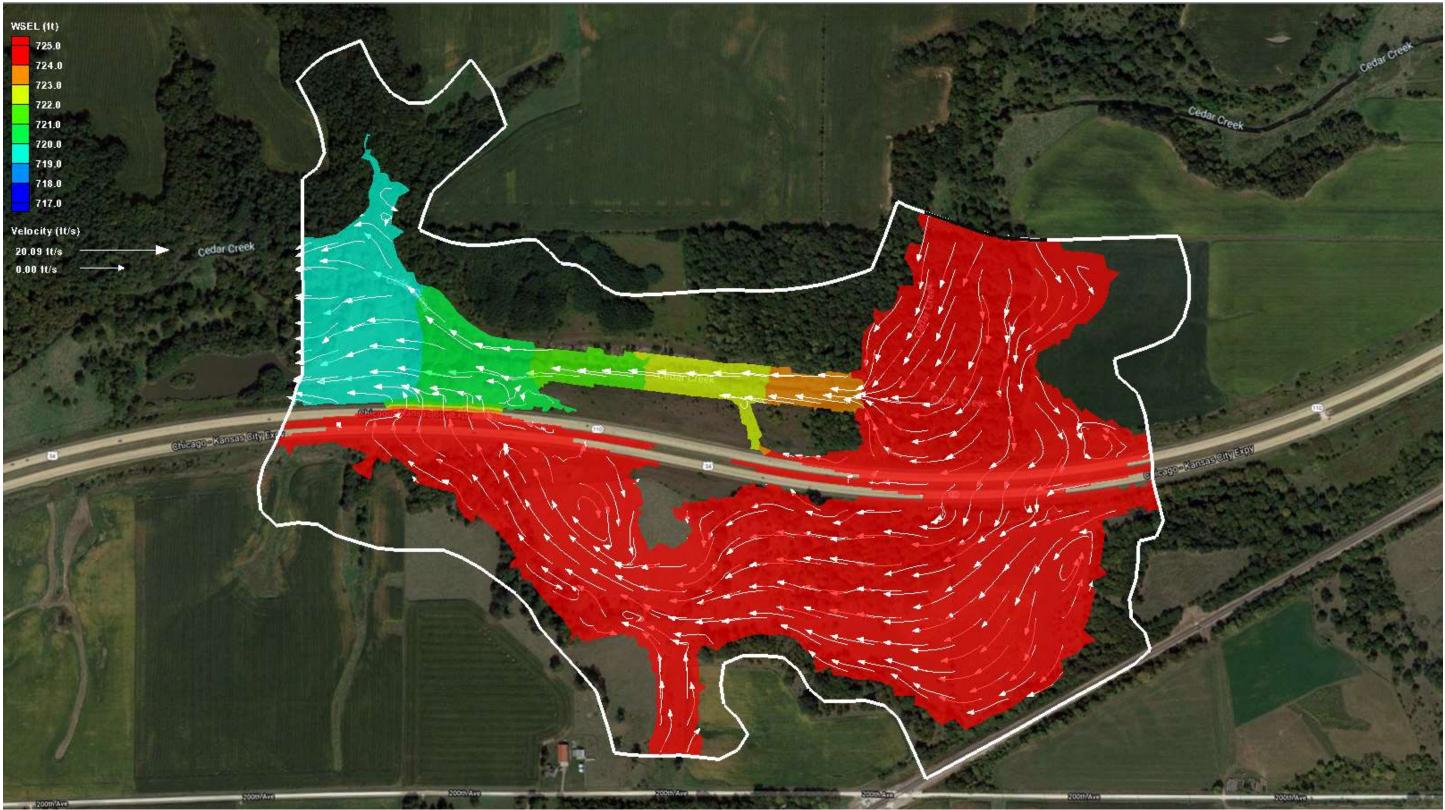
100-Year Storm – Velocity/Depth Results





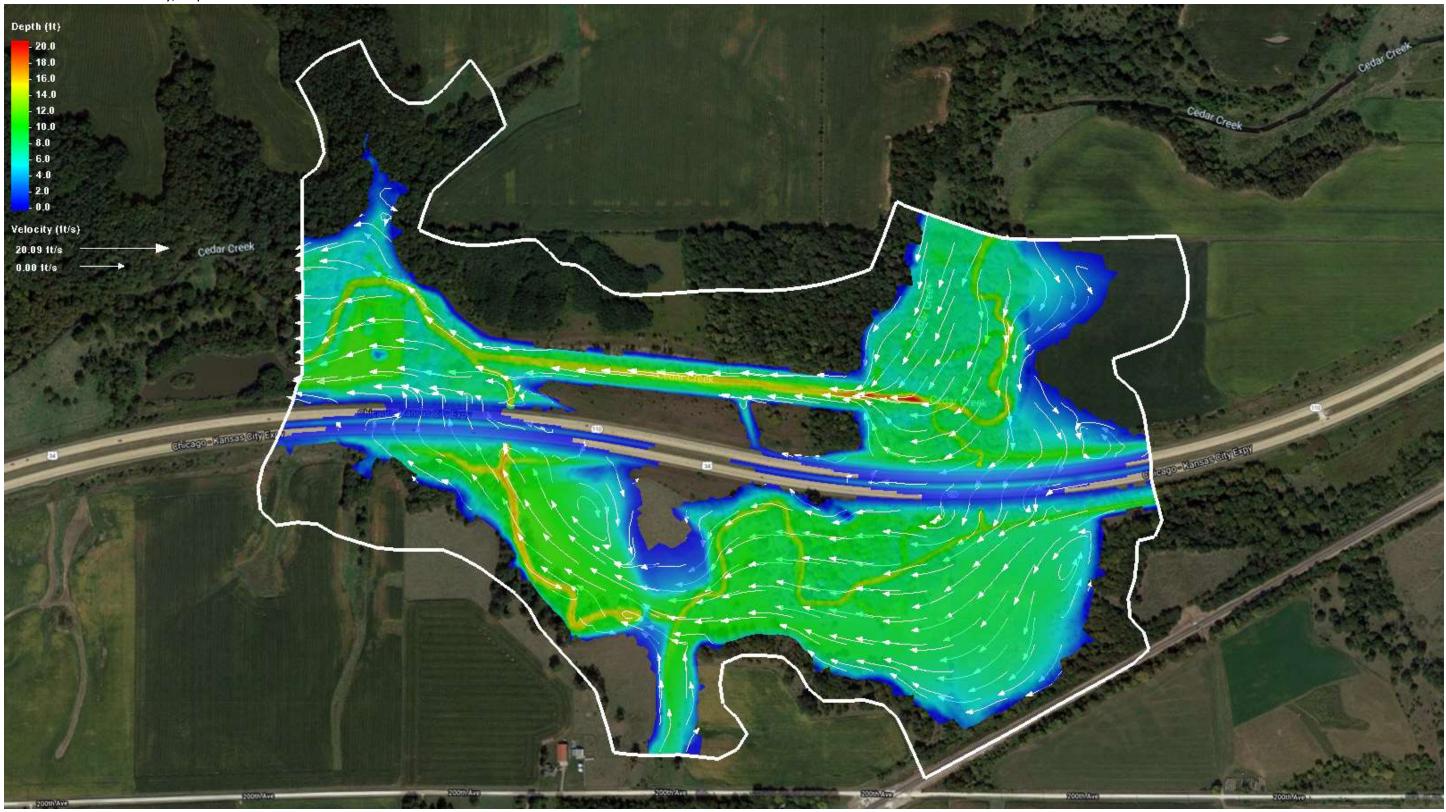
200-Year Storm – Velocity/Depth Results





US-34 Over Cedar Creek SMS Detailed Model

500-Year Storm – Velocity/Depth Results



SUPPLEMENT to QUICK CHECK GUIDEBOOK



095-0009 – IL 15 over Nashville Creek – District 8 – Single Span Bridge 24 feet

IL Hwy 15 Over Nashville Creek



SMS Quick Check Model

SMS Quick Check Model for IL Hwy 15 Over Nashville Creek Near Nashville

то:	Neil Vanbebber, IDOT Rich Guise, IDOT Nicholas Jack, IDOT
From:	2IM Group, LLC.; Hanson Professional Services Inc.
SUBJECT:	SMS Quick Check Model for IL Hwy 15 Over Nashville Creek Near Nashville
DATE:	September 17 th , 2021

Introduction

This crossing is located in Washington County on IL Hwy 15. It is west of Nashville, IL within city limits. Nashville Creek flows from the south towards IL Hwy 15. S Willowbrook Dr runs parallel to Nashville Creek and crosses the creek 300-ft upstream of IL Hwy 15. A tributary joins Nashville Creek 300-ft upstream of IL Hwy 15 near the Willowbrook Dr crossing. Separate flows are entered in for Nashville Creek and the tributary. The IL Hwy 15 and Willowbrook Dr crossings are modelled as openings in the 2D mesh terrain. The IL Hwy 15 opening is approximately 40'. The quick check summary table and exhibits are attached. The following paragraph contains a brief description of the site hydrology.

Hydrology

The hydrology for this site was developed from Streamstats. Streamstats queries were made for both Nashville Creek and the tributary upstream of IL Hwy 15. The 10-year, 50-year, 100-year, and the 500-year storm events urban discharges reported in the Streamstats report were applied to the model boundary at Nashville Creek and the tributary. The total flow at the bridge was distributed between both streams by the ratio of each tributary drainage area to that of the total drainage area at the structure. A 200-year discharge was interpolated from the Streamstats output. See the summary table on the following page for the flow rates used.

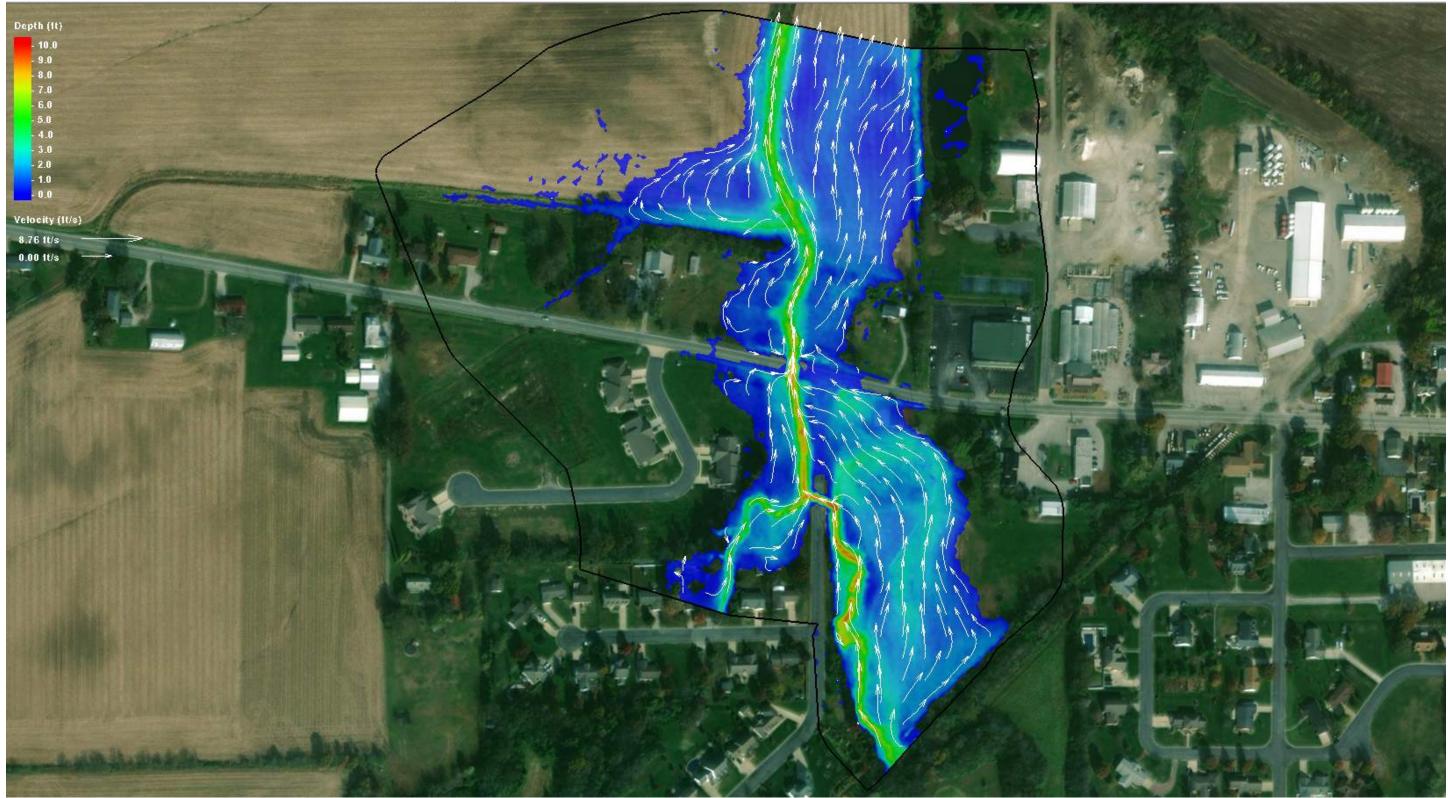
Date: 9/17/2021 County: Washington Route: IL Hwy 15 Watercourse: Nashville Creek ESN: 095-0009 Structure Type: 🛛 Bridge □ Culvert Drainage Area: 2.1 Sq. Mi. (1325 acres) Hydrology Method (check all that apply): □FIS ⊠StreamStats □HEC-HMS \Box TR-20 □Rational Method Other: Discharges/ Flows Y 2 5 10 25 50 100 200 500 \boxtimes \boxtimes \times \boxtimes \boxtimes Analyzed 345 BC ID: 1 70 131 179 242 294 400 476 338 BC ID: 2 634 871 1178 1426 1675 1940 2314 BC ID: BC ID: Source of Topography/ Surface Data (check all that apply): ⊠LiDAR Bathymetry \Box Cross Sections Text File \Box SMS Mesh Generator Coverage: Mesh Name: QC IL15 Existing Conditions Mesh Generator Mesh Mesh Type: ⊠Paving □Patching Vertices Spacing: Max: 10 ft.; Min: 10 ft. Mesh Density (Elements/ Acre): 51424 / 50.9 = 1010.3Monitor Lines & Points Coverage: Number of Monitor Lines: 3 Number of Monitor Points: 1 Materials Coverage: Manning's "n" Value used: 0.060 Boundary Conditions Coverage: Number of BC Arcs: BC ID: 1 □Exit-H Location: Tributary US (southwest) Type: ⊠Inlet-O BC ID: 2 Type: ⊠Inlet-Q □Exit-H Location: Nashville Ck US (southeast) BC ID: 3 Type: □Inlet-Q ⊠Exit-H Location: Nashville Ck DS (north) BC ID: Type: □Inlet-Q Exit-H Location: BC ID: Type: □Inlet-Q □Exit-H Location: Exit-H Channel Calculator Normal Depth Slope (ft/ft): 0.002 Source: \boxtimes DEM \square FIS Profile Model Control: Time Step (sec.): 5 Simulations Length (hrs.): 12 Output Method: ⊠Specified Frequency □Specified Times □Simulation End □Unsteady Output Model Convergence: Time of Convergence at (hrs.): 3 **Results:** \boxtimes Roadway Overtopping occurs between the <10Y & Y Ghere Ratio (Mesh Density/ Time of Convergence): 1010.3 / 3 = 337Notes: Recommended element density reduced from 50-ft to 10-ft to capture bridge embankment opening and channel.

Revised: June 21, 2021

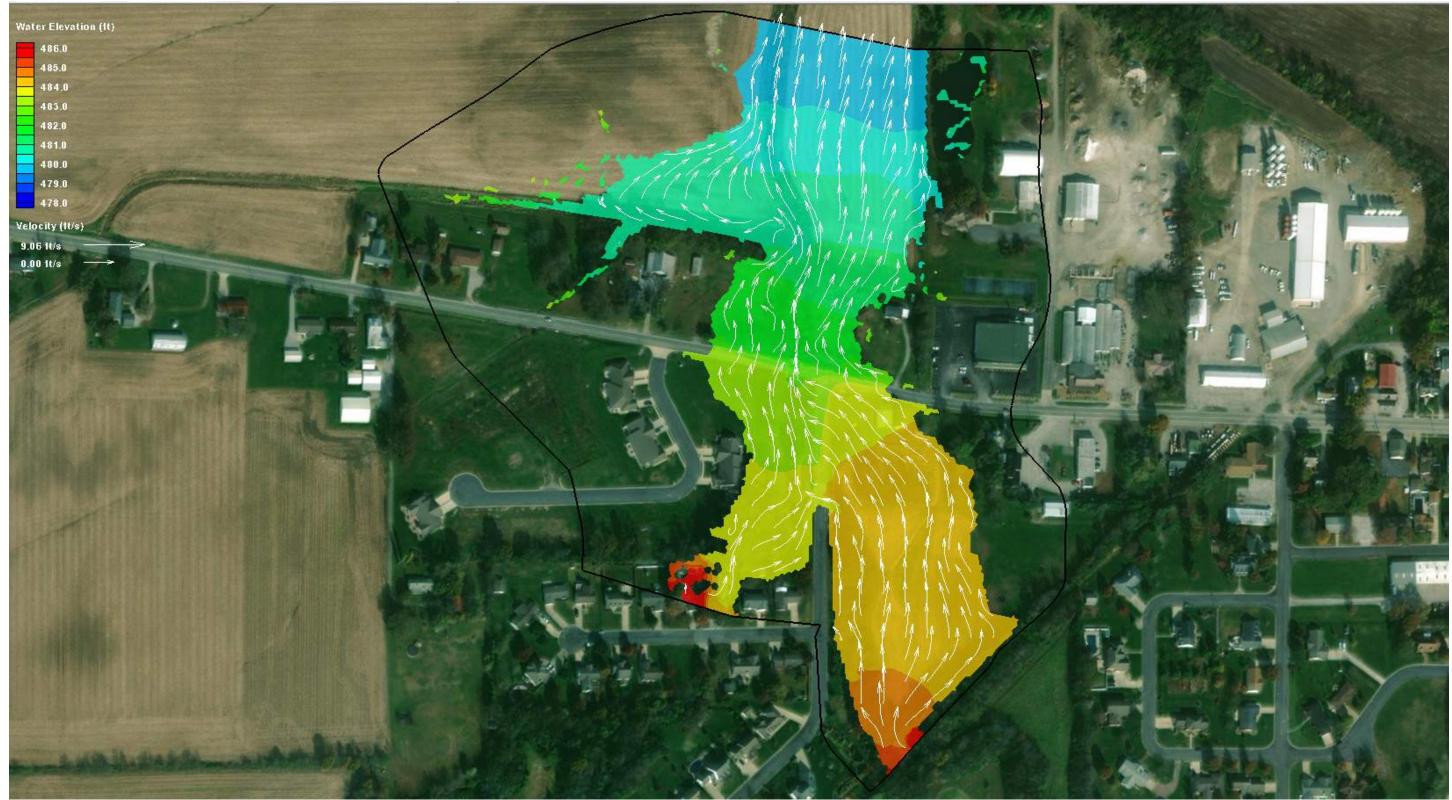
IL-15 Over Nashville Creek SMS Quick Check Model 10-Year Storm – Velocity/Elevation Results



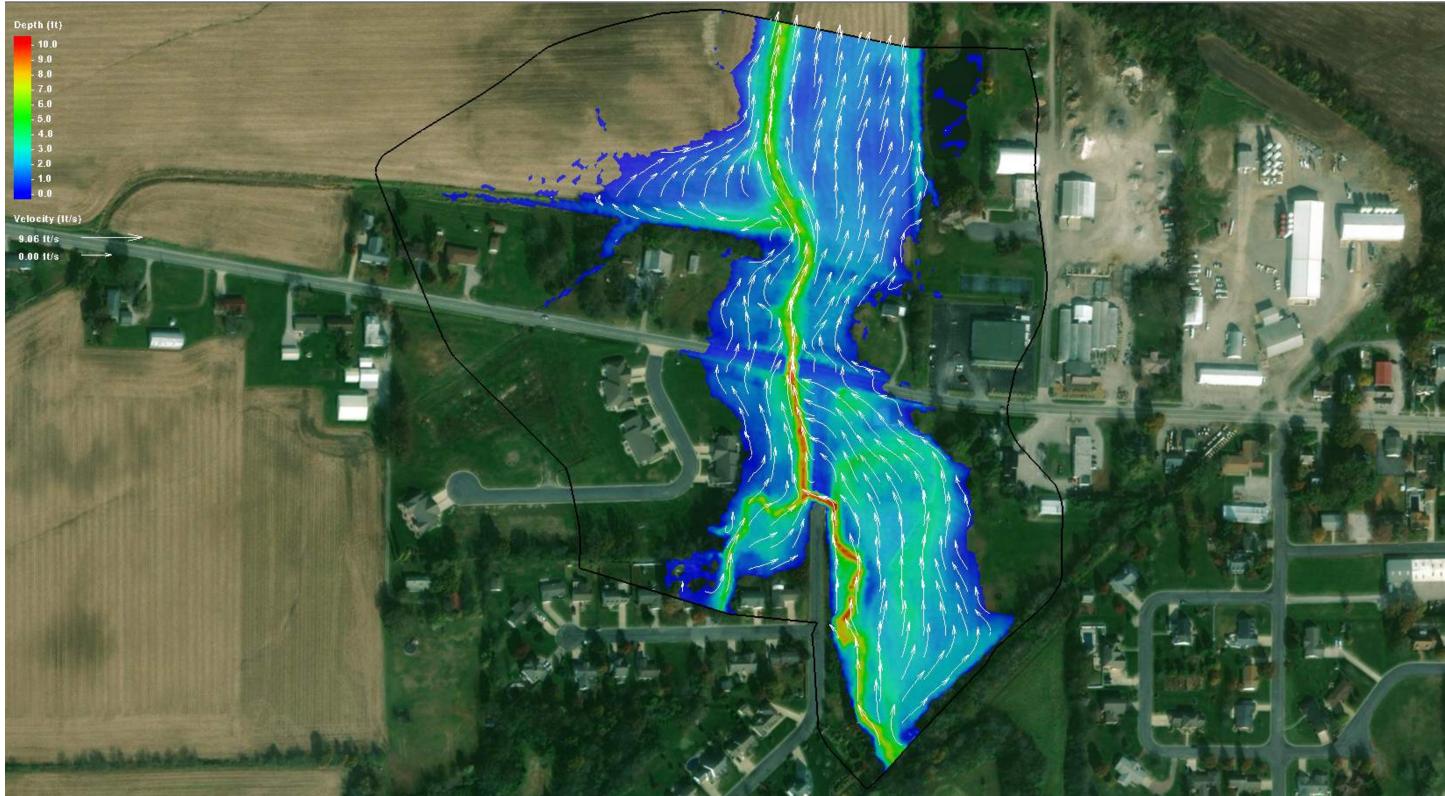
IL-15 Over Nashville Creek SMS Quick Check Model 10-Year Storm – Velocity/Depth Results



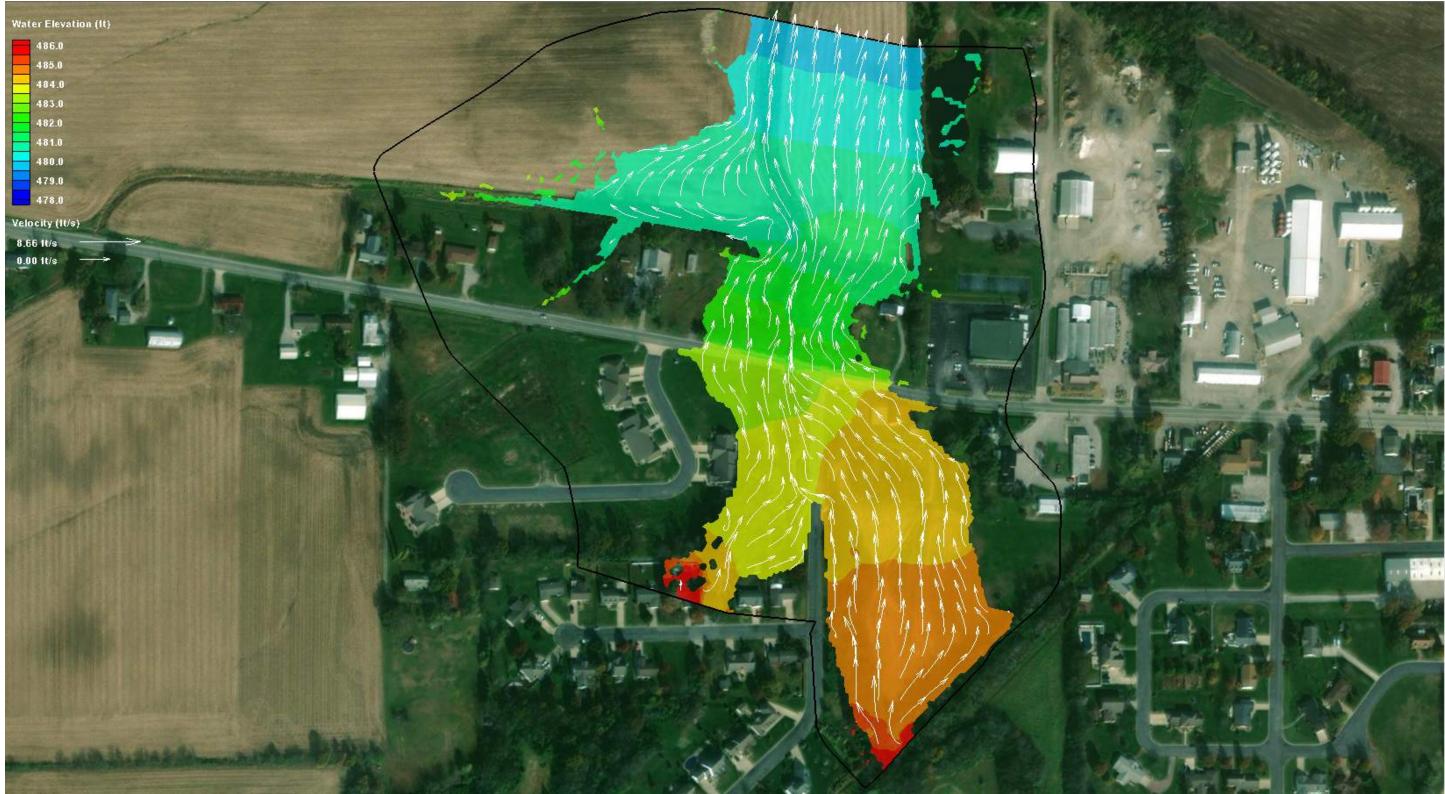
IL-15 Over Nashville Creek SMS Quick Check Model 50-Year Storm – Velocity/Elevation Results



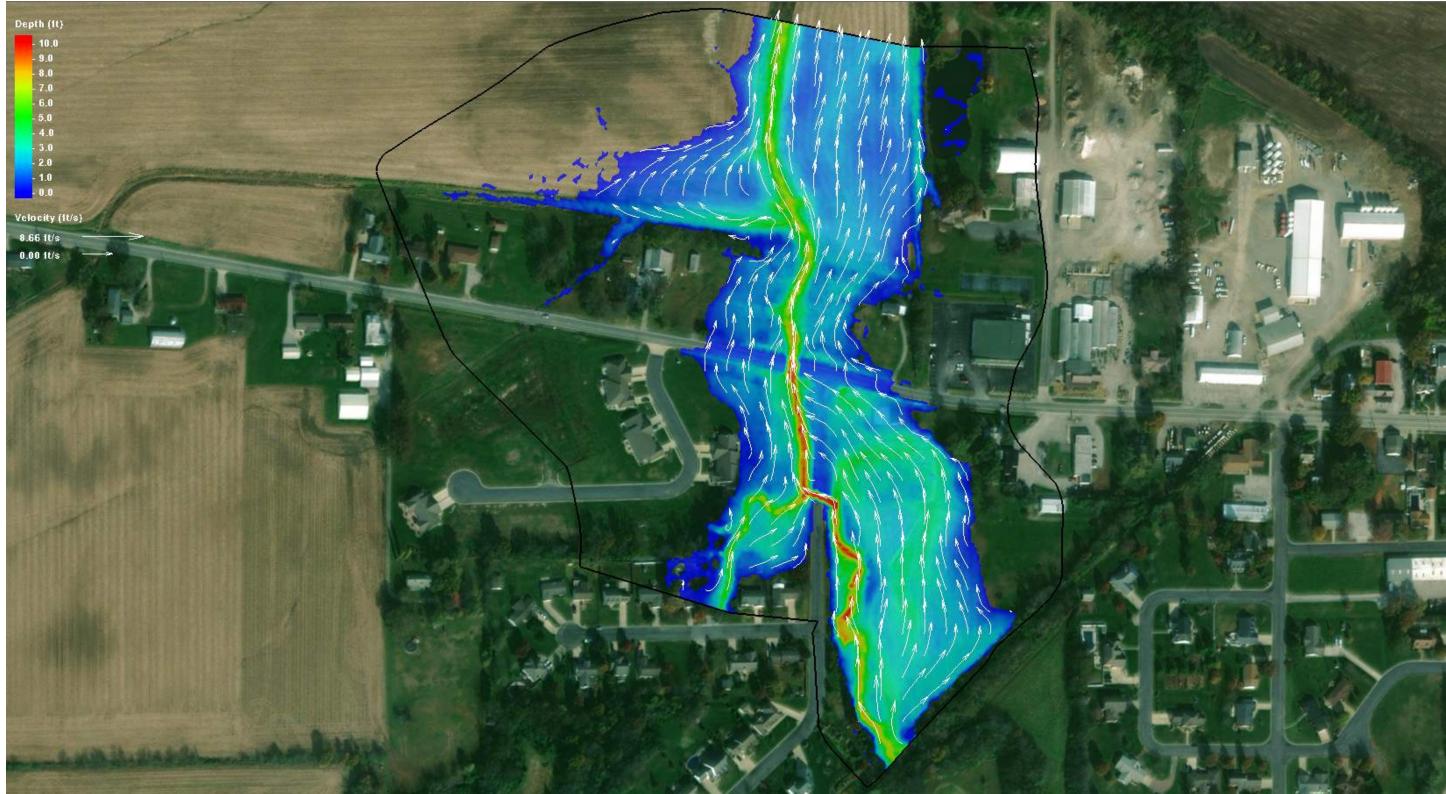
IL-15 Over Nashville Creek SMS Quick Check Model 50-Year Storm – Velocity/Depth Results



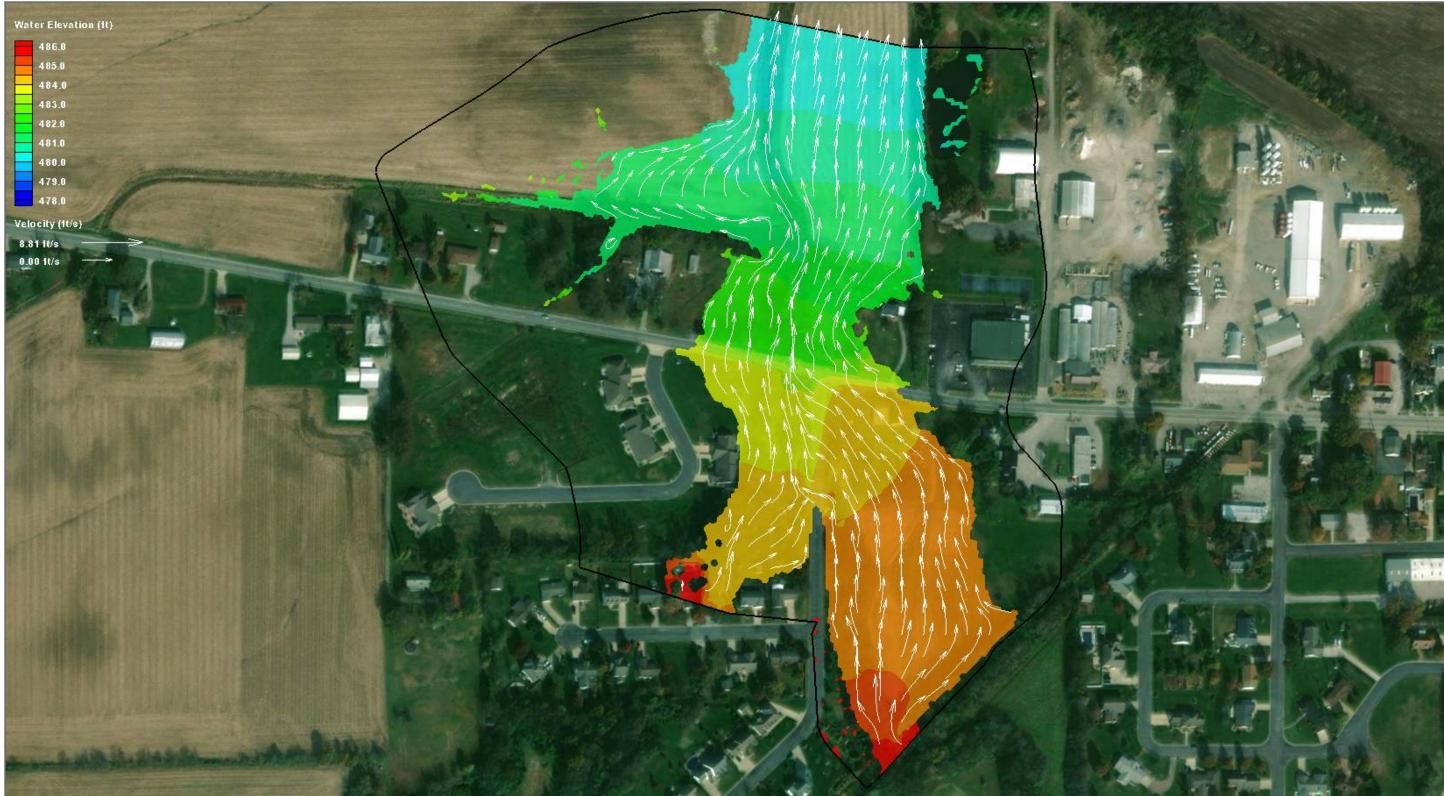
IL-15 Over Nashville Creek SMS Quick Check Model 100-Year Storm – Velocity/Elevation Results



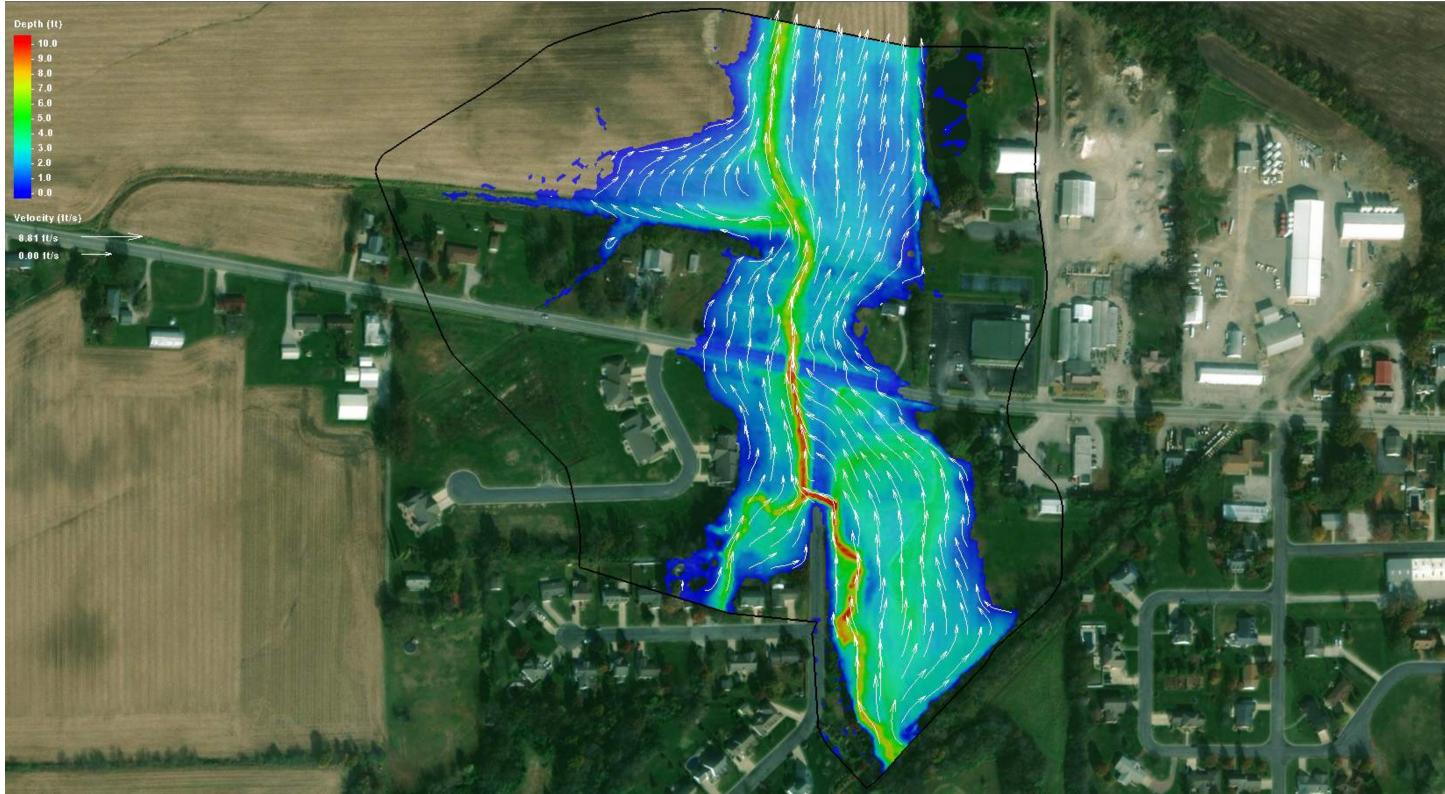
IL-15 Over Nashville Creek SMS Quick Check Model 100-Year Storm – Velocity/Depth Results



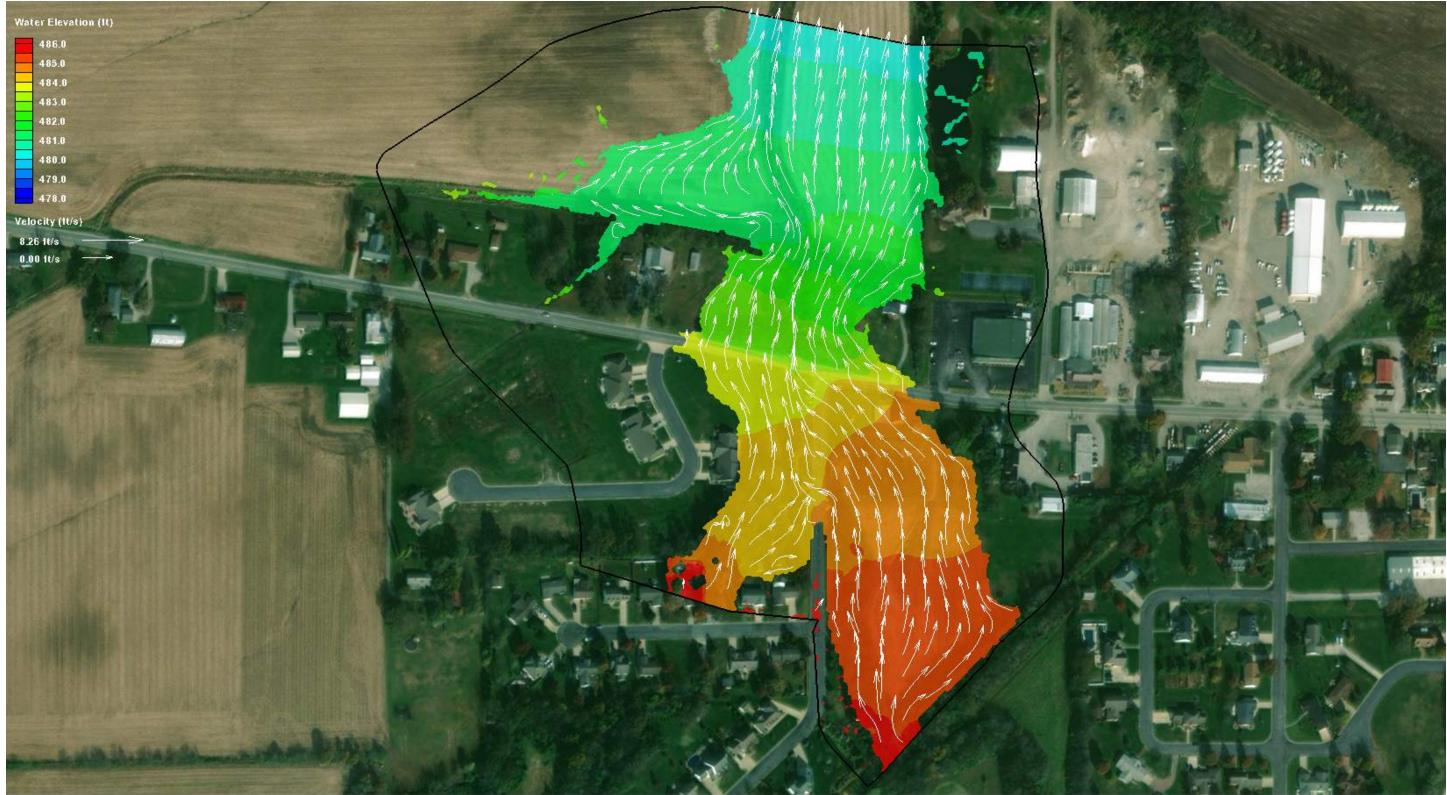
IL-15 Over Nashville Creek SMS Quick Check Model 200-Year Storm – Velocity/Elevation Results



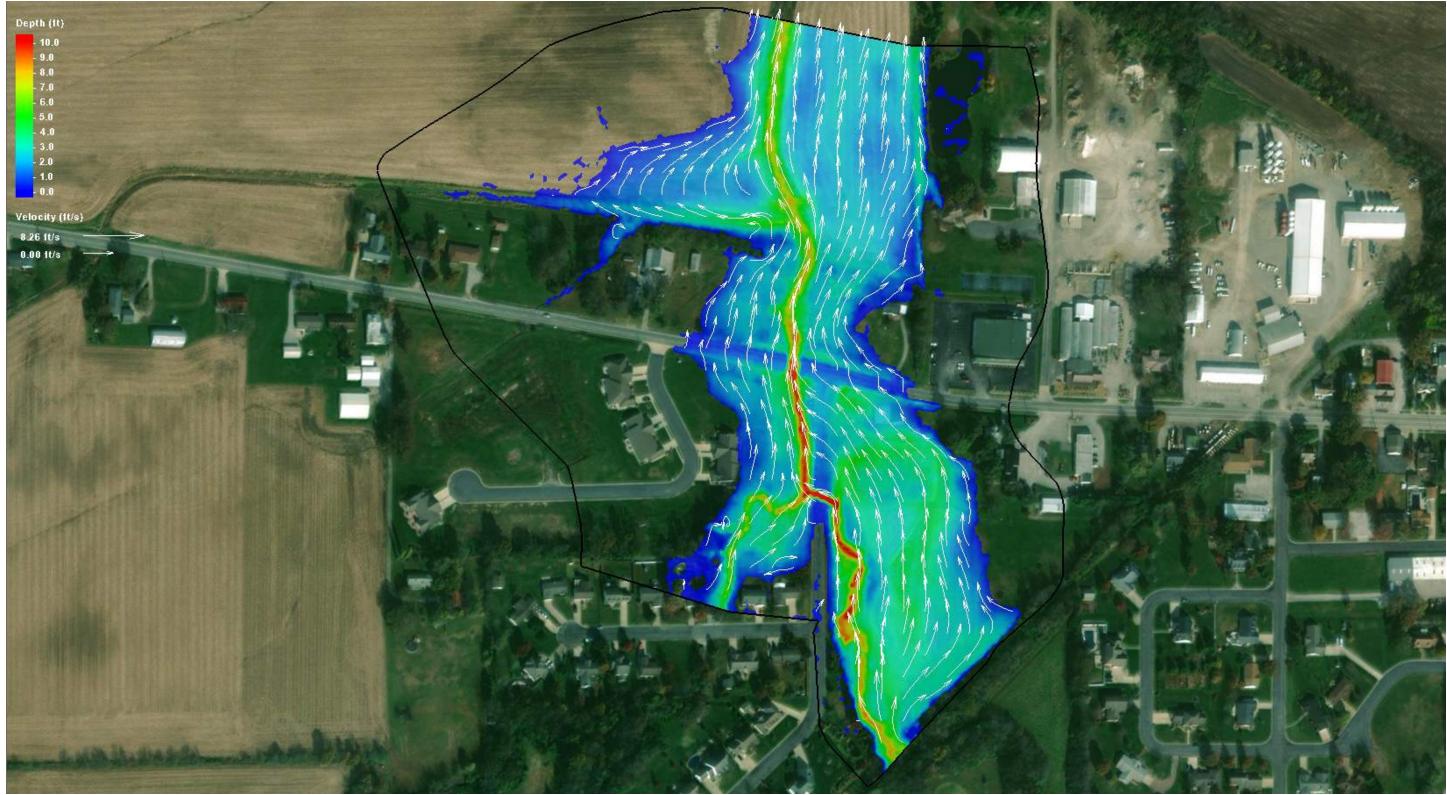
IL-15 Over Nashville Creek SMS Quick Check Model 200-Year Storm – Velocity/Depth Results



IL-15 Over Nashville Creek SMS Quick Check Model 500-Year Storm – Velocity/Elevation Results



IL-15 Over Nashville Creek SMS Quick Check Model 500-Year Storm – Velocity/Depth Results



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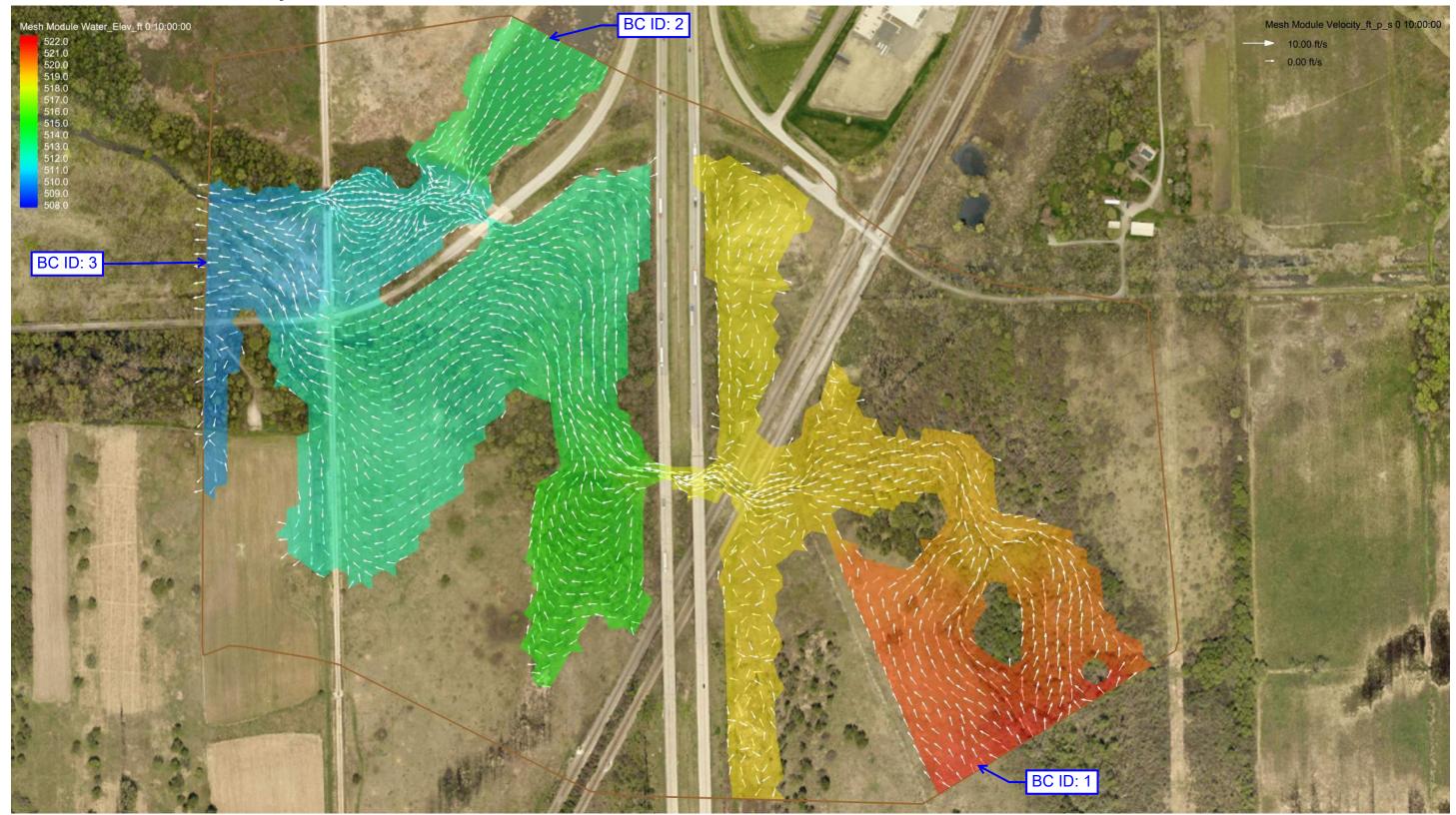


099-0005 (SB) and 099-0286 (NB) – I-55 over Grant Creek – District 1 – Dual Bridges SB 3-span 177 feet NB 5-span 665 feet

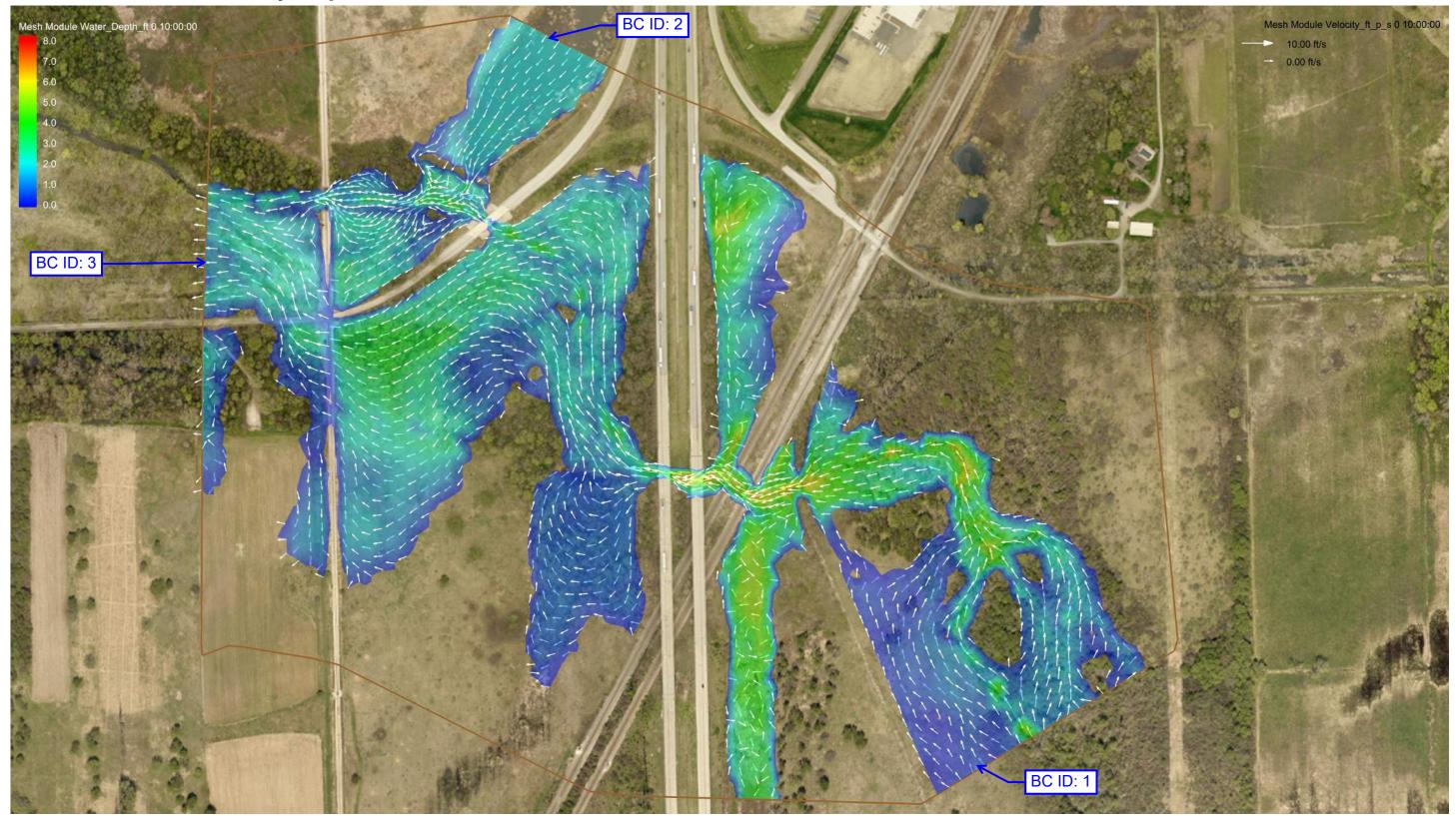
Date: 9/17/2021 County: Will Route: I-55 Watercourse: Grant Creek ESN: 099-0005 Structure Type: 🛛 Bridge □ Culvert Drainage Area: 13.58 Sq. Mi. (8,691 acres) Hydrology Method (check all that apply): ⊠ StreamStats □HEC-HMS \Box TR-20 □Rational Method Other: Discharges/ Flows Y 2 5 10 25 50 100 200 500 \times \boxtimes \times \times \times Analyzed BC ID: 1 312 496 630 812 951 1,090 1,240 1,440 BC ID: 2 62 94 117 146 169 190 208 230 BC ID: BC ID: Source of Topography/ Surface Data (check all that apply): ⊠LiDAR □Bathymetry □Cross Sections □Text File \Box SMS Mesh Generator Coverage: Mesh Name: QC I55 GrantCreek Mesh Mesh Type: ⊠Paving □ Patching Vertices Spacing: Max: 50 ft.; Min: 25 ft. Mesh Density (Elements/ Acre): 7967 / 175.96 = 45.28 Monitor Lines & Points Coverage: Number of Monitor Lines: 9 Number of Monitor Points: 0 Materials Coverage: Manning's "n" Value used: 0.06 Boundary Conditions Coverage: Number of BC Arcs: 3 BC ID: 1 □Exit-H Location: SE Type: ⊠Inlet-O BC ID: 2 Type: ⊠Inlet-Q Exit-H Location: NW BC ID: 3 Type: □Inlet-Q ⊠Exit-H Location: W BC ID: Type: □Inlet-Q Exit-H Location: BC ID: Type: □Inlet-Q □Exit-H Location: Exit-H Channel Calculator Normal Depth Slope (ft/ft): 0.003 ⊠DEM □FIS Profile Source: Model Control: Time Step (sec.): 5 Simulations Length (hrs.): 12 Output Method:
Specified Frequency
Specified Times
Simulation End
Unsteady Output Model Convergence: Time of Convergence at (hrs.): 10 Results: \Box Roadway Overtopping occurs between the >500Y & Y Ghere Ratio (Mesh Density/ Time of Convergence): 45.28 / 10 = 4.5

<u>Notes:</u> An additional inflow location is added downstream of the I-55 bridge and comes from the Frontage Road Pond. The inflow amount from this location was calculated by subtracting the Grant Creek flow upstream of the pond from the Grant Creek flow downstream of the pond.

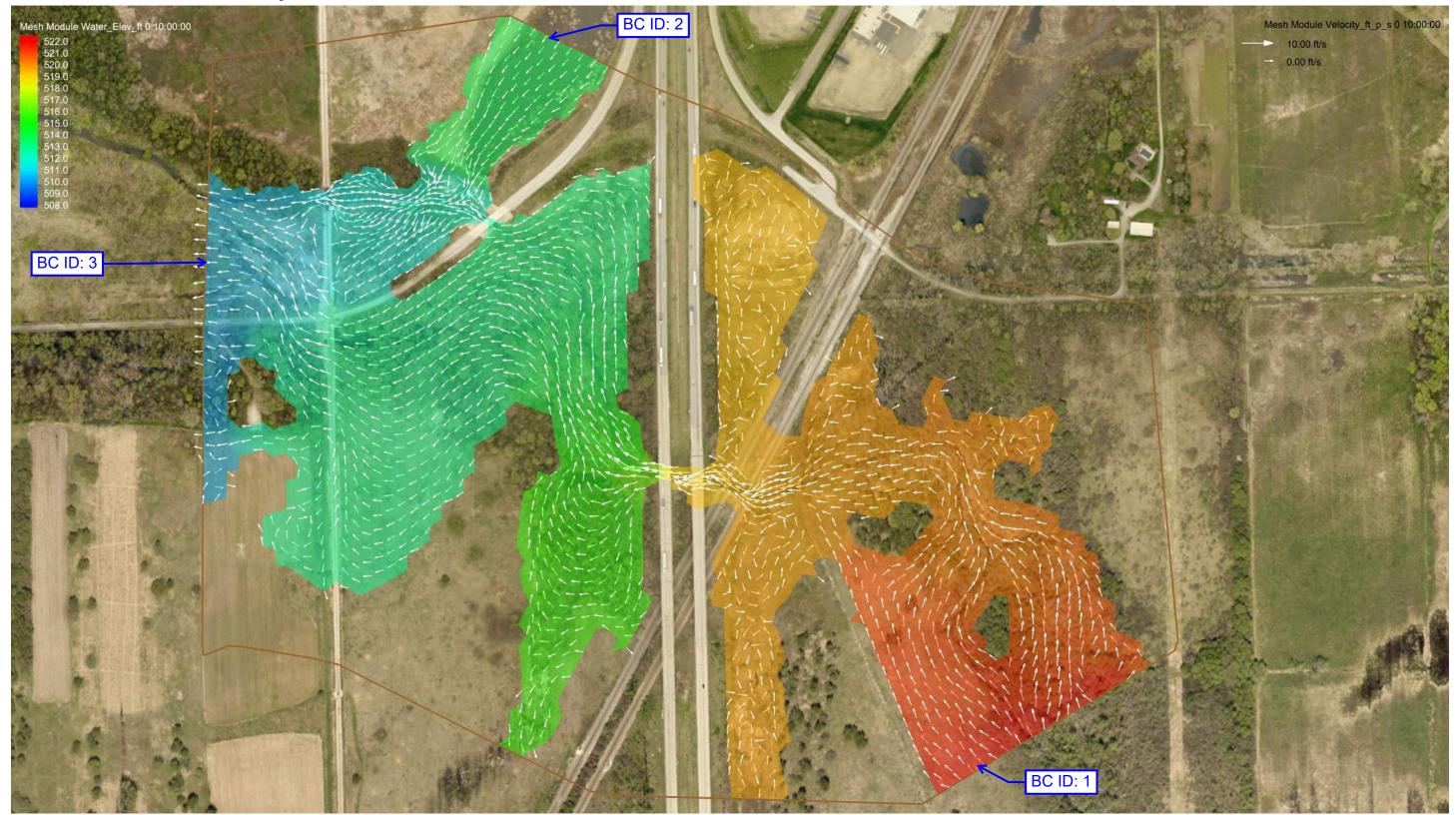
I-55 over Grant Creek SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



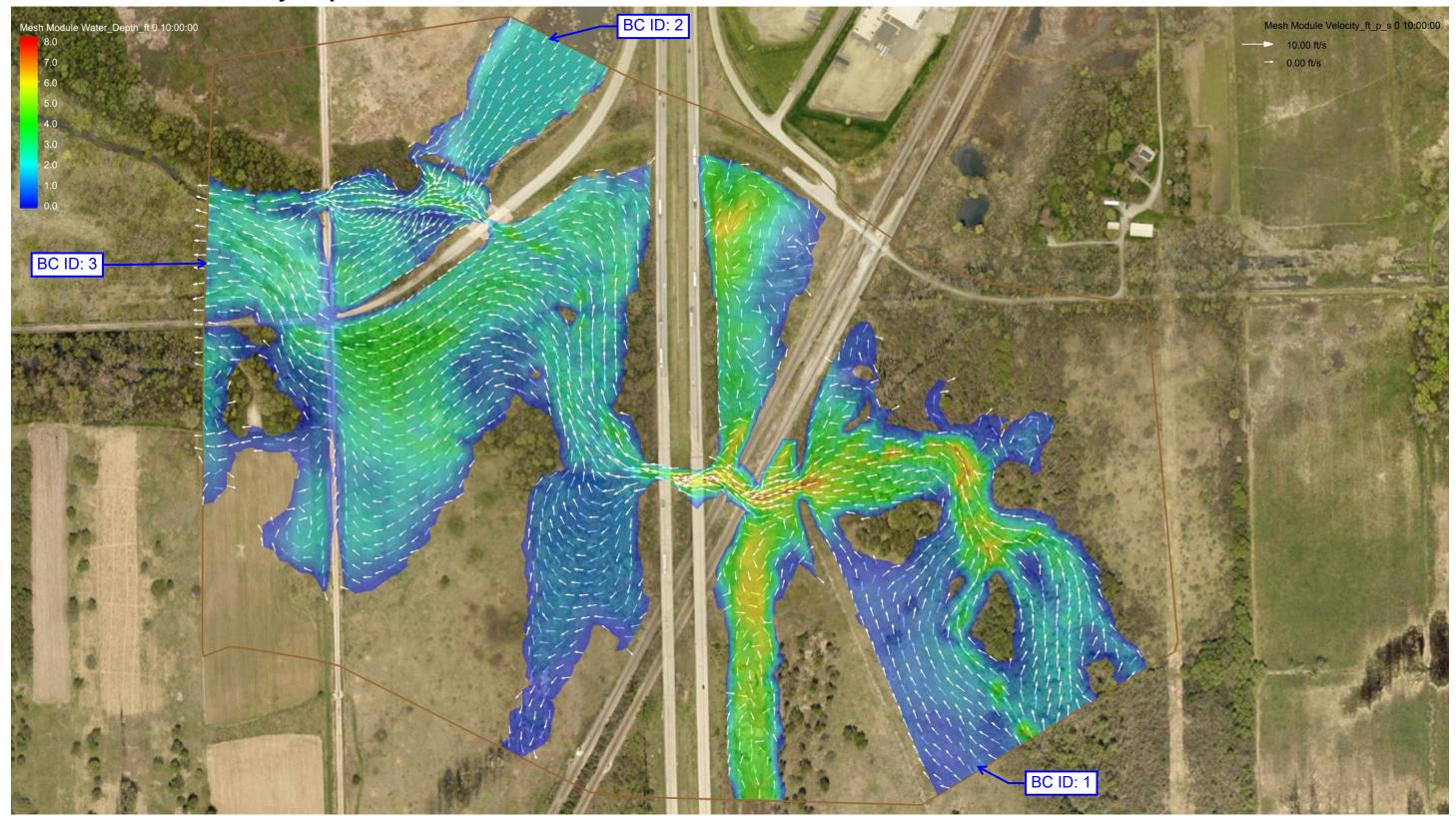
I-55 over Grant Creek SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



I-55 over Grant Creek SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



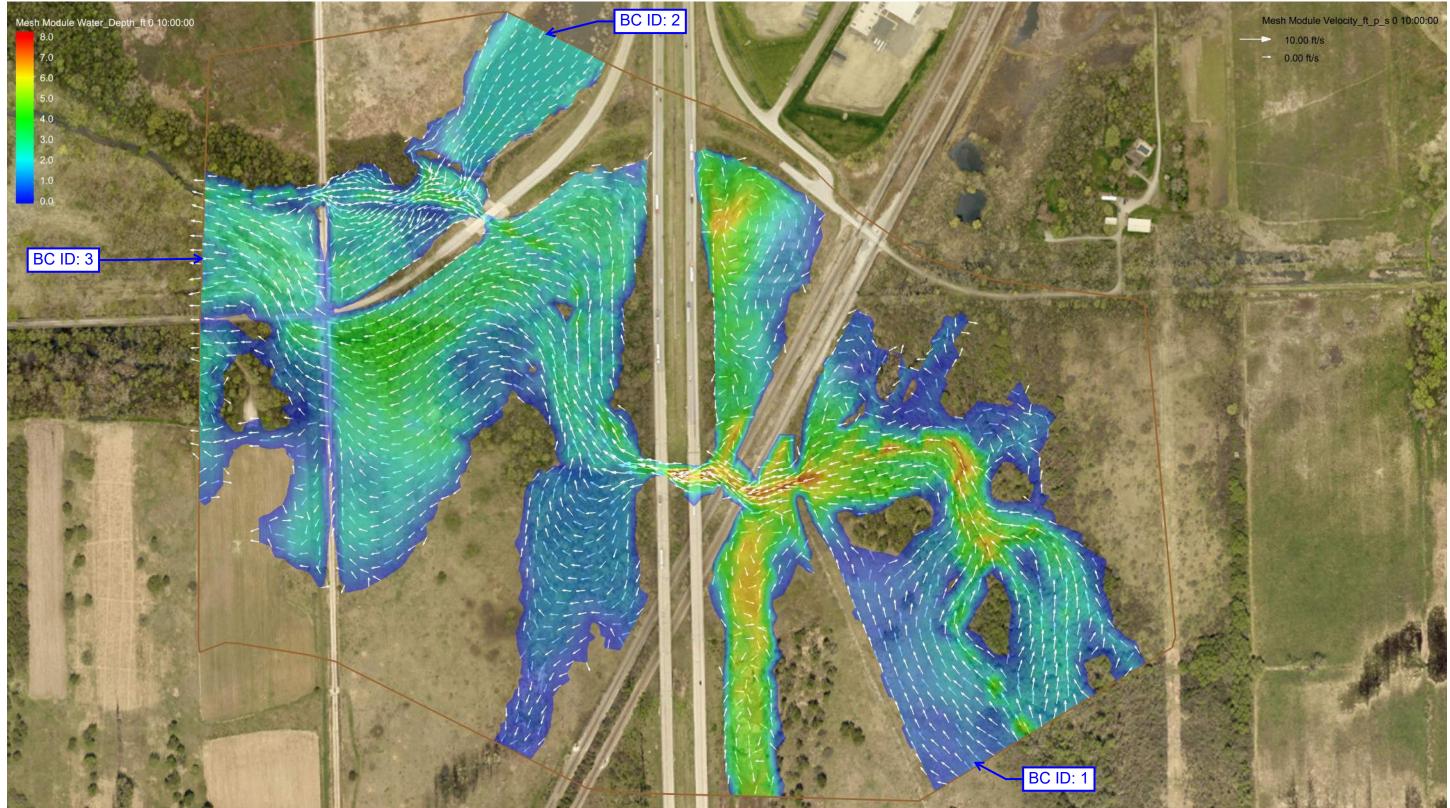
I-55 over Grant Creek SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



I-55 over Grant Creek SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



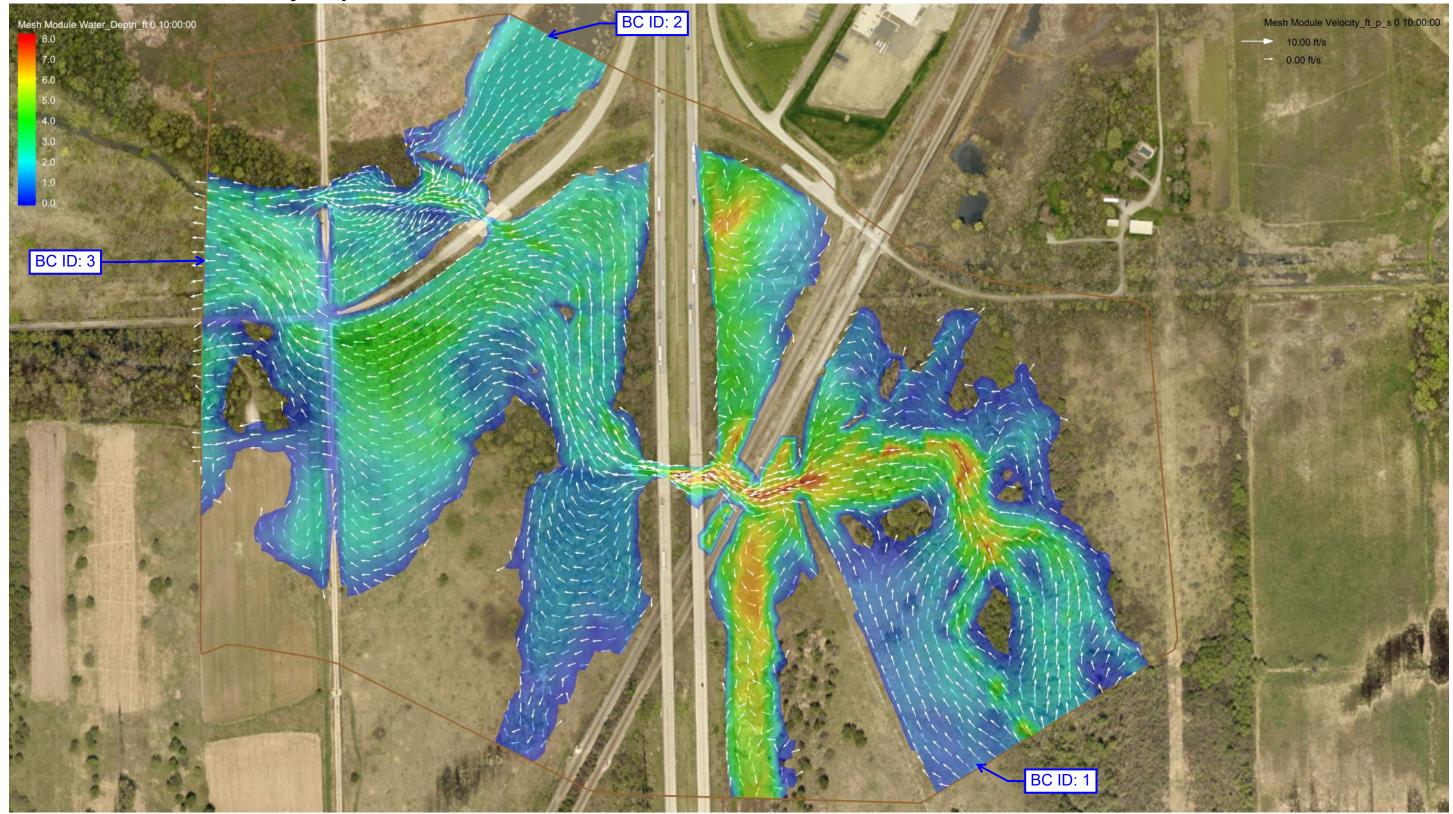
I-55 over Grant Creek SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



I-55 over Grant Creek SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



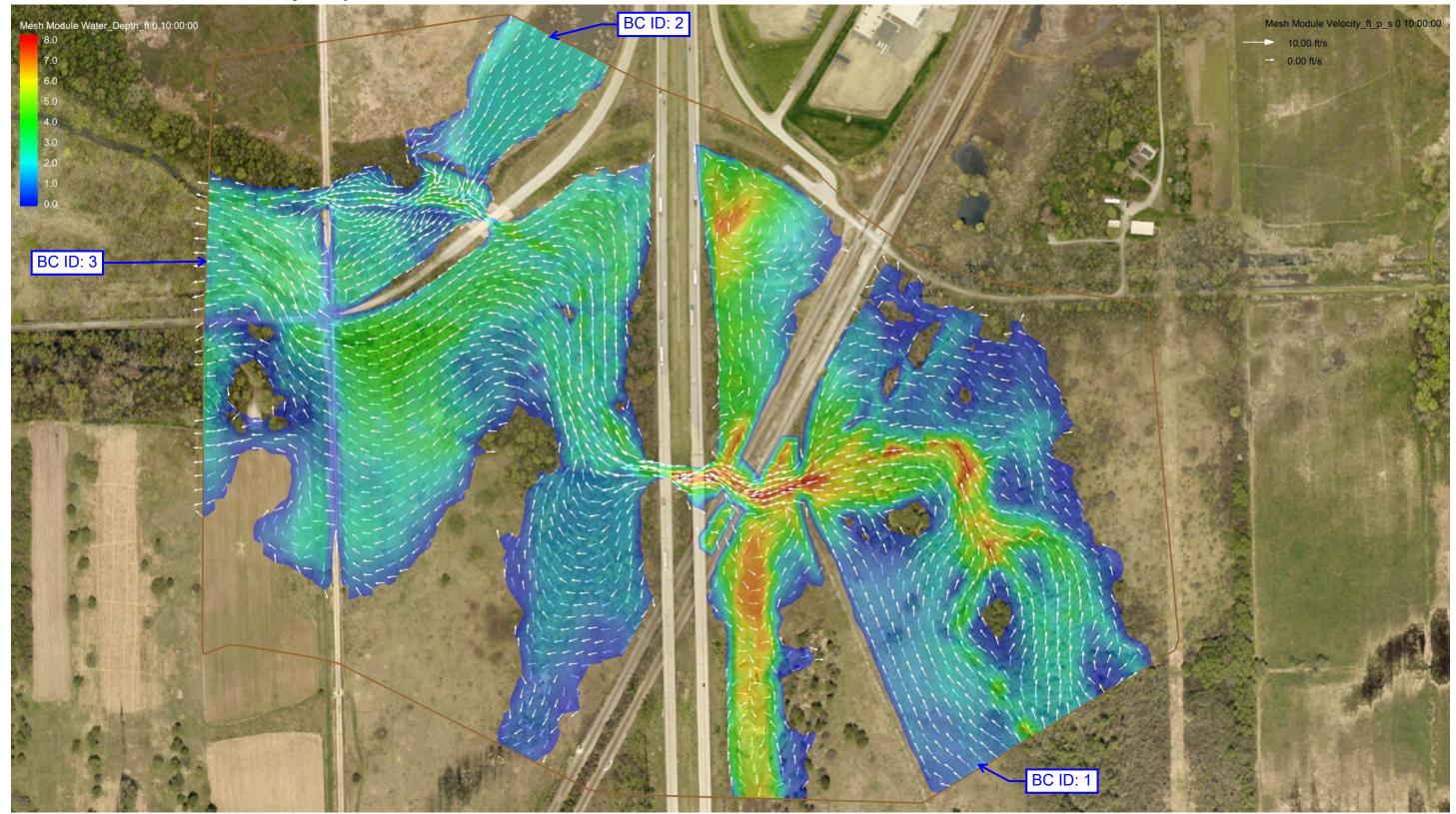
I-55 over Grant Creek SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



I-55 over Grant Creek SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



I-55 over Grant Creek SMS Quick Check Model 500-Year Storm - Velocity/Depth Results



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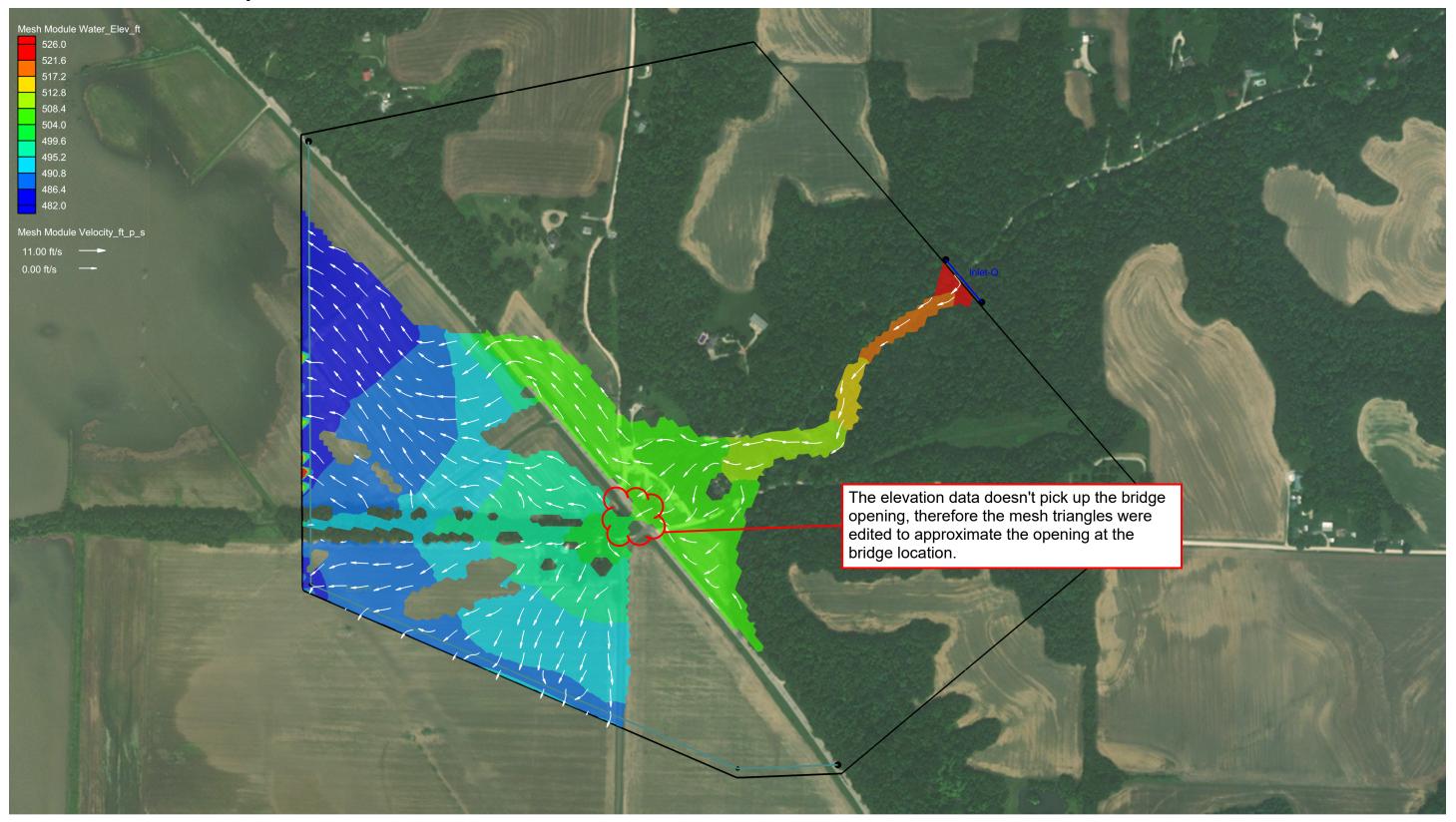


001-0016 – IL 57 over Harkness Creek – District 6 – Single Span Bridge 32 feet

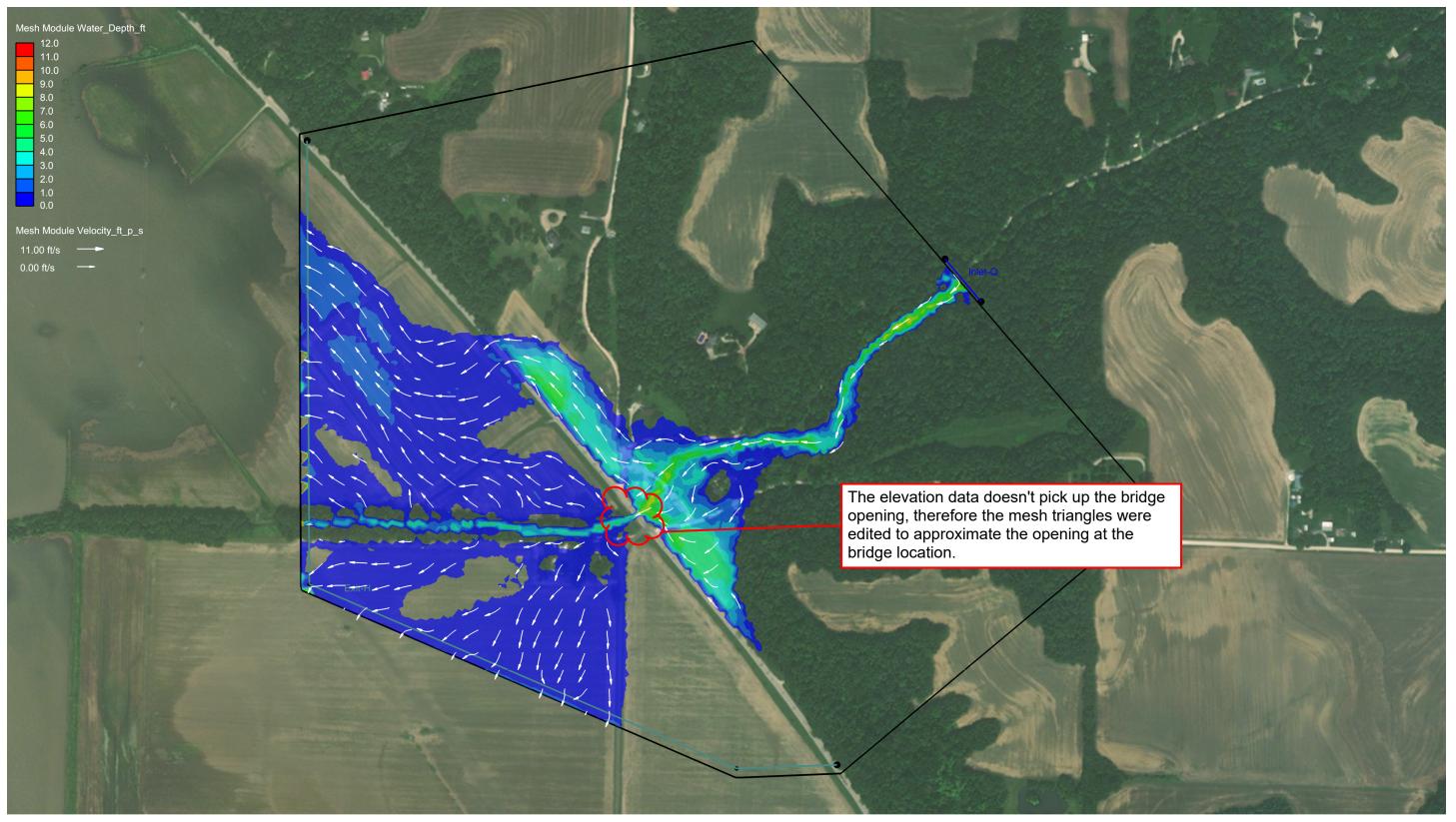
Date: 11/10/2021 County: Adams Route: IL 57 Watercourse: Harkness Creek ESN: 001-0016 Structure Type: \square Bridge □ Culvert Drainage Area: 2.36 Sq. Mi. (1510 acres) Hydrology Method (check all that apply): **FIS** \boxtimes StreamStats □HEC-HMS \Box TR-20 \Box Rational Method Other: Discharges/ Flows Y 2 5 10 25 50 100 200 500 \boxtimes Analyzed \boxtimes \times \times \times BC ID: 1 421 794 1090 1500 1820 2170 2523 3030 BC ID: BC ID: BC ID: Source of Topography/ Surface Data (check all that apply): ⊠LiDAR Bathymetry \Box Cross Sections □Text File \Box SMS Mesh Generator Coverage: Mesh Name: QC_IL57_Harkness_Mesg Mesh Type: ⊠Paving □Patching Vertices Spacing: Max: 28 ft.; Min: 28 ft. Mesh Density (Elements/ Acre): 39,489 / 307.8 = 128.3 Monitor Lines & Points Coverage: Number of Monitor Lines: 4 Number of Monitor Points: 0 Materials Coverage: Manning's "n" Value used: 0.06 Boundary Conditions Coverage: Number of BC Arcs: 2 BC ID: 1 Type: **Exit-H** Location: NE \boxtimes Inlet-O BC ID: 2 Type: □Inlet-Q ⊠Exit-H Location: W BC ID: Type: □Inlet-Q □Exit-H Location: BC ID: Type: □Inlet-O Exit-H Location: BC ID: Type: □Inlet-Q □Exit-H Location: ⊠DEM Exit-H Channel Calculator Normal Depth Slope (ft/ft): 0.007 □FIS Profile Source: Model Control: Time Step (sec.): 1 Simulations Length (hrs.): 4 Output Method:
Specified Frequency
Specified Times
Simulation End
Unsteady Output Model Convergence: Time of Convergence at (hrs.): 1.5 **Results:** \boxtimes Roadway Overtopping occurs between the 0Y & 10Y Ghere Ratio (Mesh Density/ Time of Convergence): 128.3 / 1.5 = 85.5Notes: Area to the west of IL 57 is within the floodplain of the Mississippi River. Ground is lower on either side of the channel and without the influence of flooding from the Mississippi, flow from Harkness Creek

appears to spread out in a seemingly unnatural way, even for smaller storms.

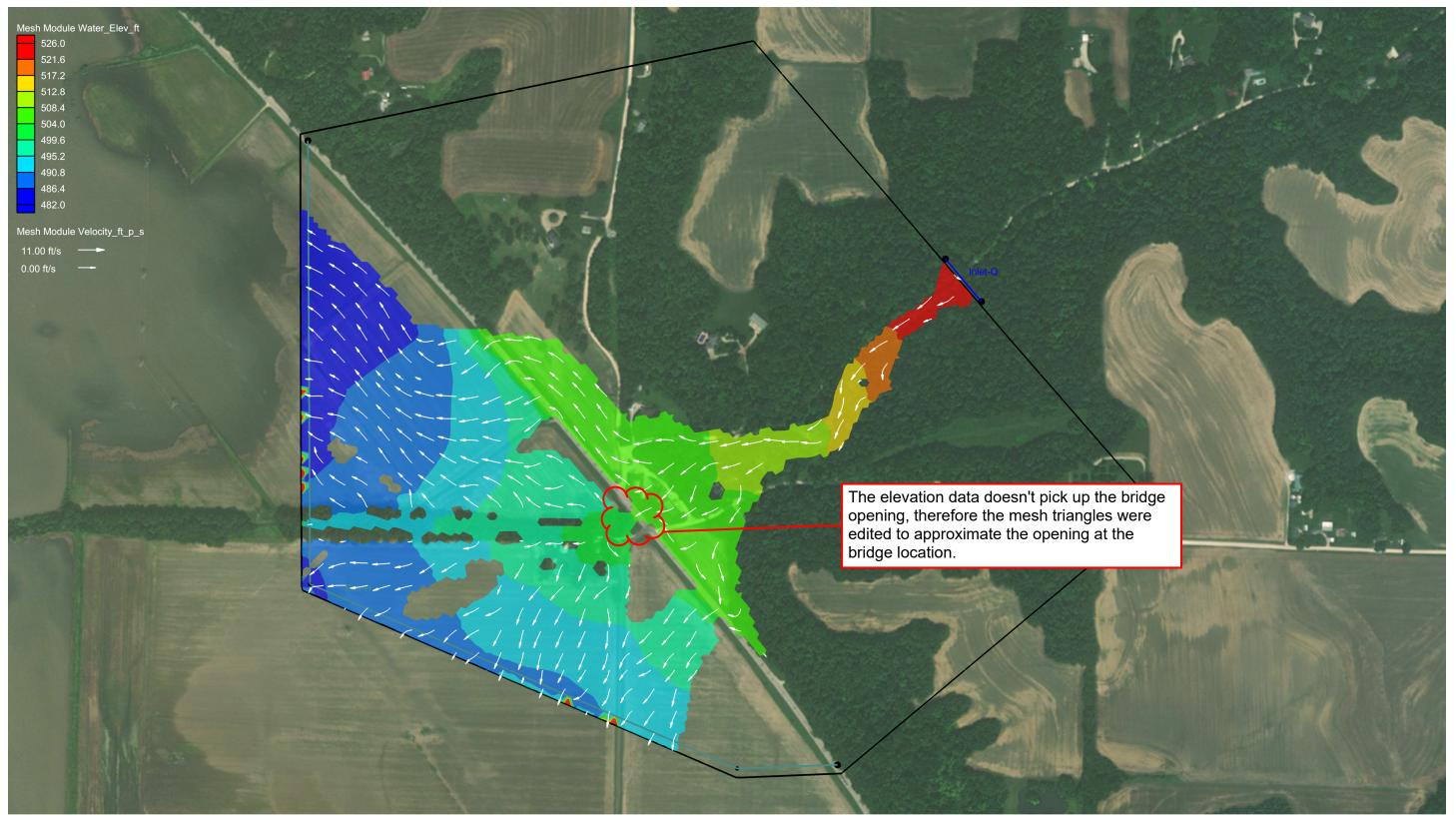
IL 57 Over Harkness Creek SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



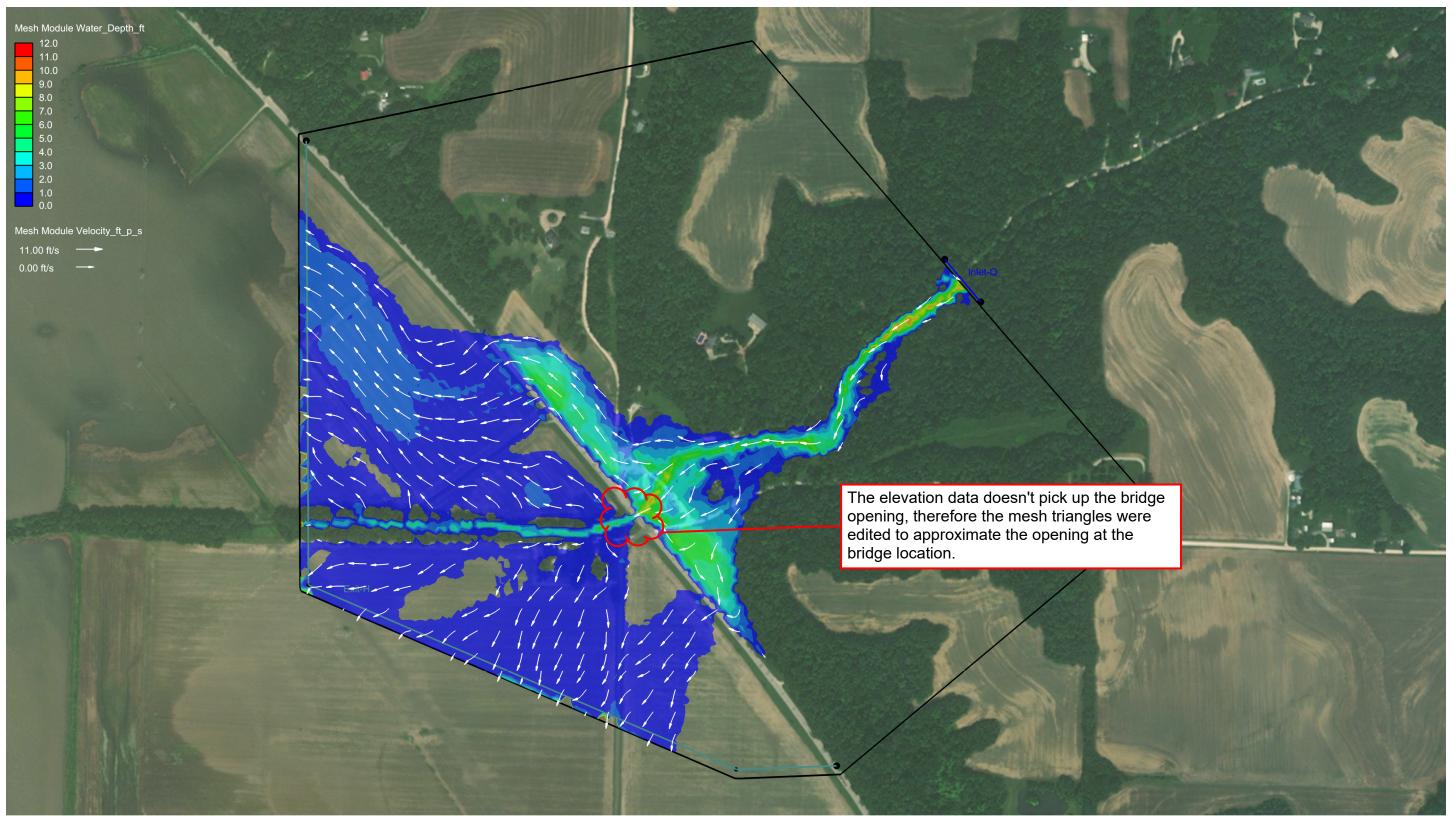
IL 57 Over Harkness Creek SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



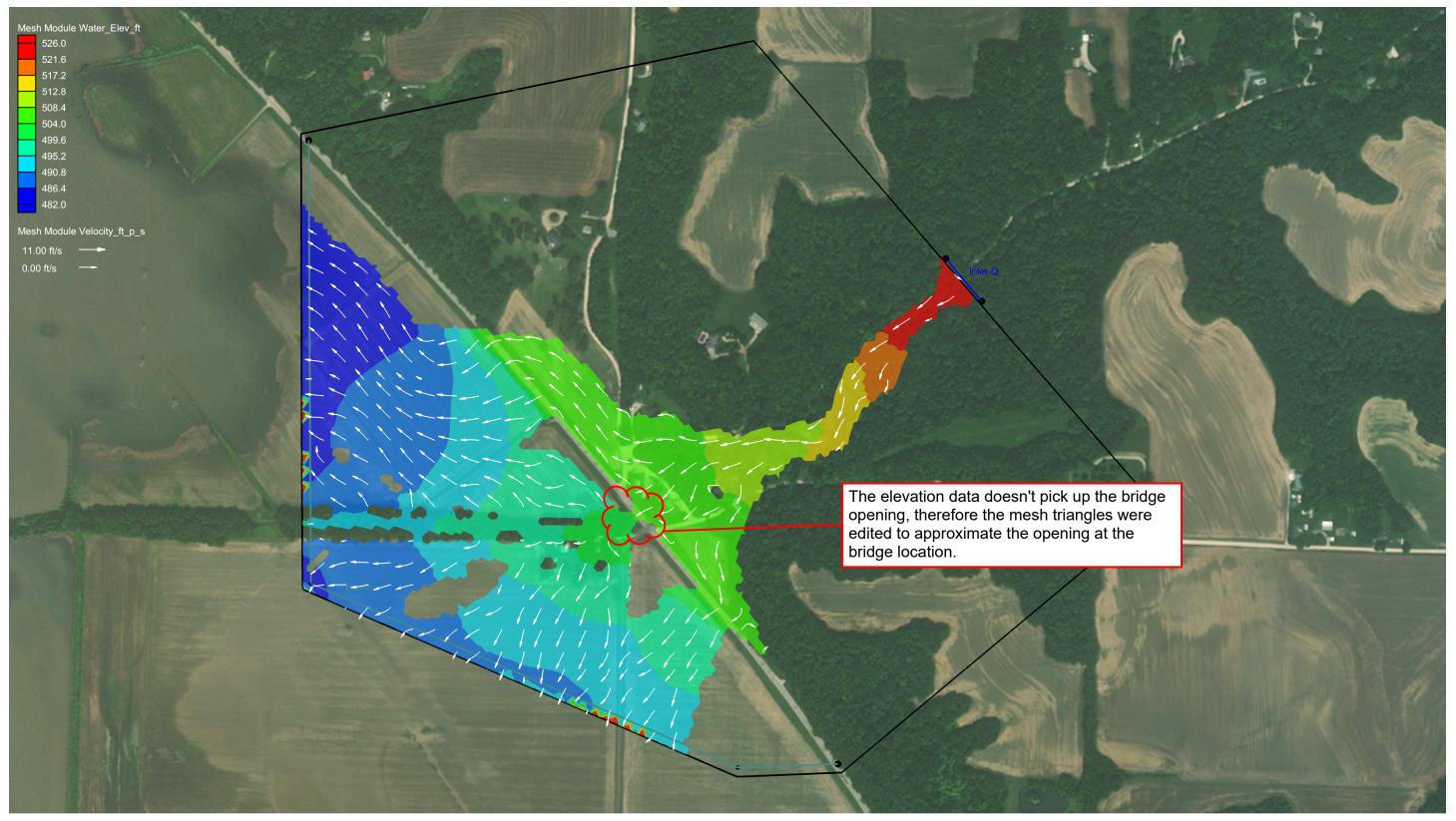
IL 57 Over Harkness Creek SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



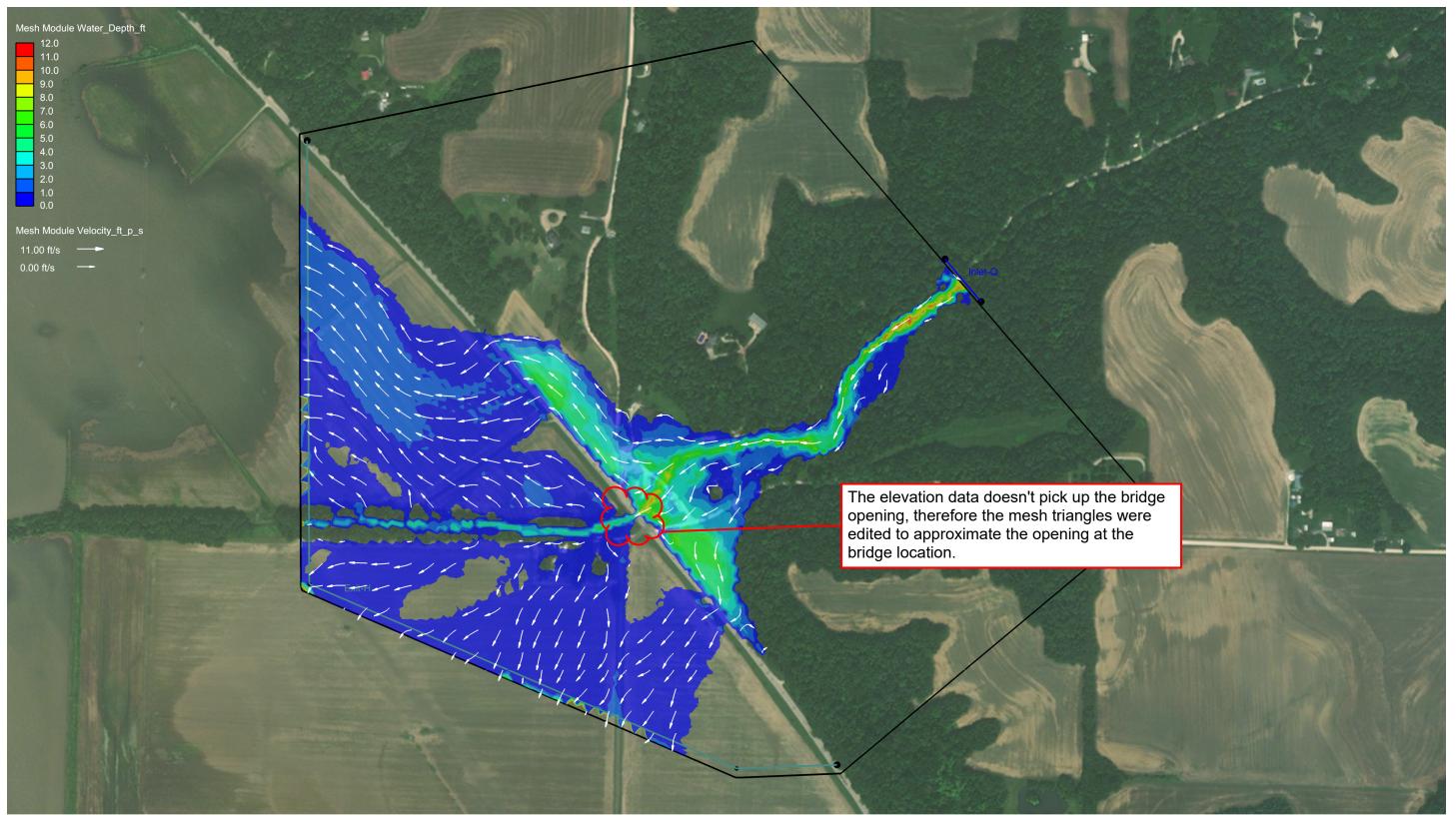
IL 57 Over Harkness Creek SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



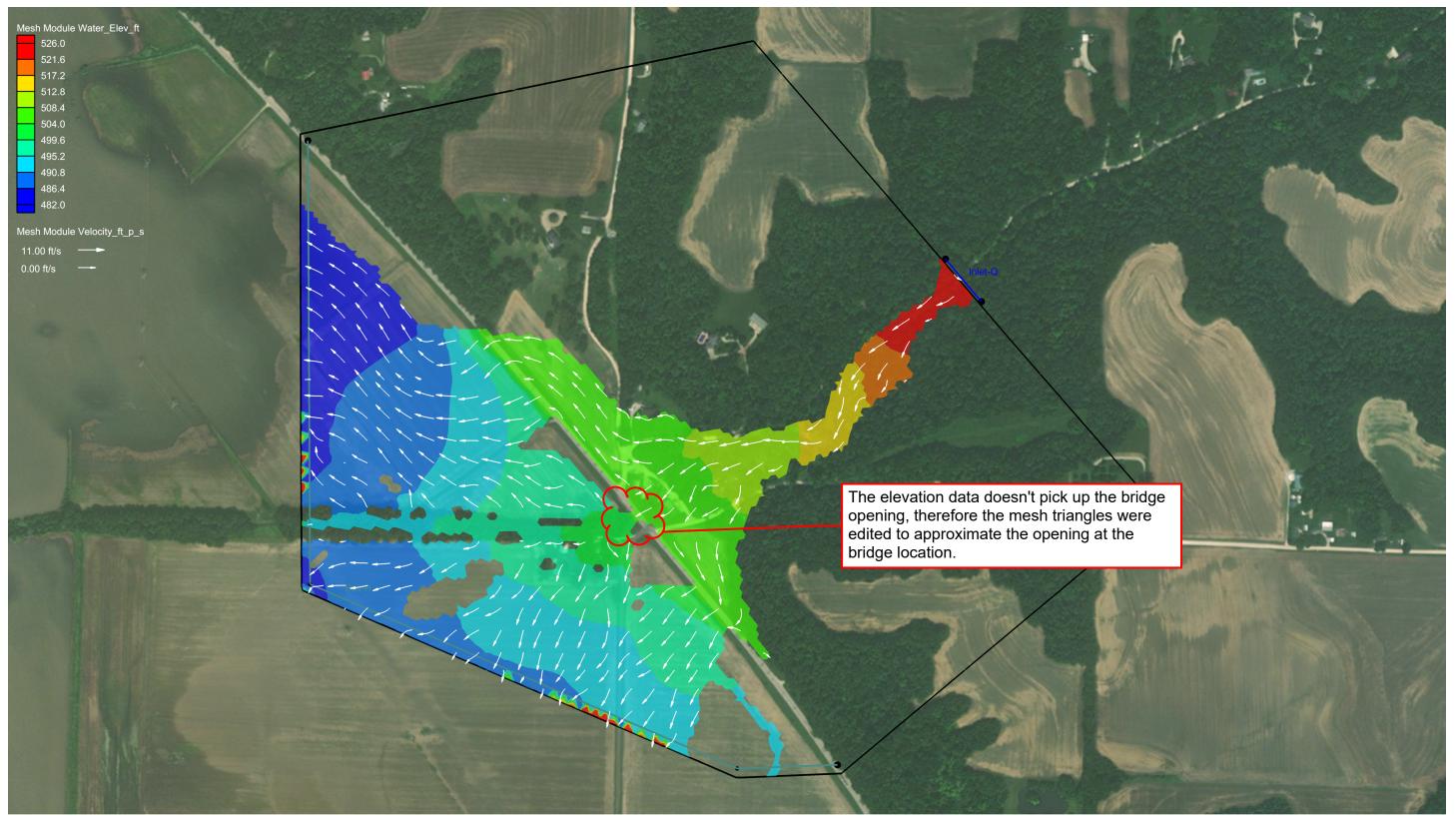
IL 57 Over Harkness Creek SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



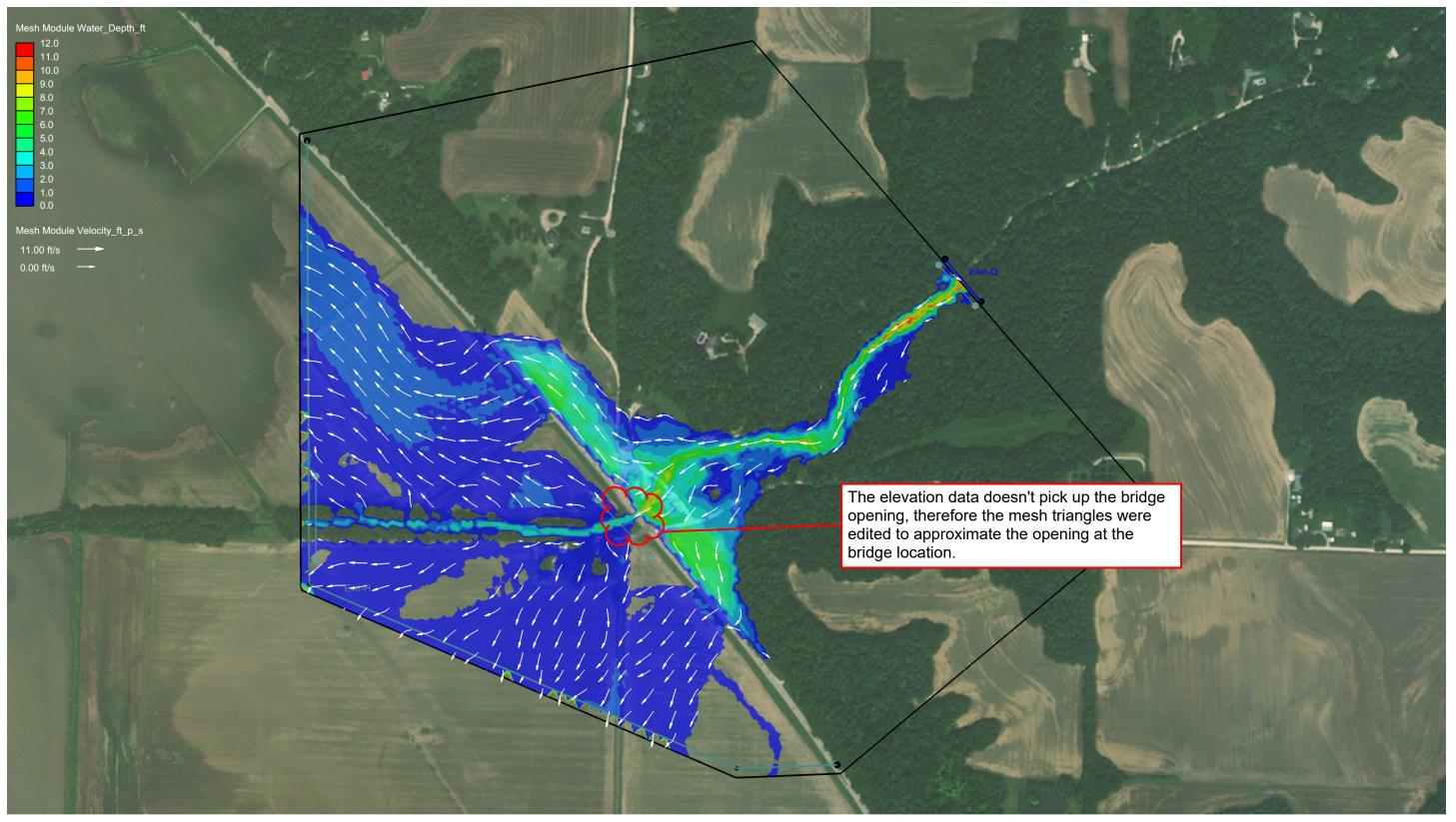
IL 57 Over Harkness Creek SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



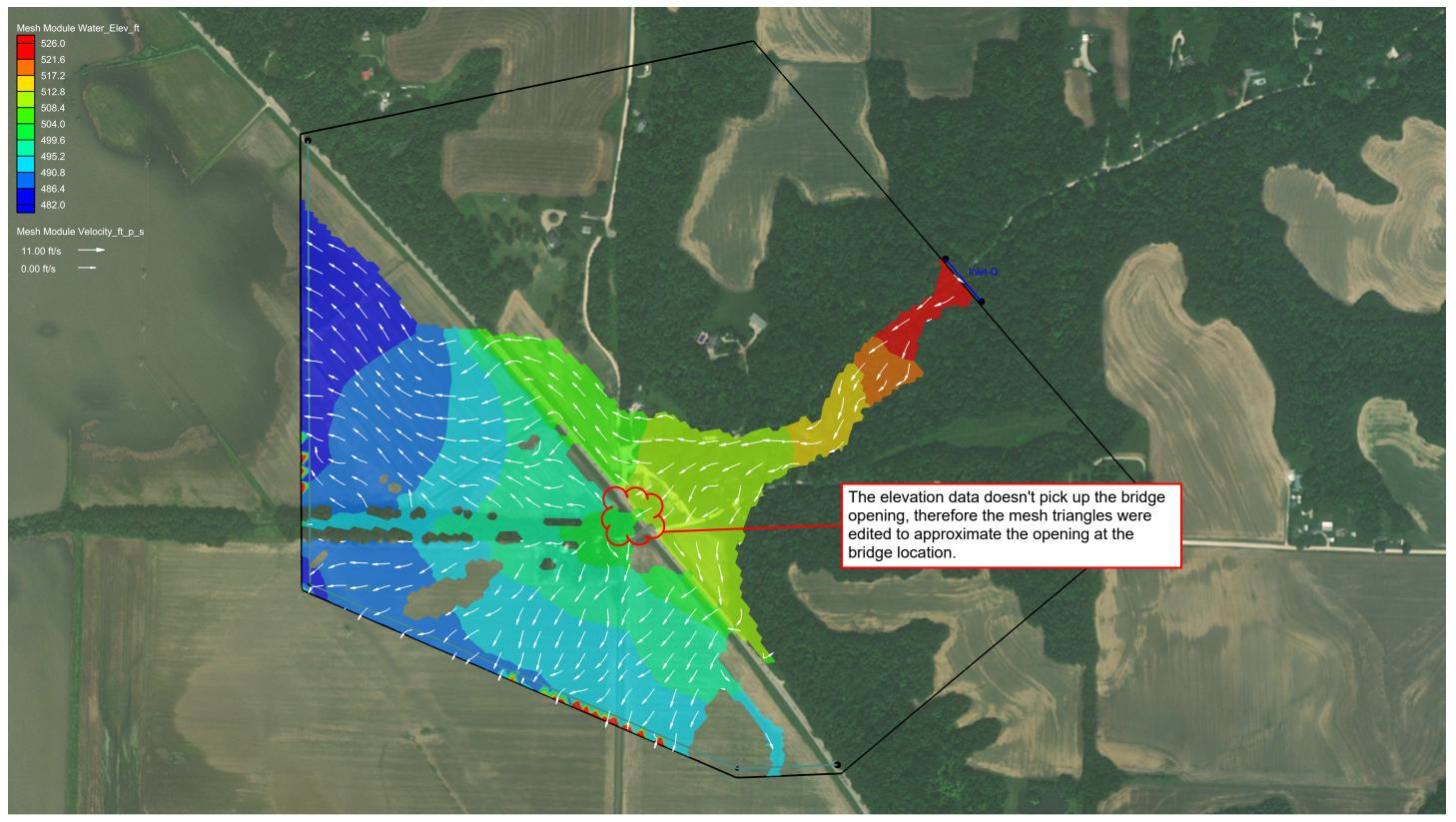
IL 57 Over Harkness Creek SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



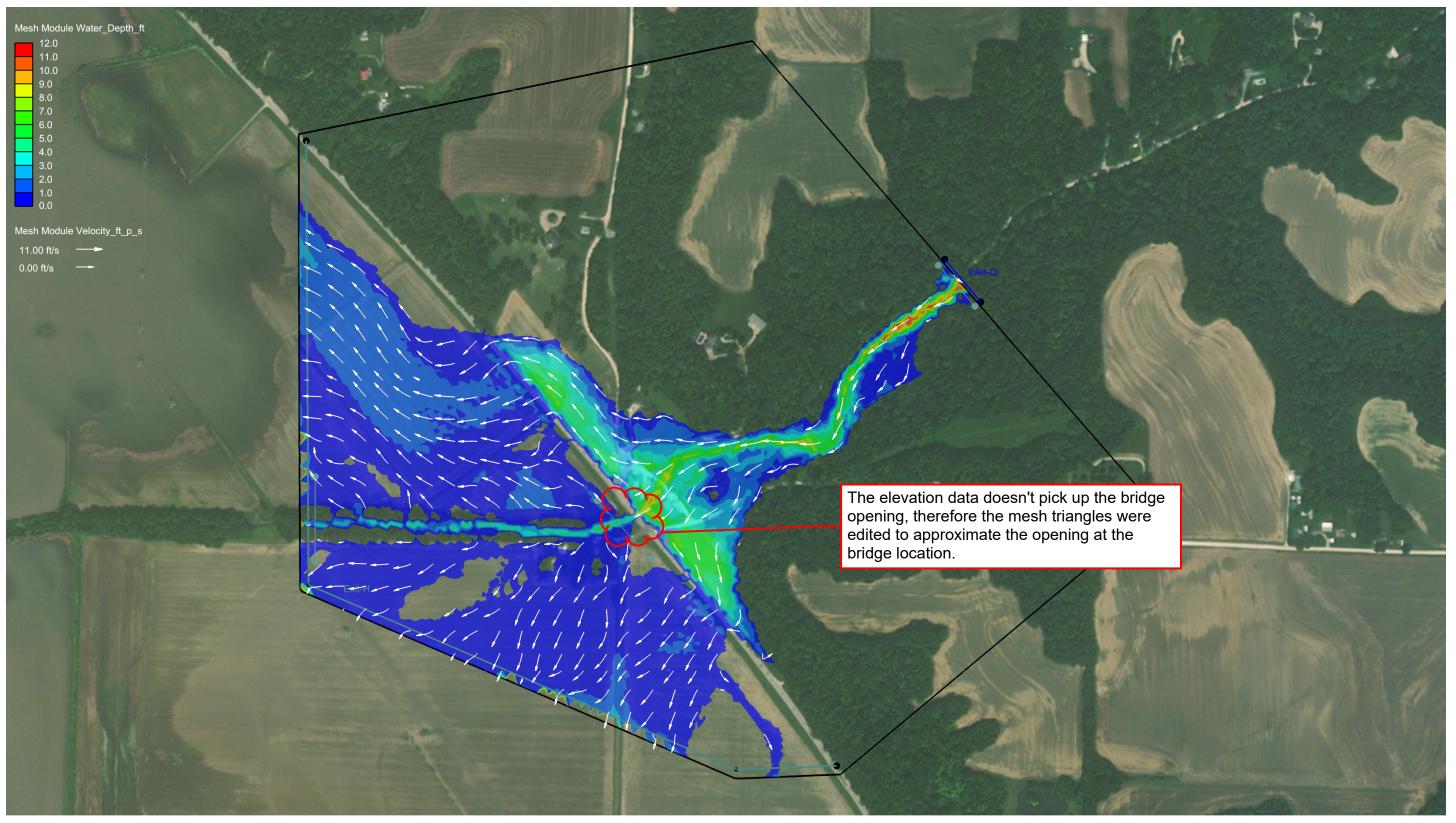
IL 57 Over Harkness Creek SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



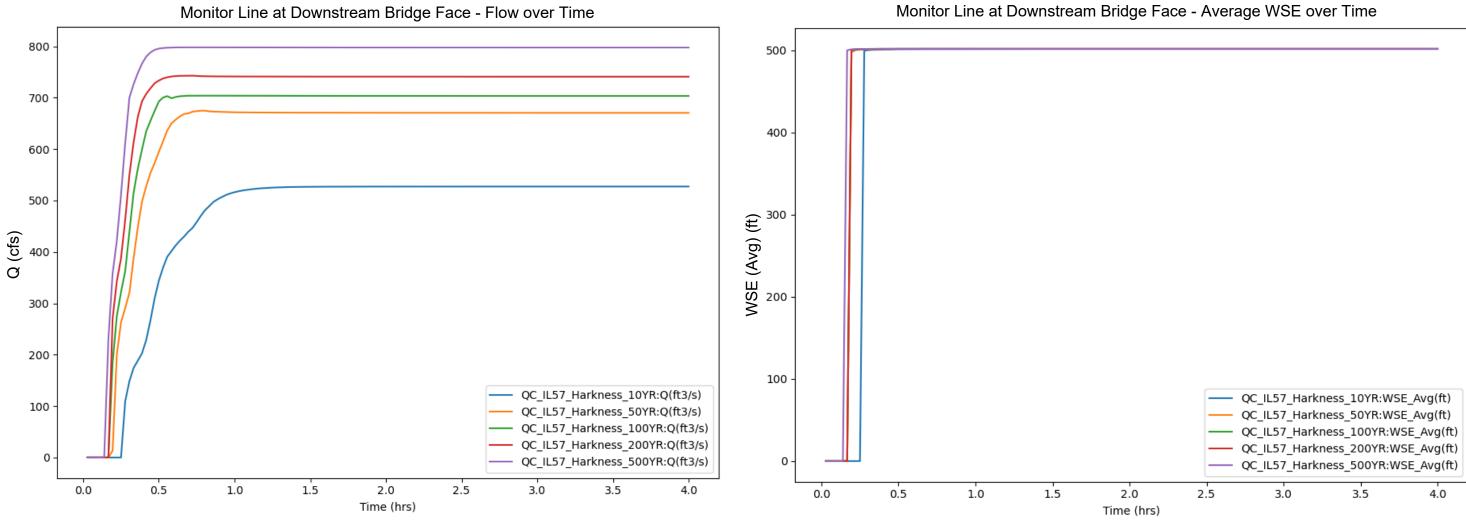
IL 57 Over Harkness Creek SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



IL 57 Over Harkness Creek SMS Quick Check Model 500-Year Storm - Velocity/Depth Results



IL 57 Over Harkness Creek SMS Quick Check Model 100-Year Storm – Simulation Plot



SUPPLEMENT to QUICK CHECK GUIDEBOOK



012-0018 – US 40 over North Fork Embarras River – District 7 – 3-span Bridge 240 feet

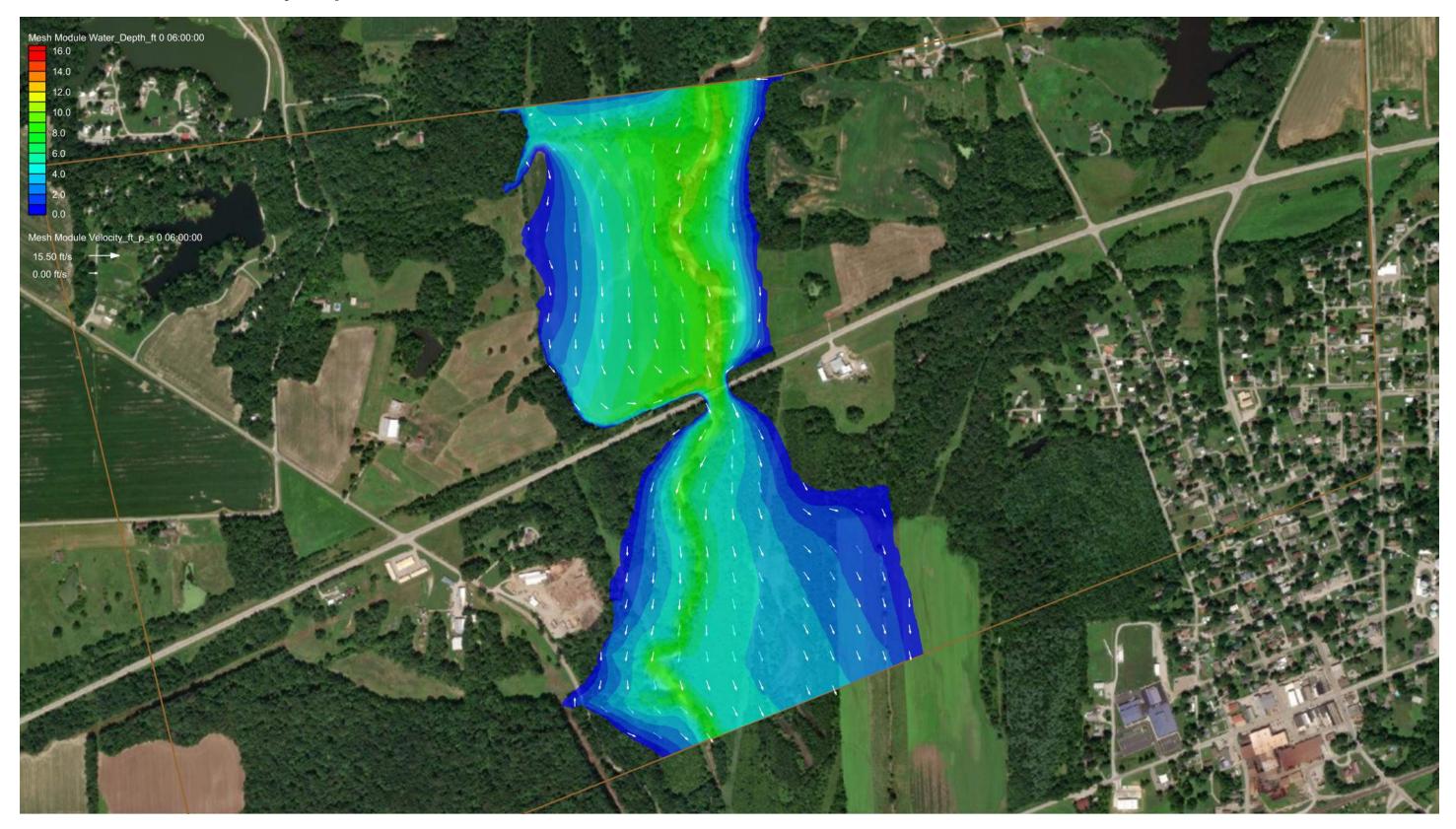
Date: 6/25/2021 County: Clark Route: US 40 Watercourse: No ESN: 012-0018 Drainage Area: 8	□ Culvert										
Hydrology Method (check all that apply): □FIS □StreamStats □HEC-HMS □TR-20 □Rational Method □Other: Discharges/ Flows											
Y	2	5	10	25	50	100	200	500			
Analyzed			\boxtimes		\boxtimes	\boxtimes	\boxtimes	\boxtimes			
BC ID: 1	3,320	5,960	7,910	10,500	12,600	14,600	16,825	19,800			
BC ID:				,			,	,			
BC ID:											
BC ID:											
Source of Topogr	aphy/ Surf	face Data (check all t	hat apply)	<u>.</u>		•				
\boxtimes SMS \square LiDAR \square Bathymetry \square Cross Sections \square Text File \square LandXML											
Mesh Generator Coverage: Mesh Name: Mesh Generator Mesh Mesh Type: \Bar Paving \Bar Patching Vertices Spacing: Max: 50 ft.; Min: 50 ft. Bensity (Elements/ Acre): 37,321 / 923 = 40.43 Monitor Lines & Points Coverage: Number of Monitor Lines: 6 Number of Monitor Points: 0 Materials Coverage: Manning's "n" Value used: 0.06 Secondary Conditions Coverage: Number of BC Arcs: 2 BC ID: 1 Type: Sinlet-Q Exit-H Location: N BC ID: 2 Type: Inlet-Q Exit-H Location: S BC ID: Type: Inlet-Q Exit-H Location: S BC ID: Type: Inlet-Q Exit-H Location: S EXIt-H Location: S											
Model Control:Time Step (sec.): 1Simulations Length (hrs.): 6											
Output Method: Specified Frequency Specified Times Simulation End Unsteady Output											
Model Convergence: Time of Convergence at (hrs.): 4											
Results: \boxtimes Roadway Overtopping occurs between the >500Y & YGhere Ratio (Mesh Density/ Time of Convergence): $40.43 / 4 = 10$											

Notes:

US-40 Over the North Branch Embarras River SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



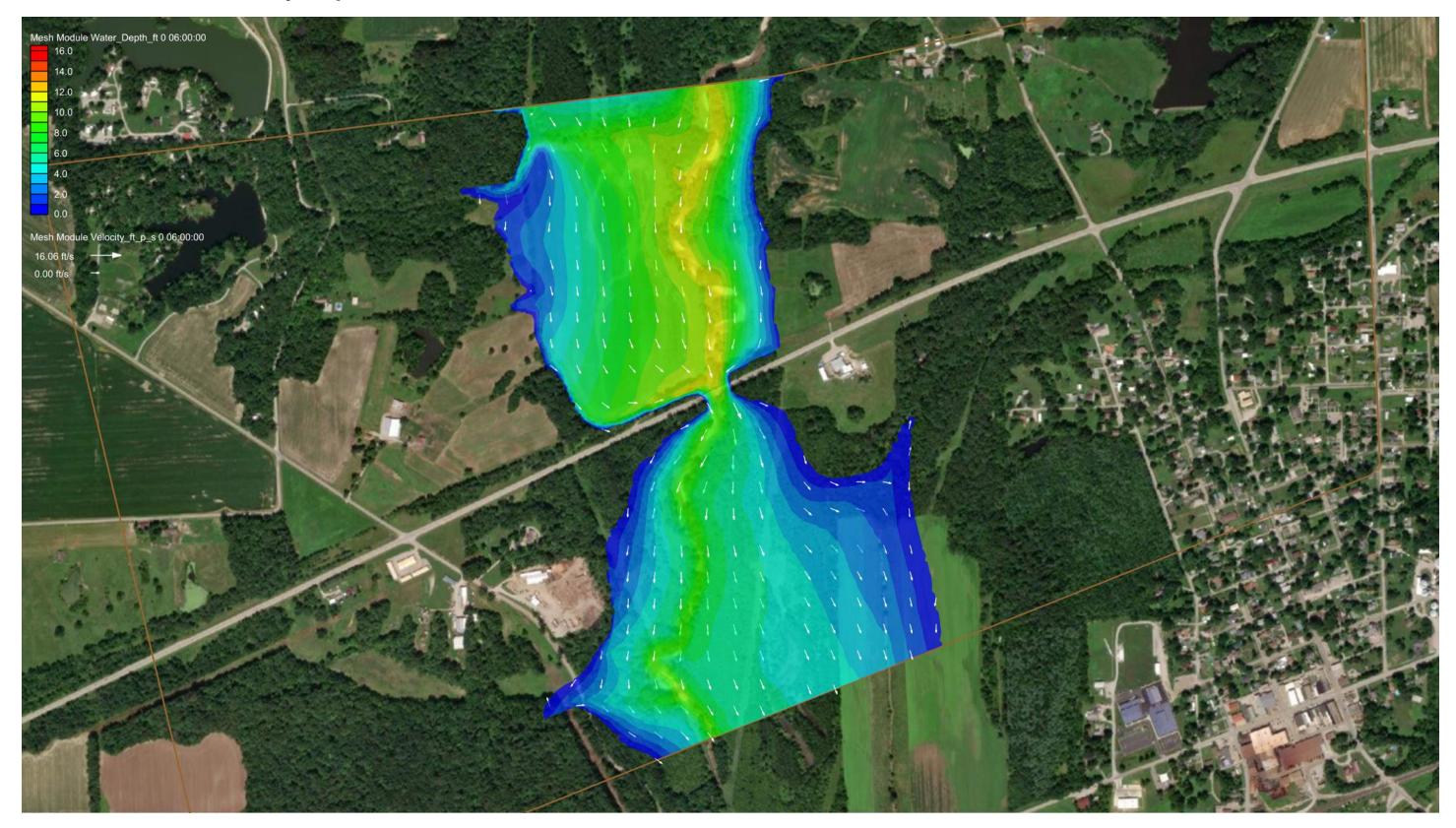
US-40 Over the North Branch Embarras River SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



US-40 Over the North Branch Embarras River SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



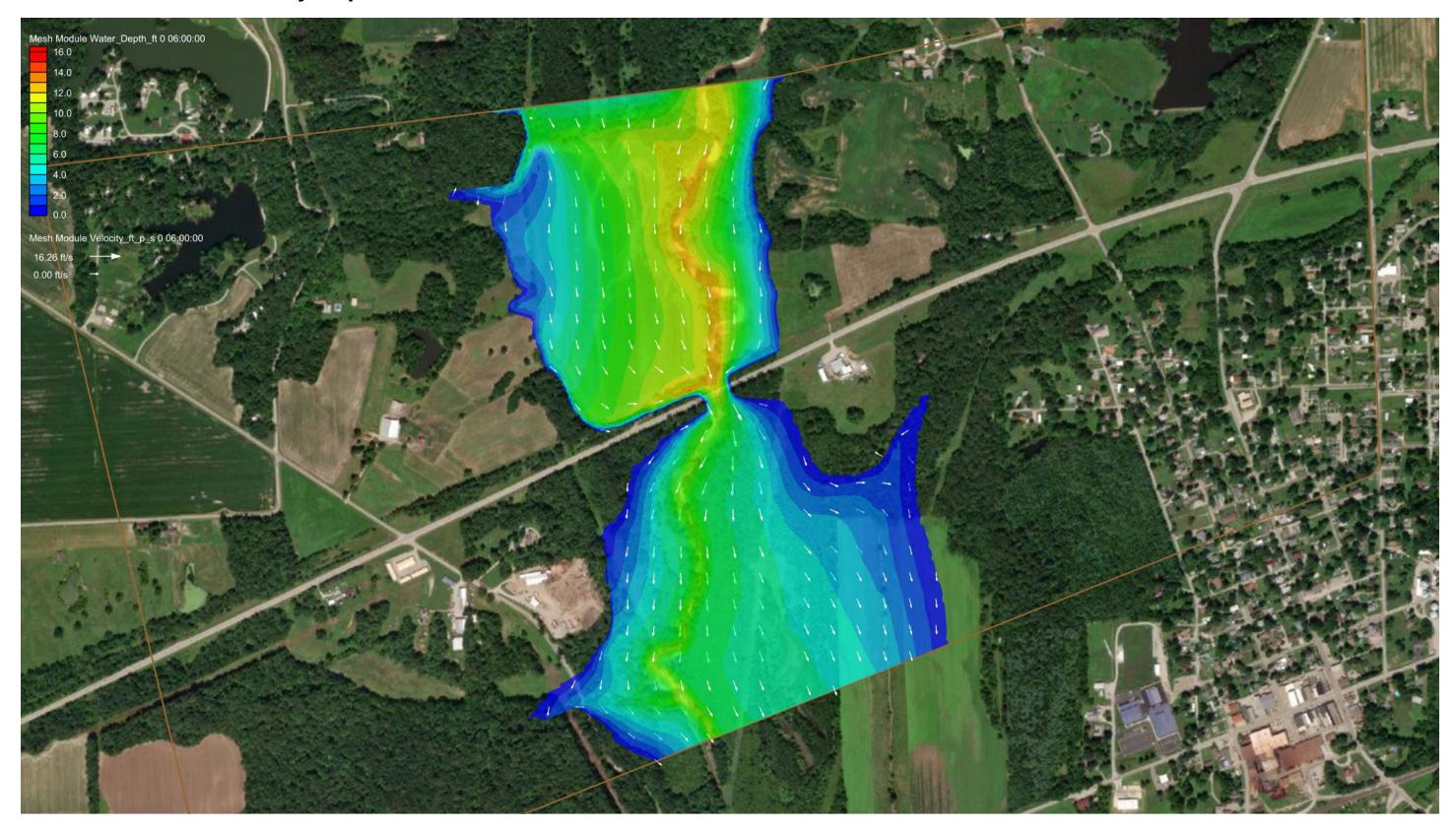
US-40 Over the North Branch Embarras River SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



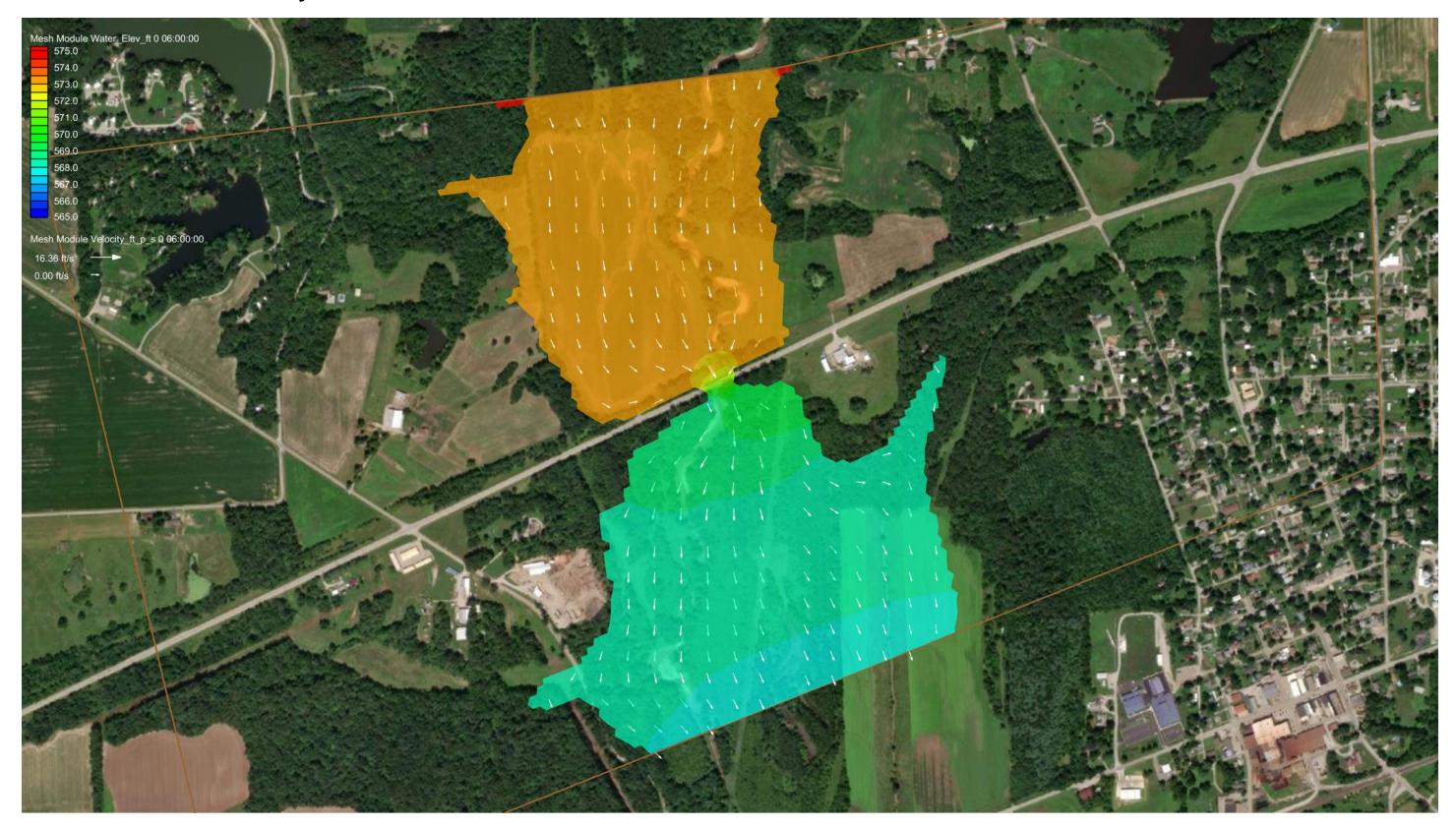
US-40 Over the North Branch Embarras River SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



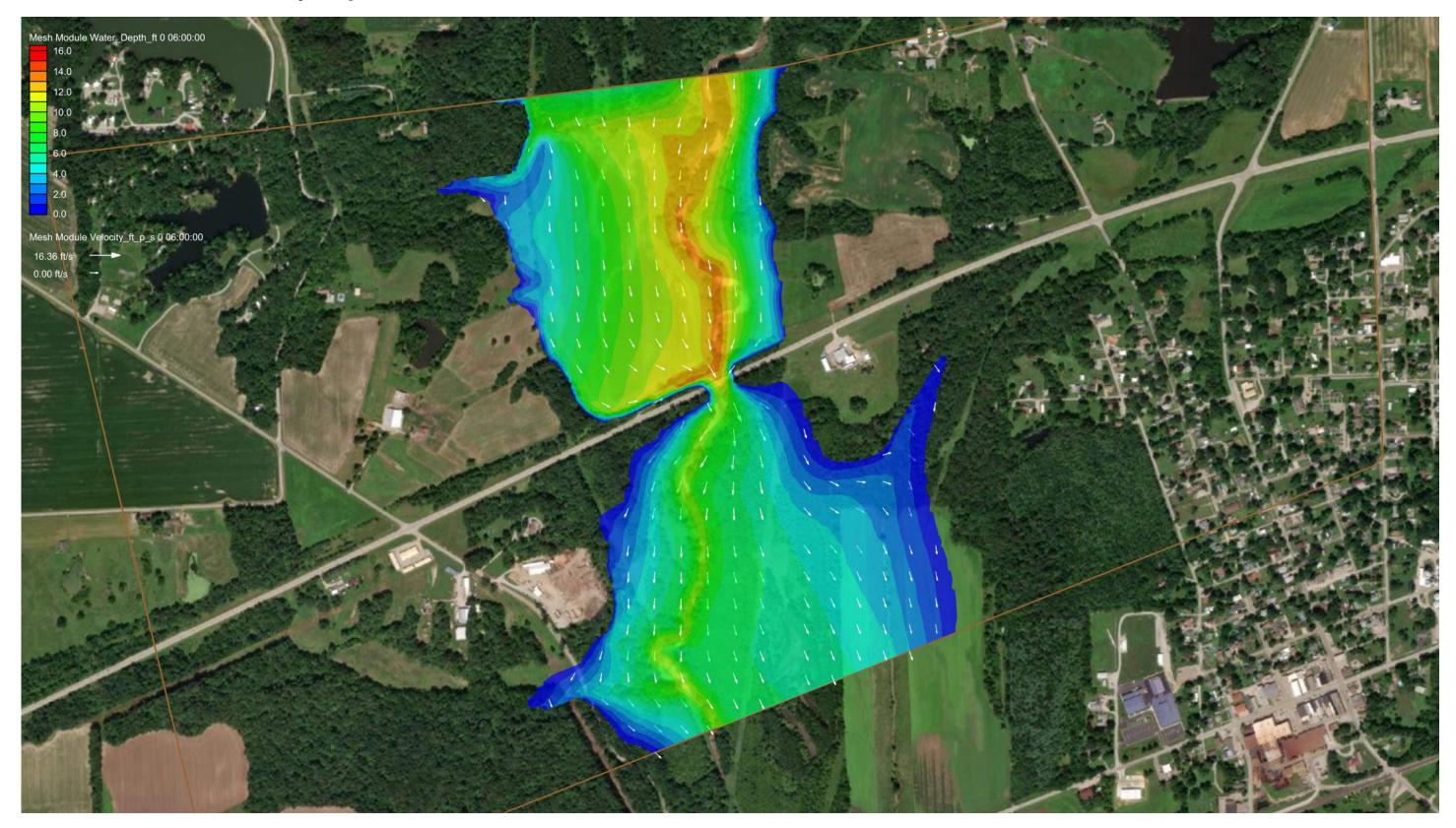
US-40 Over the North Branch Embarras River SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



US-40 Over the North Branch Embarras River SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



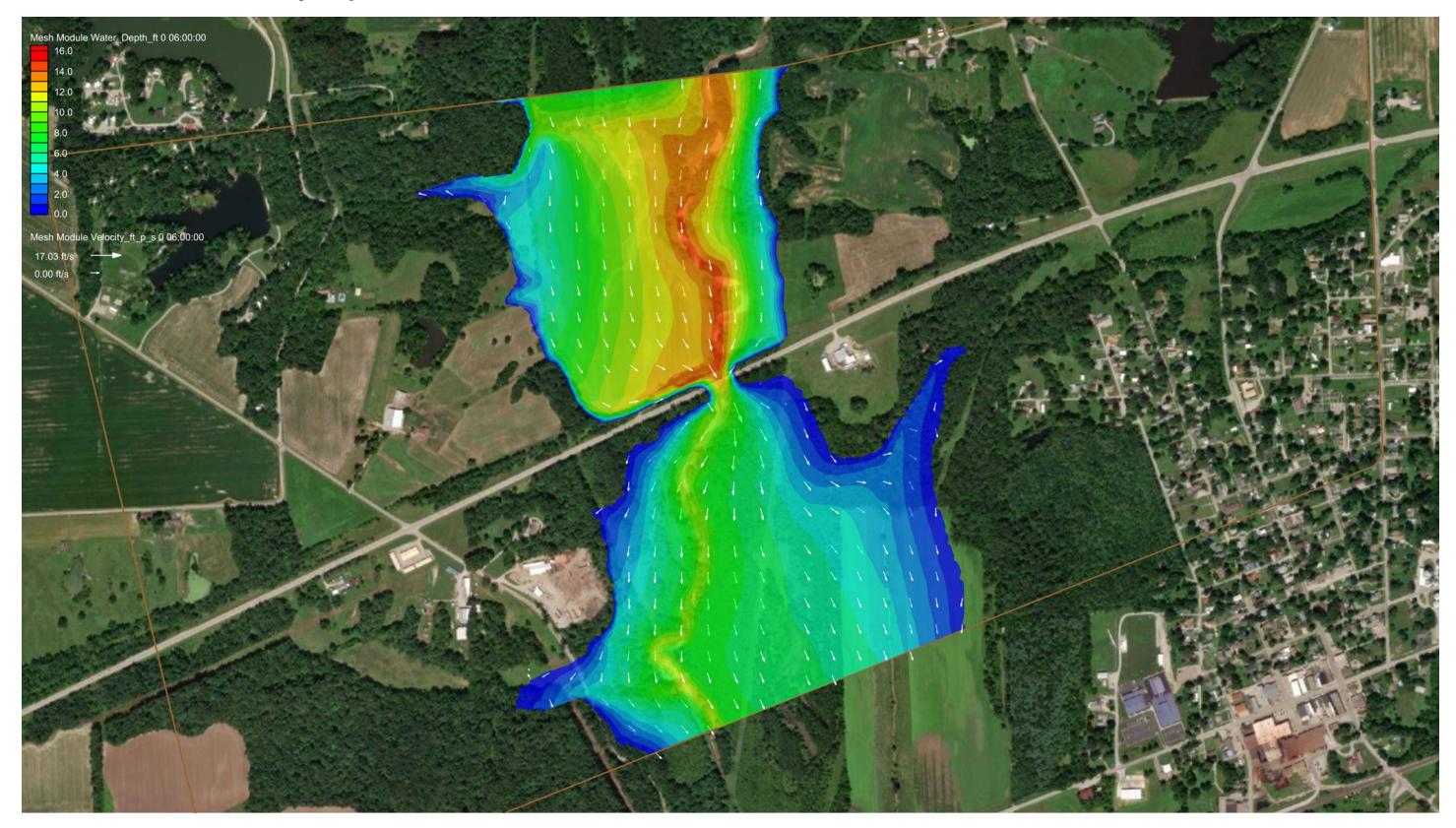
US-40 Over the North Branch Embarras River SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



US-40 Over the North Branch Embarras River SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



US-40 Over the North Branch Embarras River SMS Quick Check Model 500-Year Storm - Velocity/Depth Results



SUPPLEMENT to QUICK CHECK GUIDEBOOK



019-0030 – IL 72 over Owens Creek – District 3 – 3-span Bridge 164 feet

IL Hwy 72 Over Owens Creek



SMS Quick Check Model

SMS Quick Check Model for IL Hwy 72 Over Owens Creek Near Kirkland

то:	Neil Vanbebber, IDOT Rich Guise, IDOT Nicholas Jack, IDOT
From:	2IM Group, LLC.; Hanson Professional Services Inc.
SUBJECT:	SMS Quick Check Model for IL Hwy 72 Over Owens Creek Near Kirkland
DATE:	November 5 th , 2021

Introduction

This crossing is located in DeKalb County on IL Hwy 72, west of Kirkland, IL. Owens Creek flows from the south towards IL Hwy 72. Quarry Rd runs perpendicular to Owens Creek and intersects with Hwy 72 250-ft from Owens Creek crossing. The IL Hwy 72 crossing is modelled as an opening in the 2D mesh terrain. The IL Hwy 72 opening is approximately 170'. The quick check summary table and exhibits are attached. The following paragraph contains a brief description of the site hydrology.

Hydrology

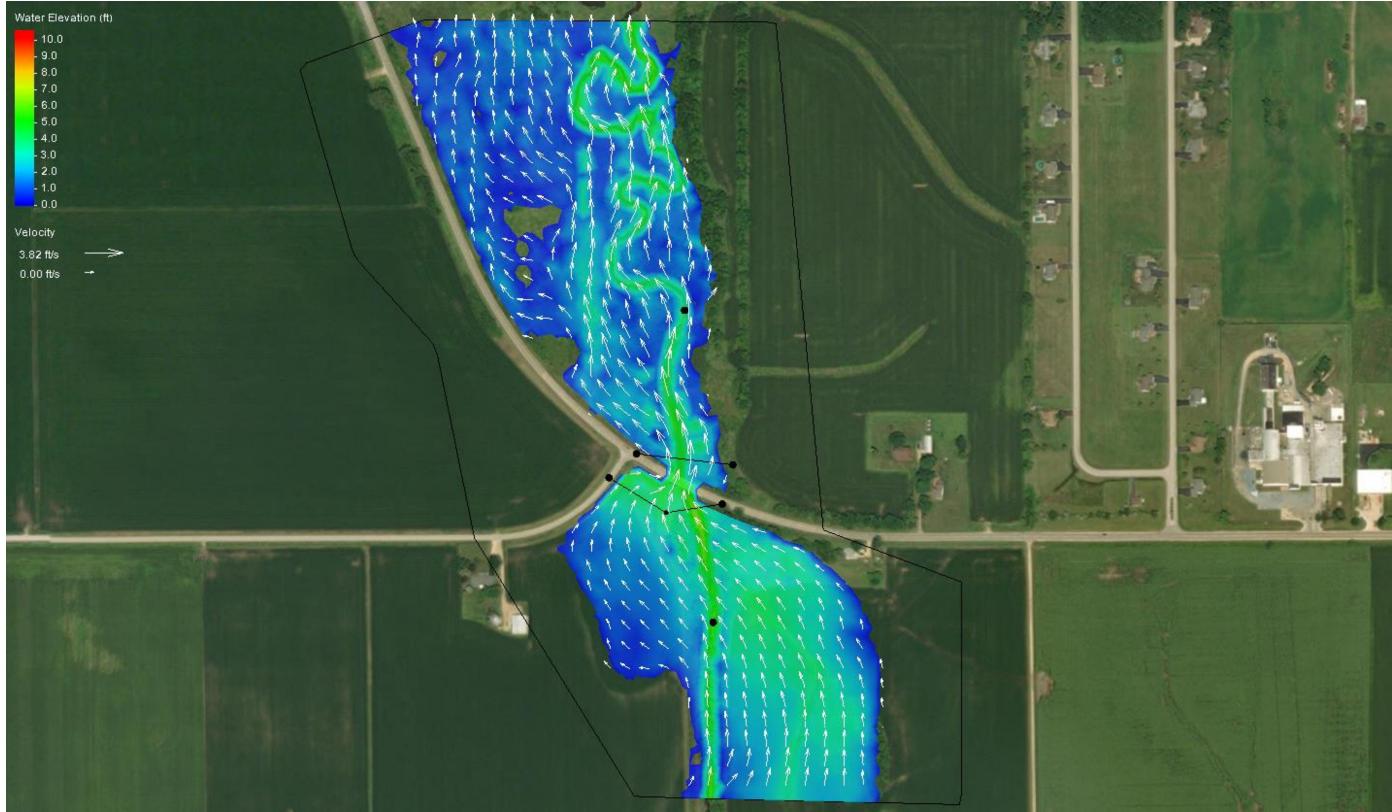
The hydrology for this site was developed from Streamstats. Streamstats queries were made for Owens Creek upstream of IL Hwy 15. The 10-year, 50-year, 100-year, and the 500-year storm events urban discharges reported in the Streamstats report were applied to the model boundary at Owens Creek. A 200-year discharge was interpolated from the Streamstats output. See the summary table on the following page for the flow rates used.

Date: 11/5/2021 County: DeKalb Route: IL 72 Watercourse: Owens Creek ESN: 019-0030 Structure Type: \square Bridge □ Culvert Drainage Area: 45.2 Sq. Mi. (28928 acres) Hydrology Method (check all that apply): FIS ⊠StreamStats \Box HEC-HMS \Box TR-20 □Rational Method Other: Discharges/ Flows Y 2 5 10 25 50 100 200 500 \boxtimes \boxtimes \times \times \times Analyzed BC ID: 2 814 1300 1640 2080 2400 2710 3042 3450 BC ID: BC ID: BC ID: Source of Topography/ Surface Data (check all that apply): ⊠LiDAR \Box Bathymetry \Box Cross Sections Text File \Box SMS Mesh Generator Coverage: Mesh Name: QC_IL72_Existing Conditions_Mesh Mesh Type: ⊠Paving □Patching Vertices Spacing: Max: 50 ft.; Min: 50 ft. Mesh Density (Elements/ Acre): 4827 / 117 = 41.3Monitor Lines & Points Coverage: Number of Monitor Points: 2 Number of Monitor Lines: 2 Materials Coverage: Manning's "n" Value used: 0.060 Boundary Conditions Coverage: Number of BC Arcs: 2 BC ID: 2 □Exit-H Type: ⊠Inlet-O Location: South (Upstream) BC ID: 1 Type: □Inlet-Q ⊠Exit-H Location: North (Downstream) BC ID: Type: □Inlet-Q □Exit-H Location: BC ID: Type: □Inlet-O Exit-H Location: BC ID: Type: □Inlet-Q □Exit-H Location: Exit-H Channel Calculator Normal Depth Slope (ft/ft): 0.002 Source: \boxtimes DEM \square FIS Profile Model Control: Time Step (sec.): 5 Simulations Length (hrs.): 12 Output Method:
Specified Frequency
Specified Times
Simulation End
Unsteady Output Model Convergence: Time of Convergence at (hrs.): 5 **Results:** \boxtimes Roadway Overtopping occurs between the >500Y & Y Ghere Ratio (Mesh Density/ Time of Convergence): 41.3 / 5 = 8.3 Elements/Hour Notes: Roadway overtops at an event greater than the 500 year flood.

IL-72 Over Owens Creek SMS Quick Check Model 10-Year Storm – Velocity/Elevation Results



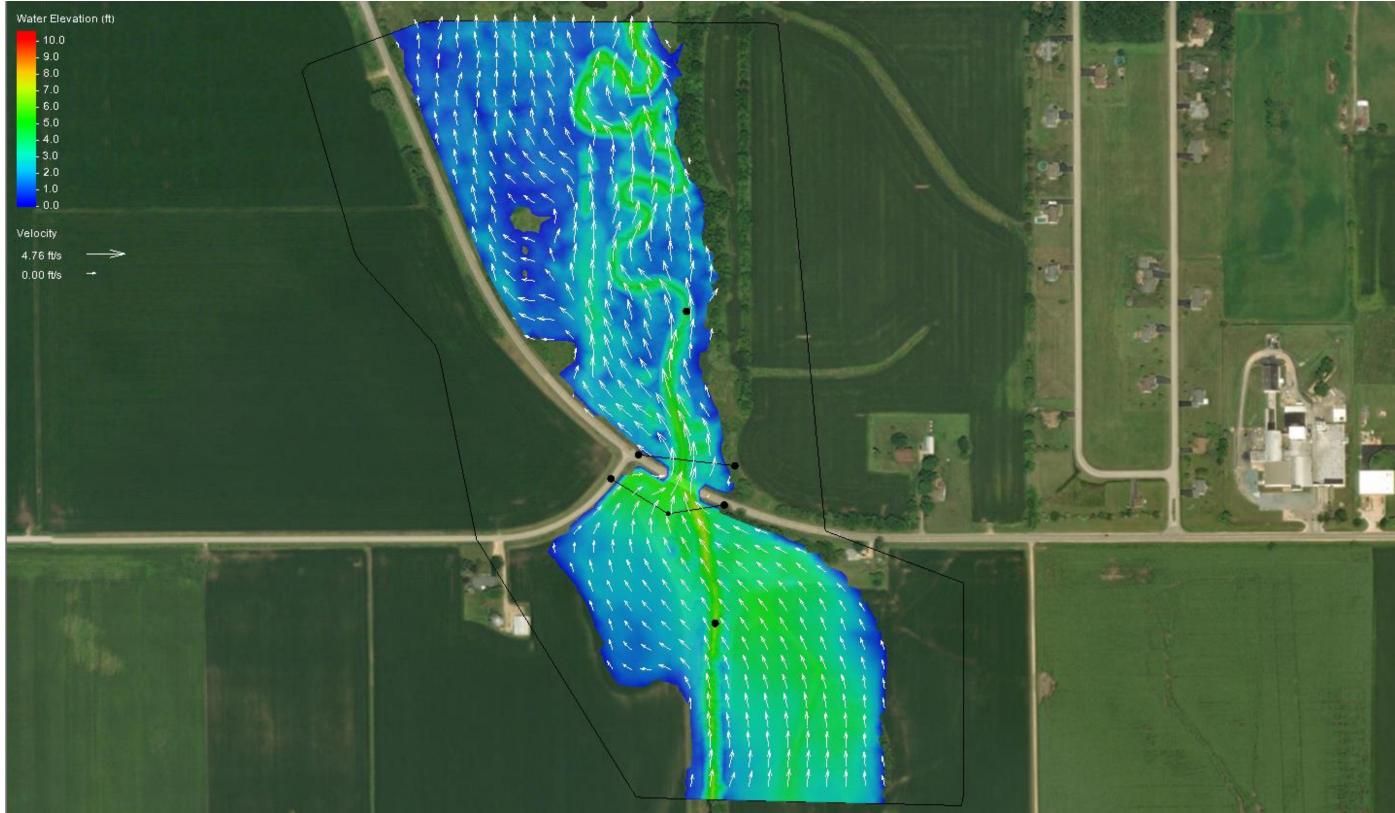
IL-72 Over Owens Creek SMS Quick Check Model 10-Year Storm – Velocity/Depth Results



IL-72 Over Owens Creek SMS Quick Check Model 50-Year Storm – Velocity/Elevation Results



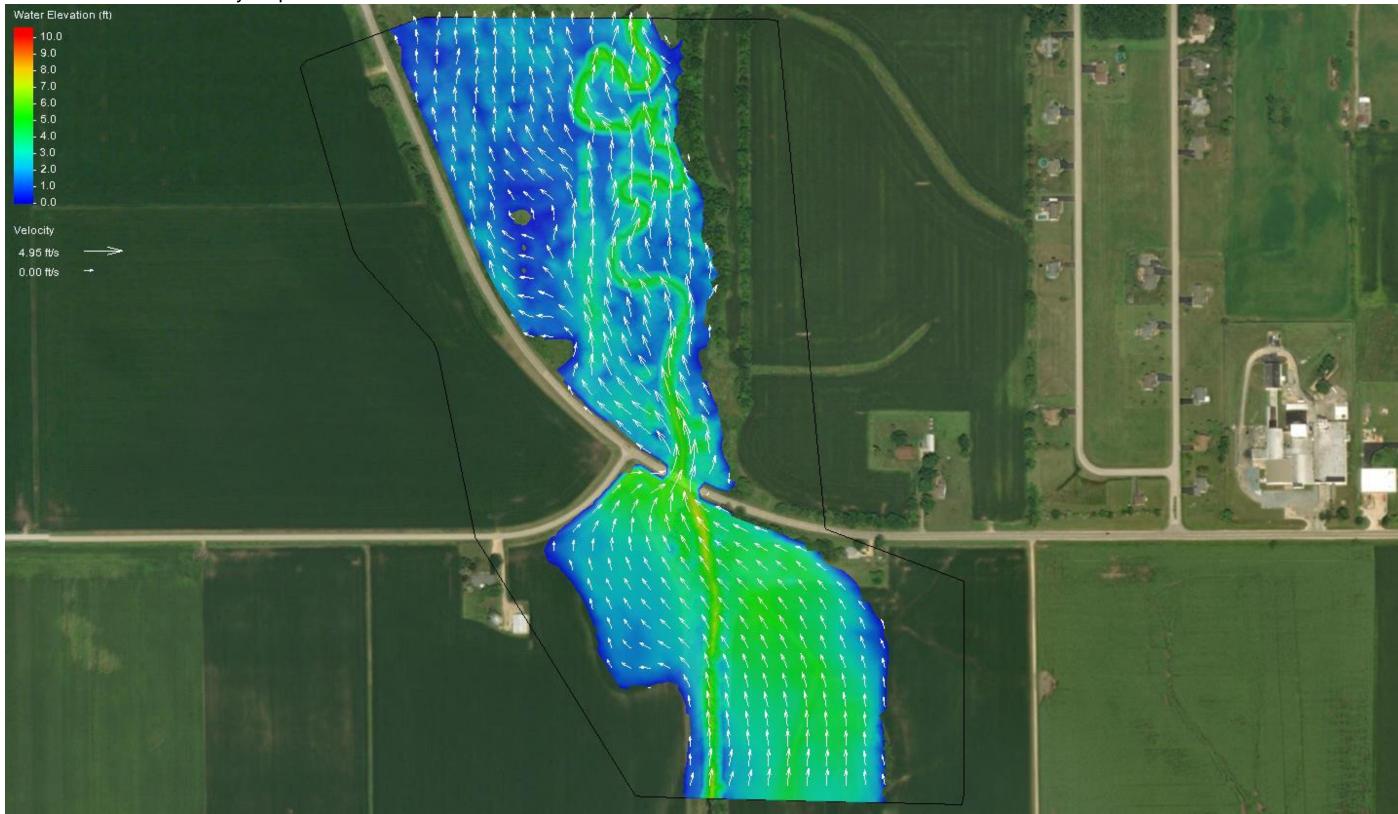
IL-72 Over Owens Creek SMS Quick Check Model 50-Year Storm – Velocity/Depth Results



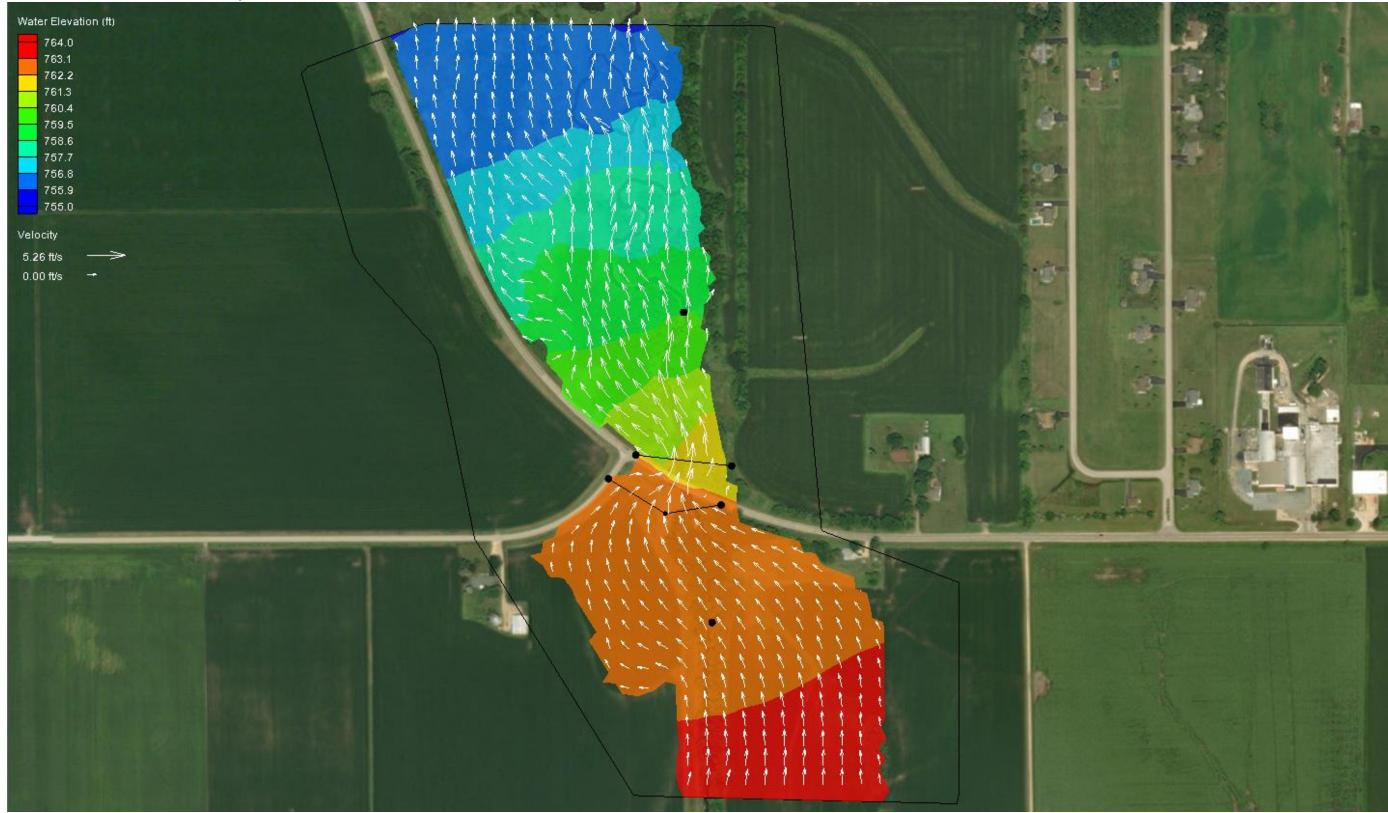
IL-72 Over Owens Creek SMS Quick Check Model 100-Year Storm – Velocity/Elevation Results



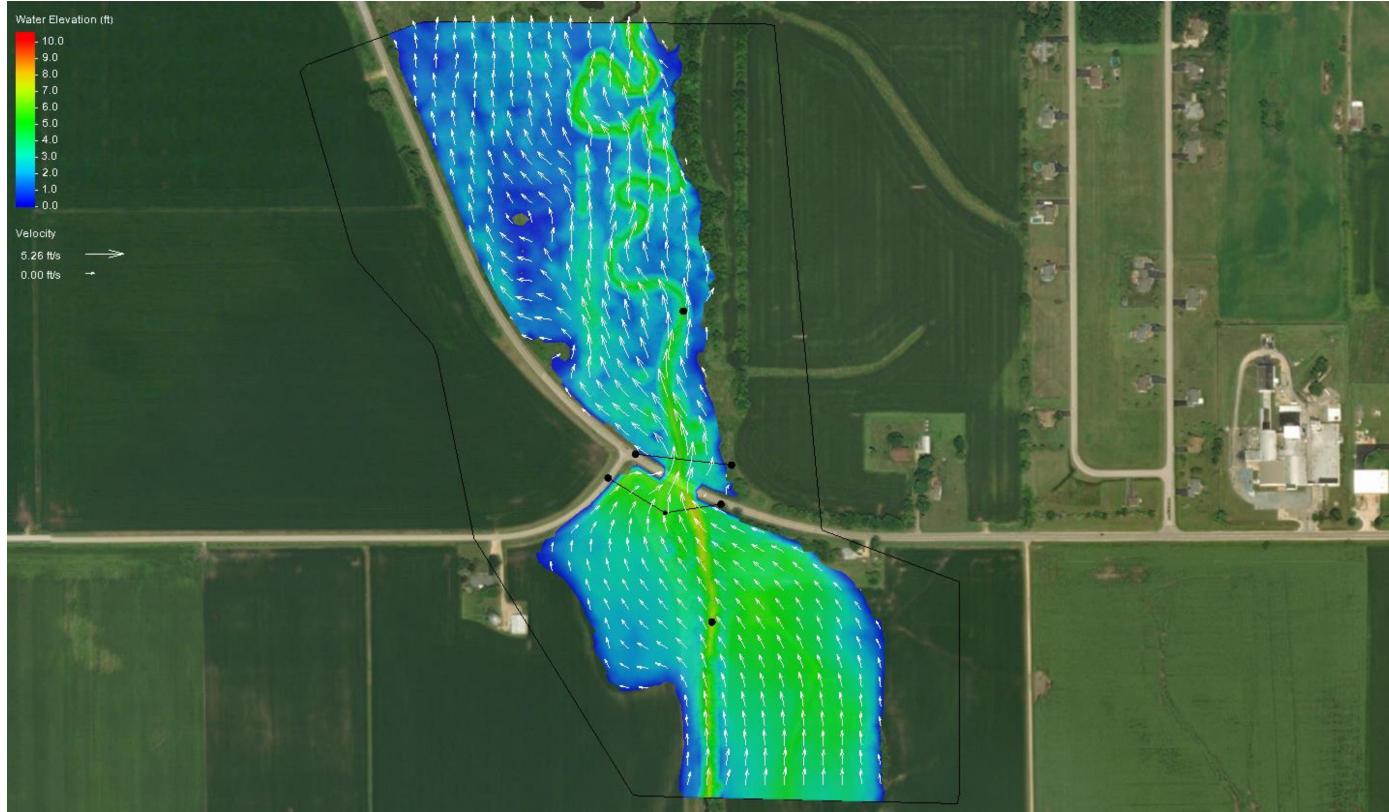
IL-72 Over Owens Creek SMS Quick Check Model 100-Year Storm – Velocity/Depth Results



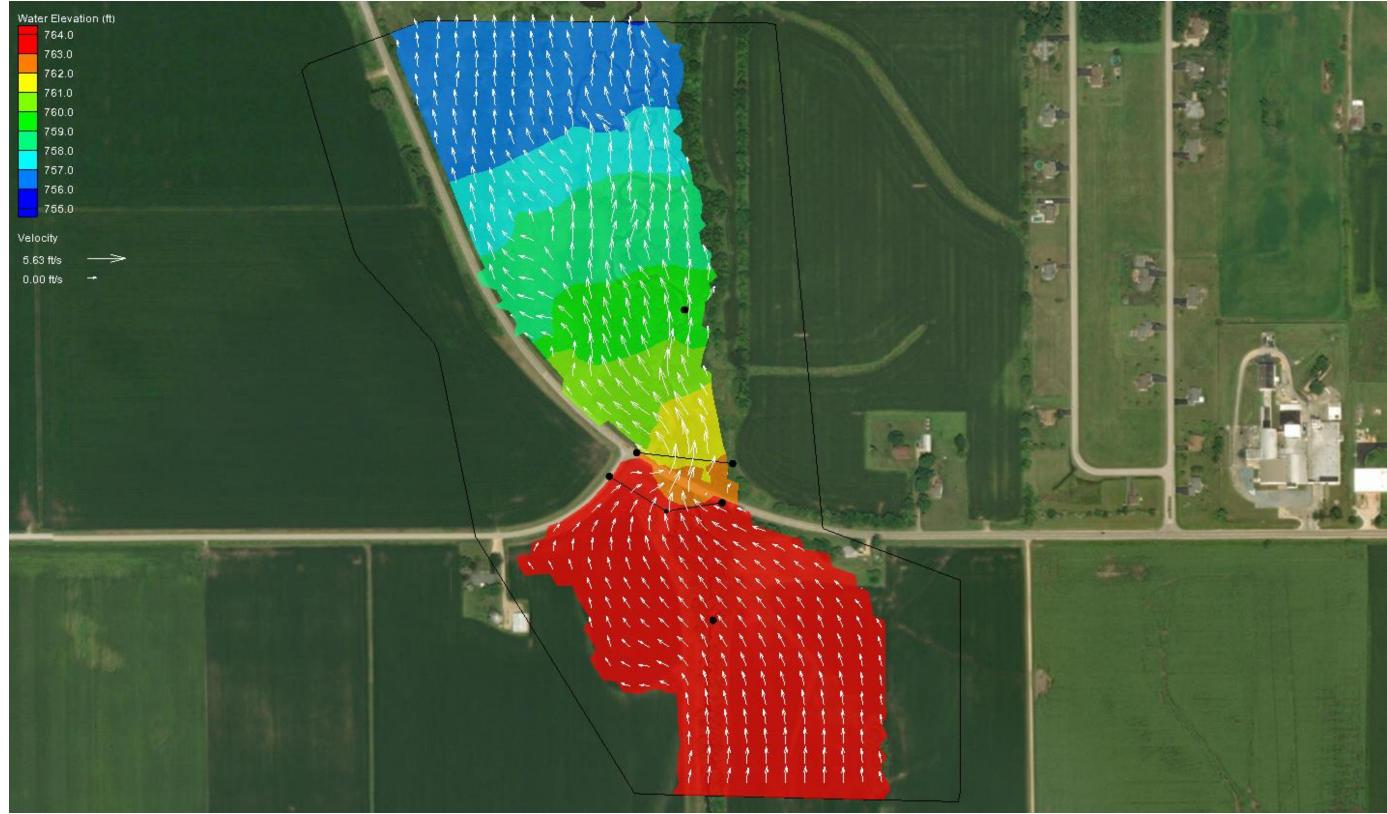
IL-72 Over Owens Creek SMS Quick Check Model 200-Year Storm – Velocity/Elevation Results



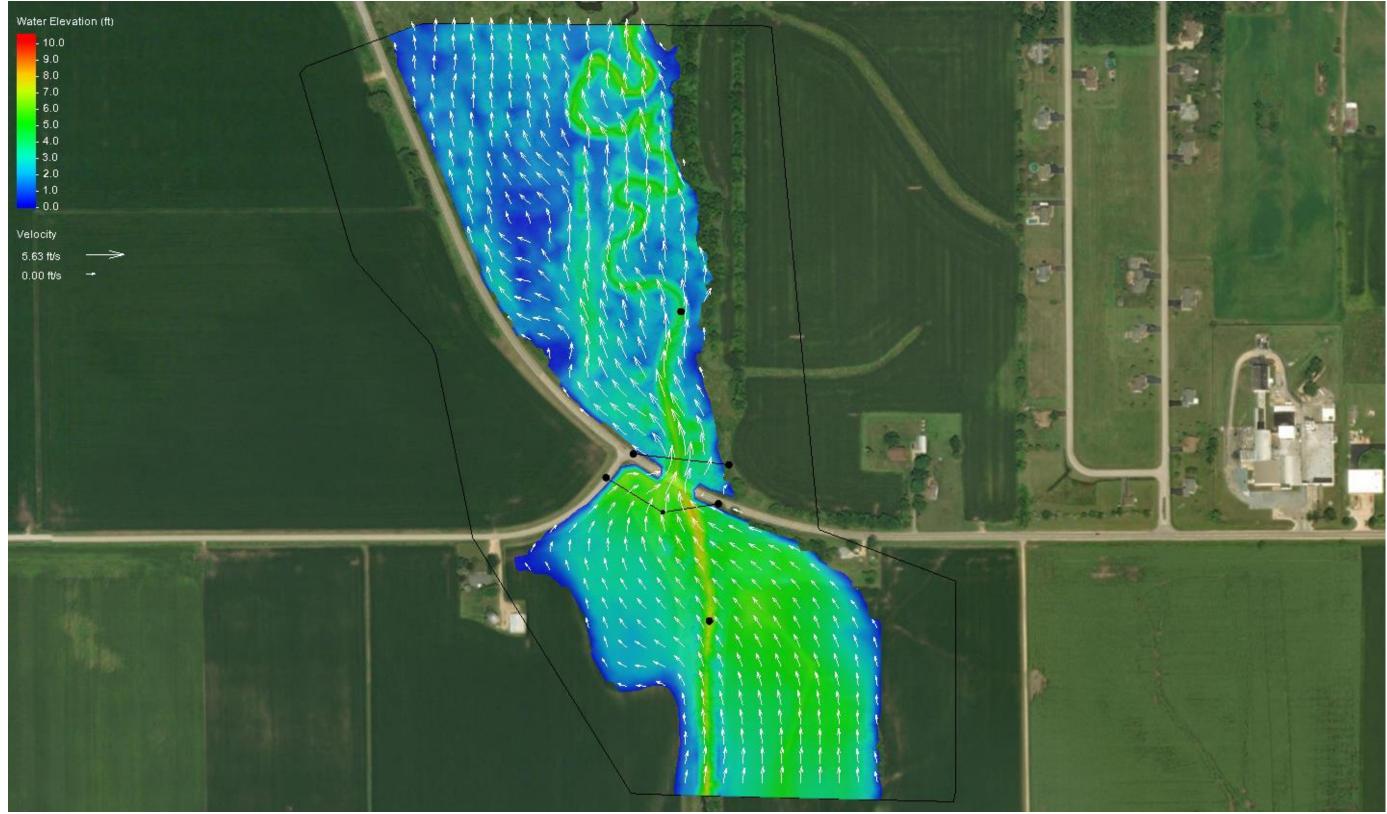
IL-72 Over Owens Creek SMS Quick Check Model 200-Year Storm – Velocity/Depth Results



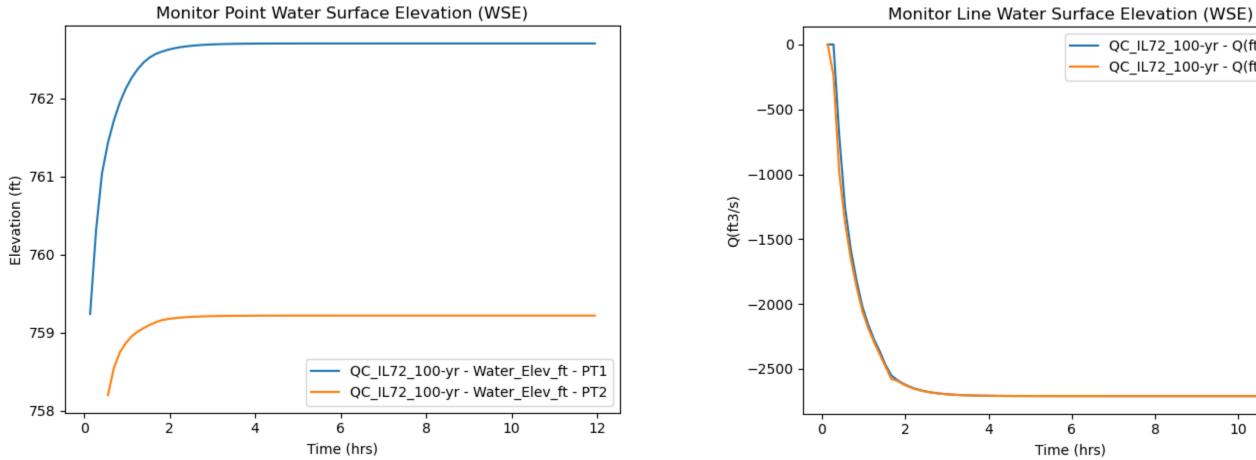
IL-72 Over Owens Creek SMS Quick Check Model 500-Year Storm – Velocity/Elevation Results



IL-72 Over Owens Creek SMS Quick Check Model 500-Year Storm – Velocity/Depth Results



IL-72 Over Owens Creek SMS Quick Check Model 100-Year Storm – Simulation Plot



8 10 12	1
QC_IL72_100-y1 - Q(IC3/S) - LN2	
QC_IL72_100-yr - Q(ft3/s) - LN1 QC_IL72_100-yr - Q(ft3/s) - LN2	
OC 72 100 v/r O(#2/c) IN1	l

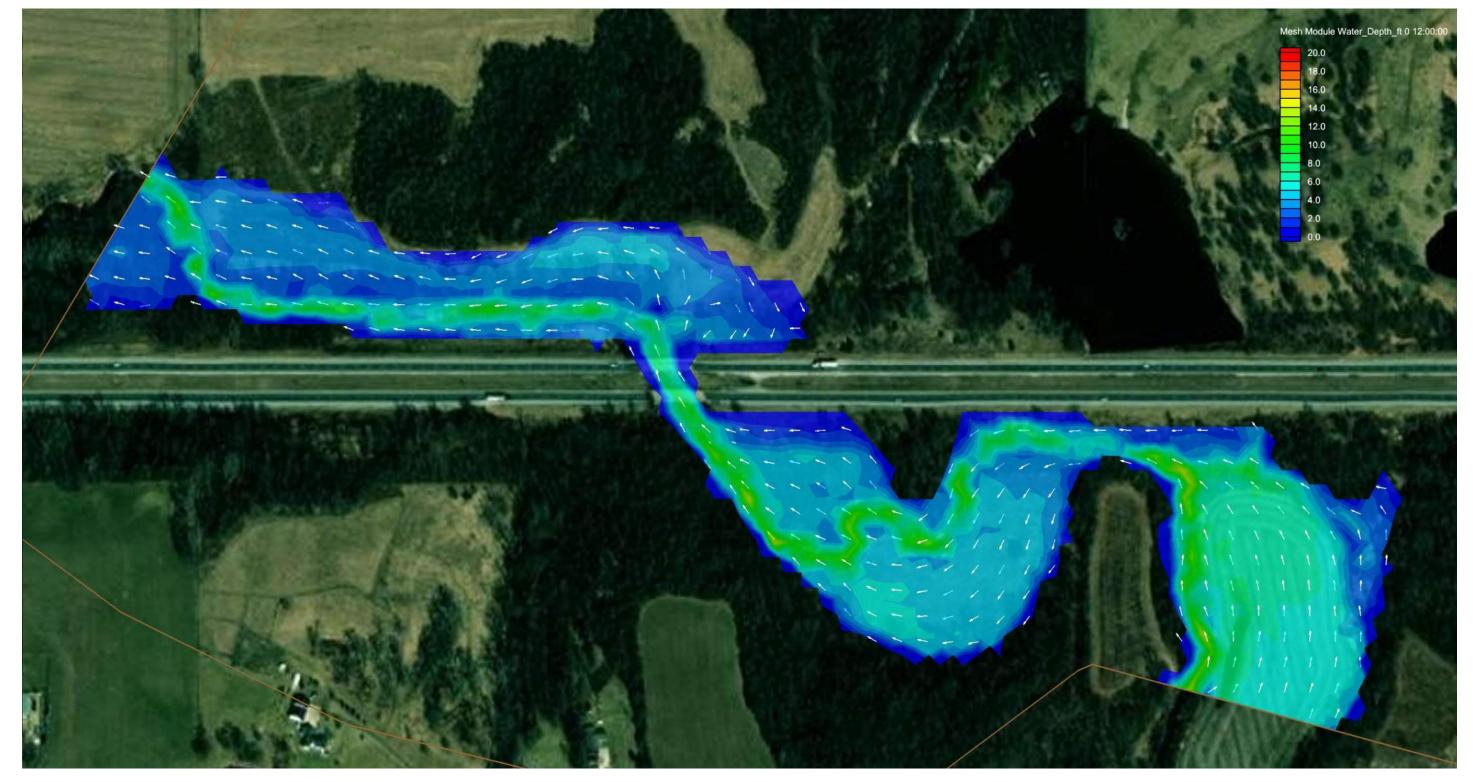
SUPPLEMENT to QUICK CHECK GUIDEBOOK



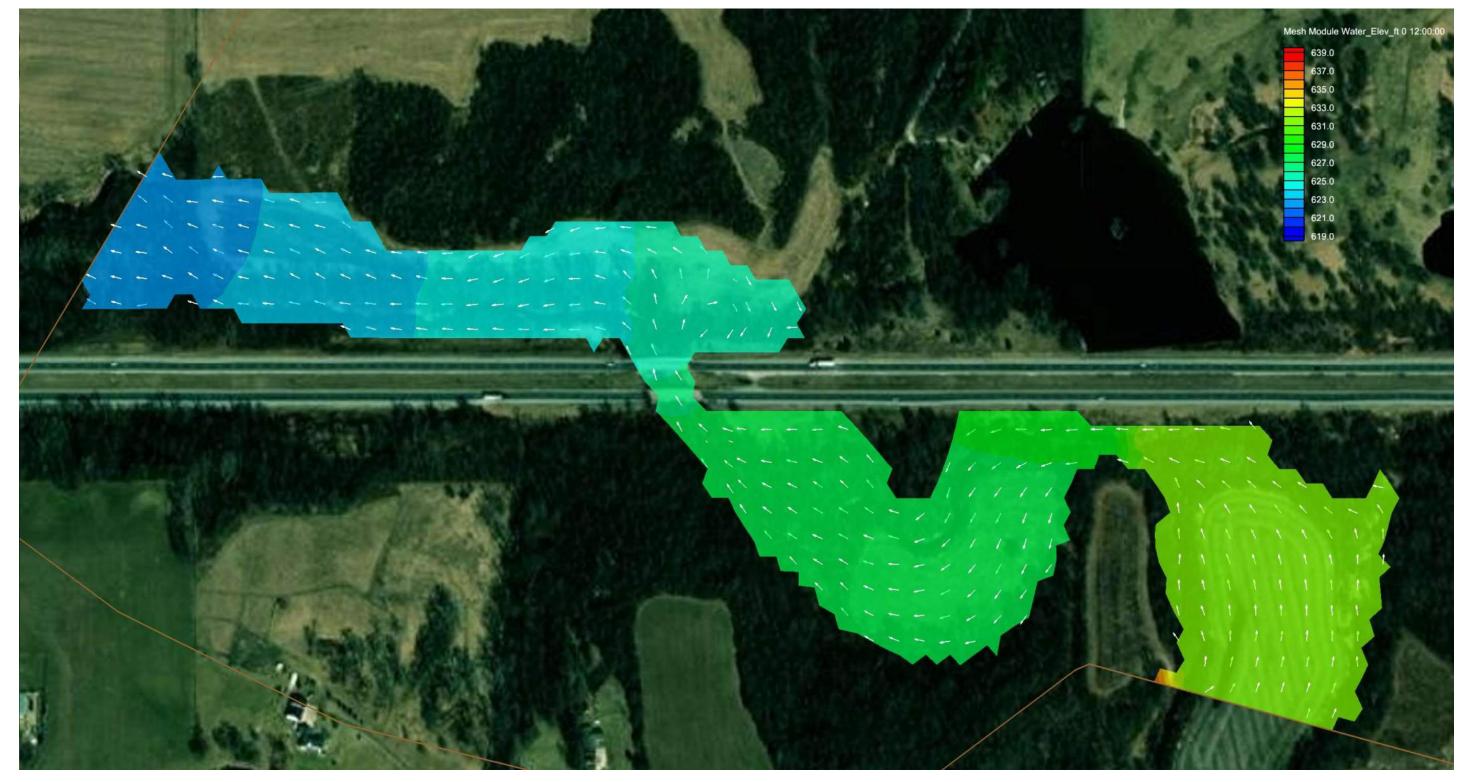
037-0107 (EB) and 037-0108 (WB) – I-80 over Mineral Creek – District 2 – 3-span Dual Bridges 151 feet

Date: 09/01/2021 County: Henry Route: I-80 Watercourse: Mineral Creek ESN: 037-0107, 037-0108 Structure Type: 🛛 Bridge □ Culvert Drainage Area: 19.17 Sq. Mi. (12,269 acres) Hydrology Method (check all that apply): ⊠ StreamStats □HEC-HMS □TR-20 □Rational Method Other: Discharges/ Flows Y 2 5 10 25 50 100 200 500 \times \boxtimes \times \times \times Analyzed 2470 3850 4490 BC ID: 1 1080 1880 3260 5141 6000 BC ID: BC ID: BC ID: Source of Topography/ Surface Data (check all that apply): □LiDAR □Bathymetry □Cross Sections □Text File \boxtimes SMS Mesh Generator Coverage: Mesh Name: QC I-80 MineralCreek Existing Conditions Mesh Type: ⊠Paving □Patching Vertices Spacing: Max: 50 ft.; Min: 50 ft. Mesh Density (Elements/ Acre): 10,358 / 256.37 = 40.40 Monitor Lines & Points Coverage: Number of Monitor Lines: 5 Number of Monitor Points: 0 Materials Coverage: Manning's "n" Value used: 0.06 Boundary Conditions Coverage: Number of BC Arcs: 2 BC ID: 1 □Exit-H Location: SE Type: ⊠Inlet-O BC ID: 2 Type: □Inlet-Q ⊠Exit-H Location: NW BC ID: Type: □Inlet-Q □Exit-H Location: BC ID: Type: □Inlet-Q Exit-H Location: BC ID: Type: □Inlet-Q □Exit-H Location: Exit-H Channel Calculator Normal Depth Slope (ft/ft): 0.001 ⊠DEM □FIS Profile Source: Model Control: Time Step (sec.): 10 Simulations Length (hrs.): 12 Output Method: ⊠Specified Frequency □Specified Times □Simulation End □Unsteady Output Model Convergence: Time of Convergence at (hrs.): 4 Results: Roadway Overtopping occurs between the N/A Y & N/A Y Ghere Ratio (Mesh Density/ Time of Convergence): 40.40 / 4 = 10.1Notes:

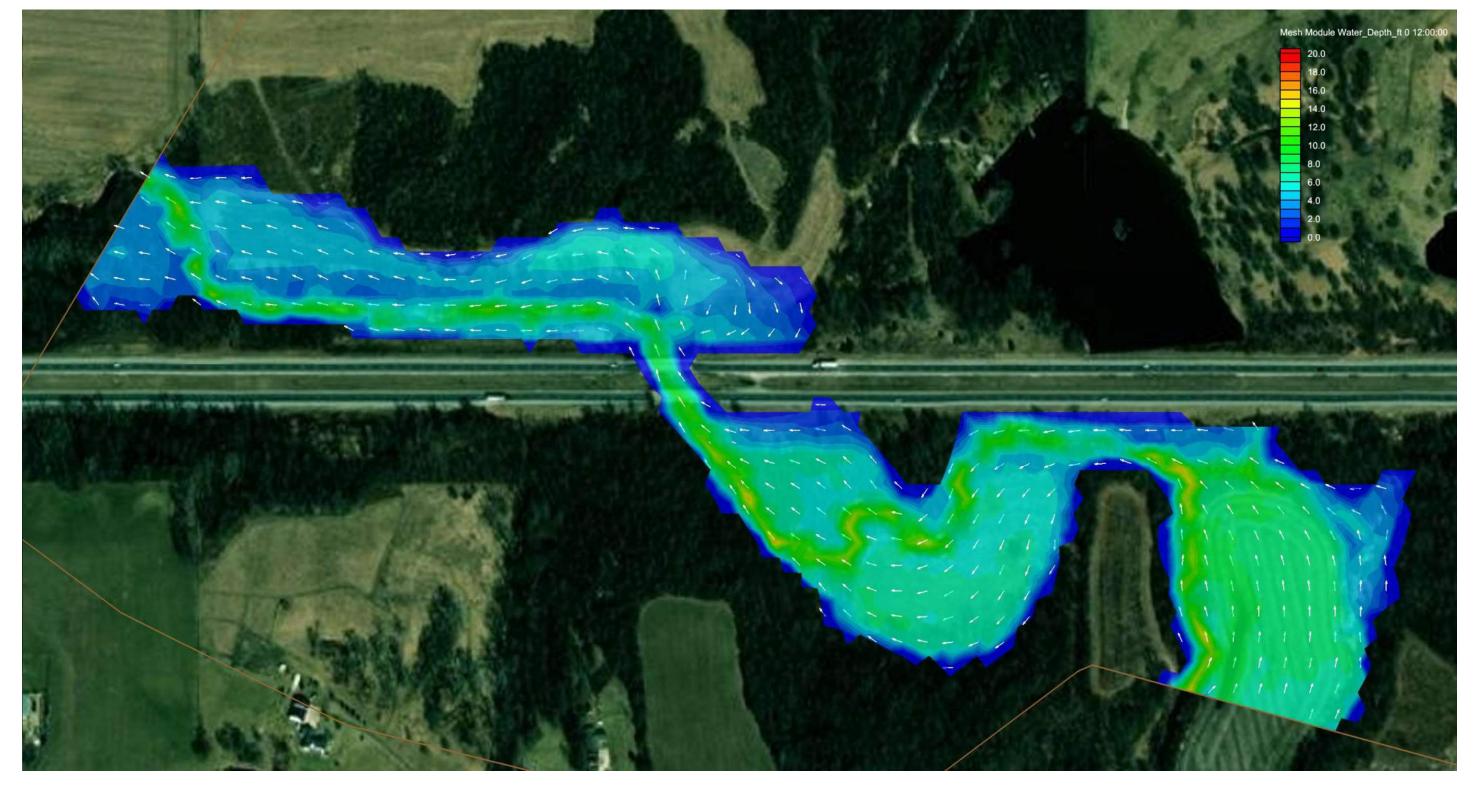
I-80 Over Mineral Creek SMS Quick Check Model 10-Year Storm – Velocity/Depth Results



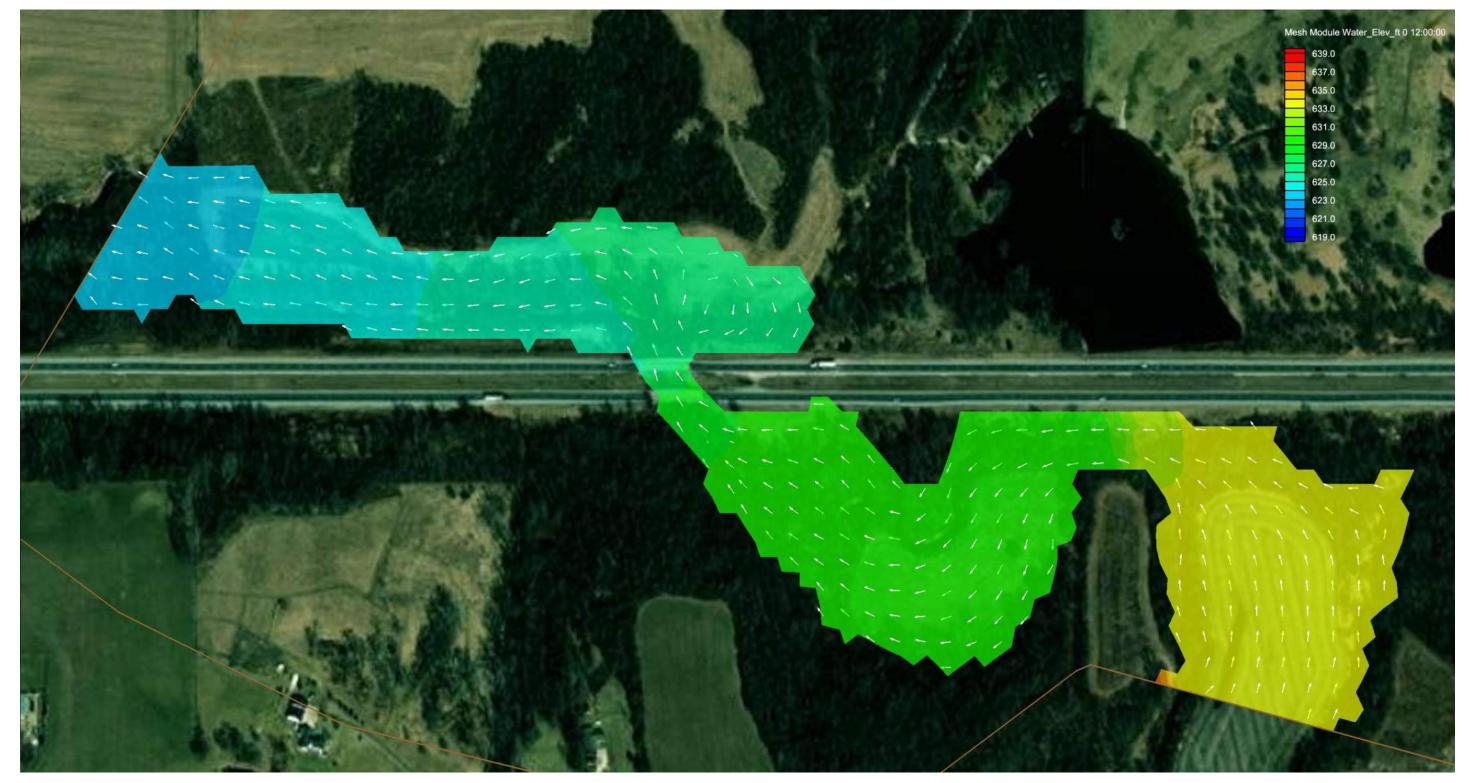
I-80 Over Mineral Creek SMS Quick Check Model 10-Year Storm – Velocity/Elevation Results



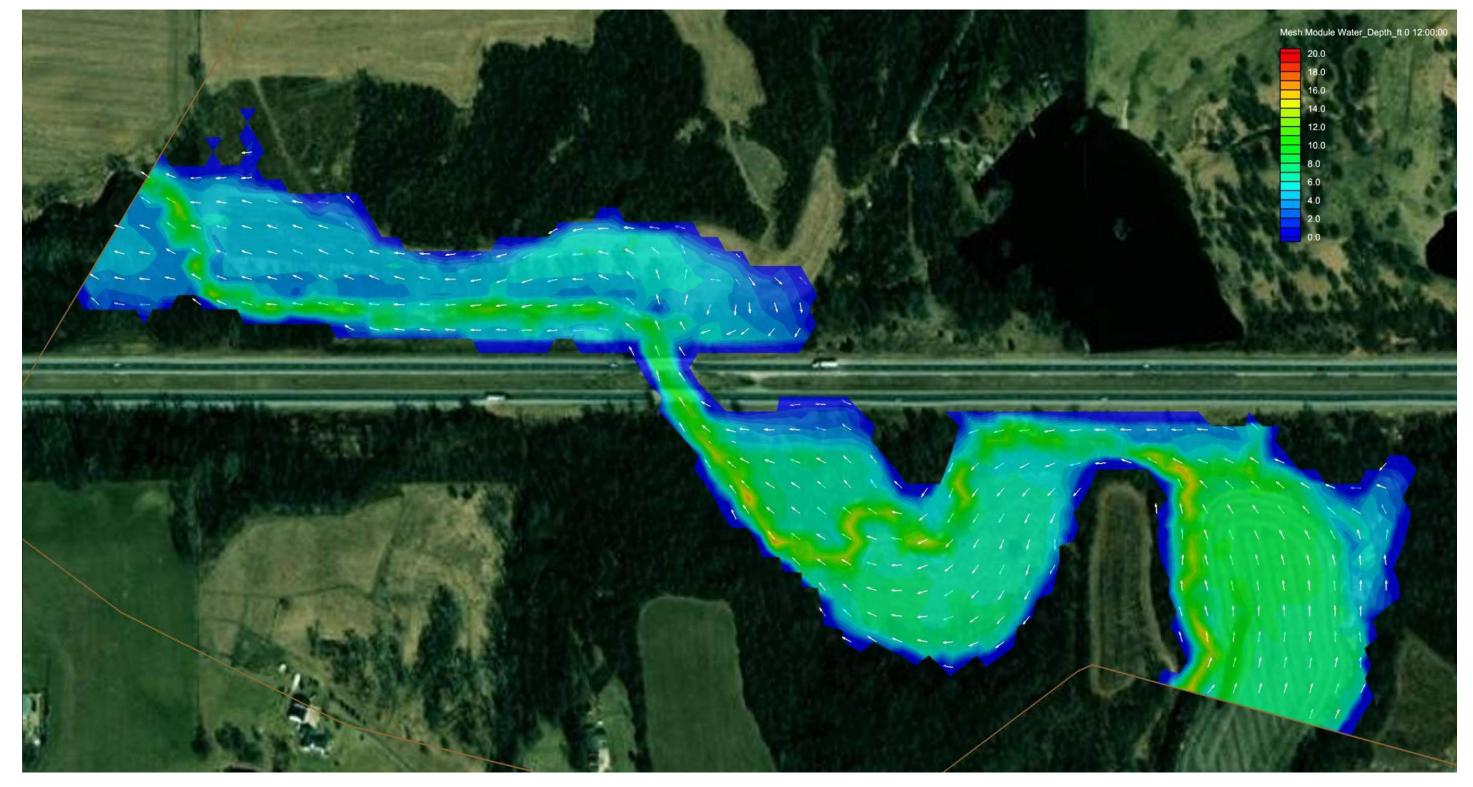
I-80 Over Mineral Creek SMS Quick Check Model 50-Year Storm – Velocity/Depth Results



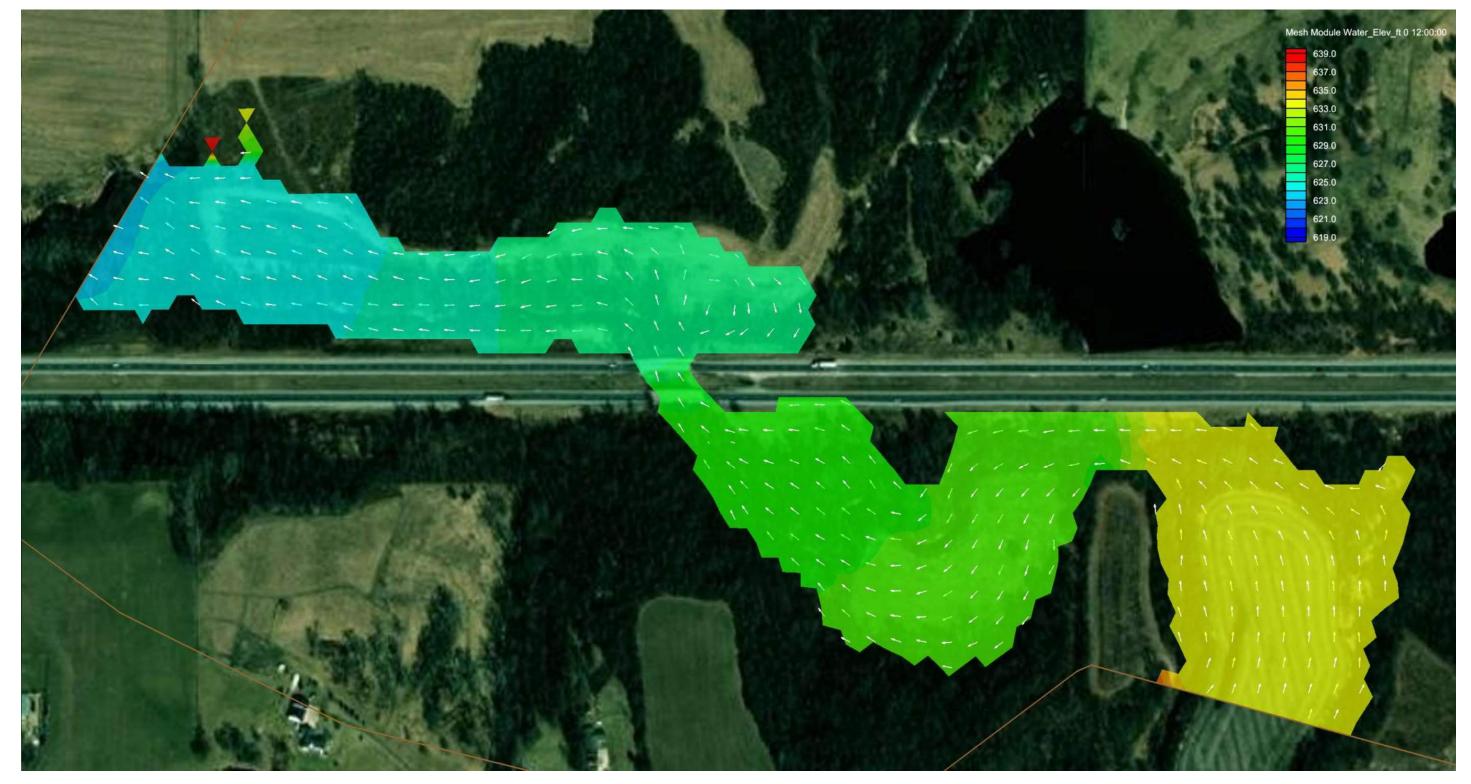
I-80 Over Mineral Creek SMS Quick Check Model 50-Year Storm – Velocity/Elevation Results



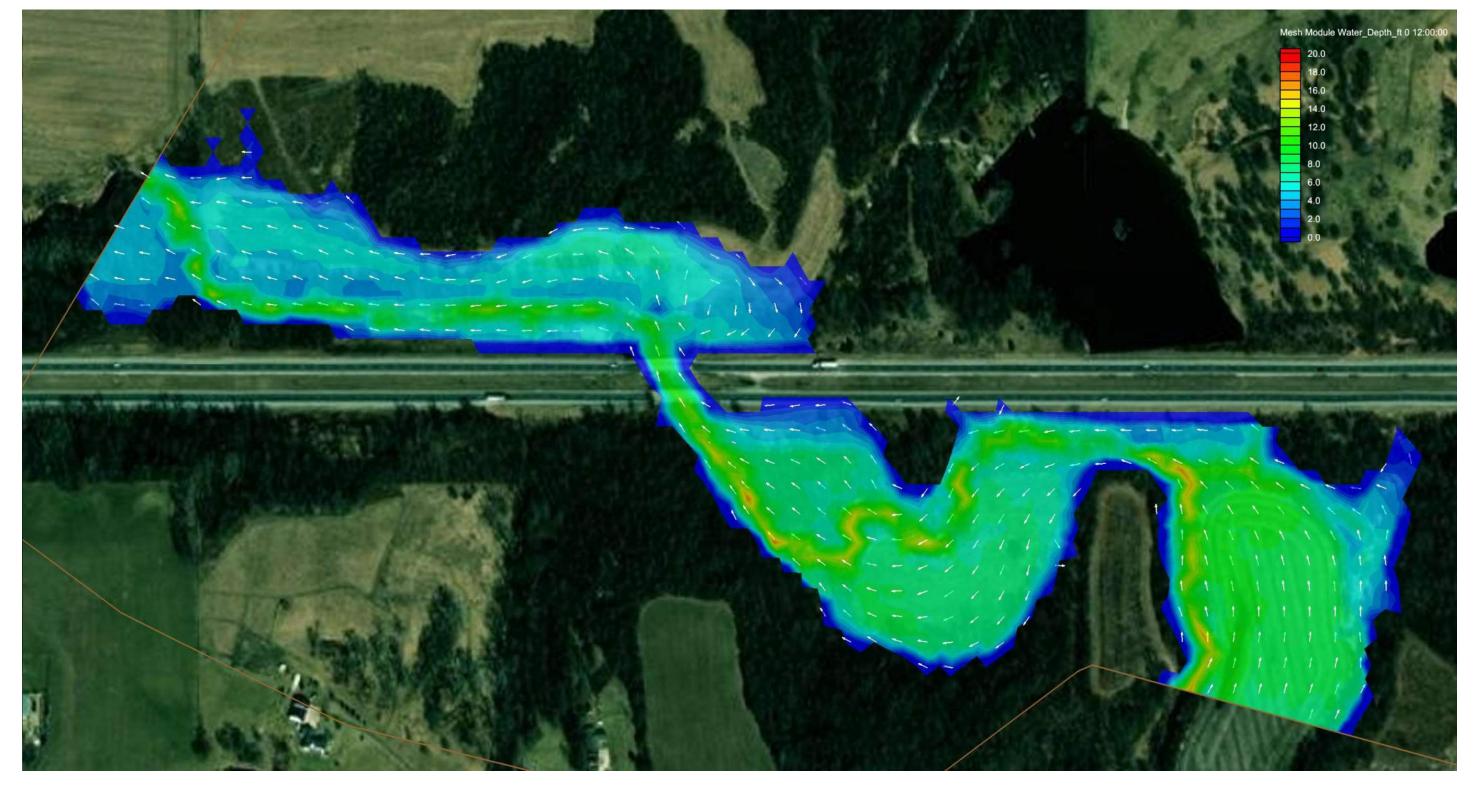
I-80 Over Mineral Creek SMS Quick Check Model 100-Year Storm – Velocity/Depth Results



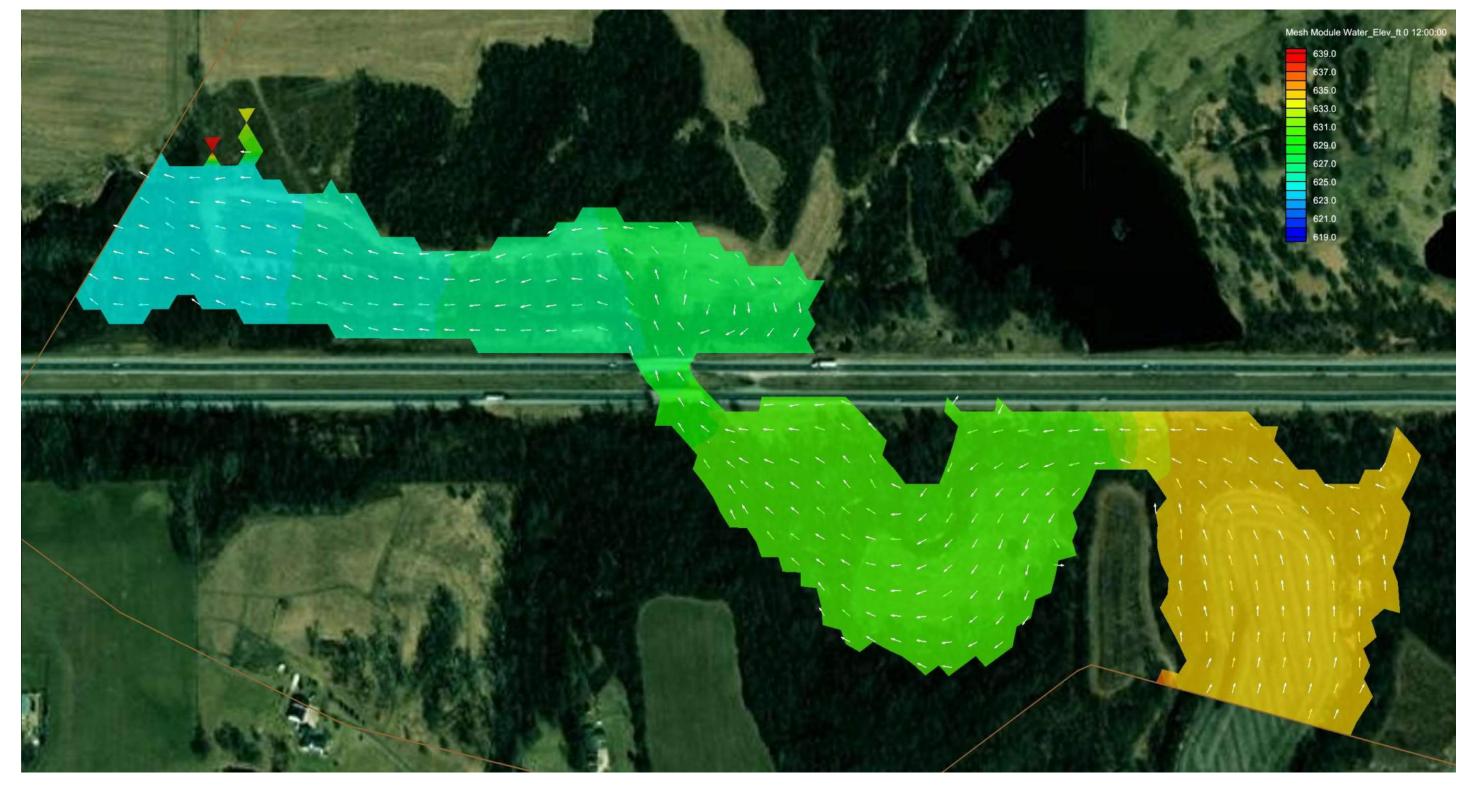
I-80 Over Mineral Creek SMS Quick Check Model 100-Year Storm – Velocity/Elevation Results



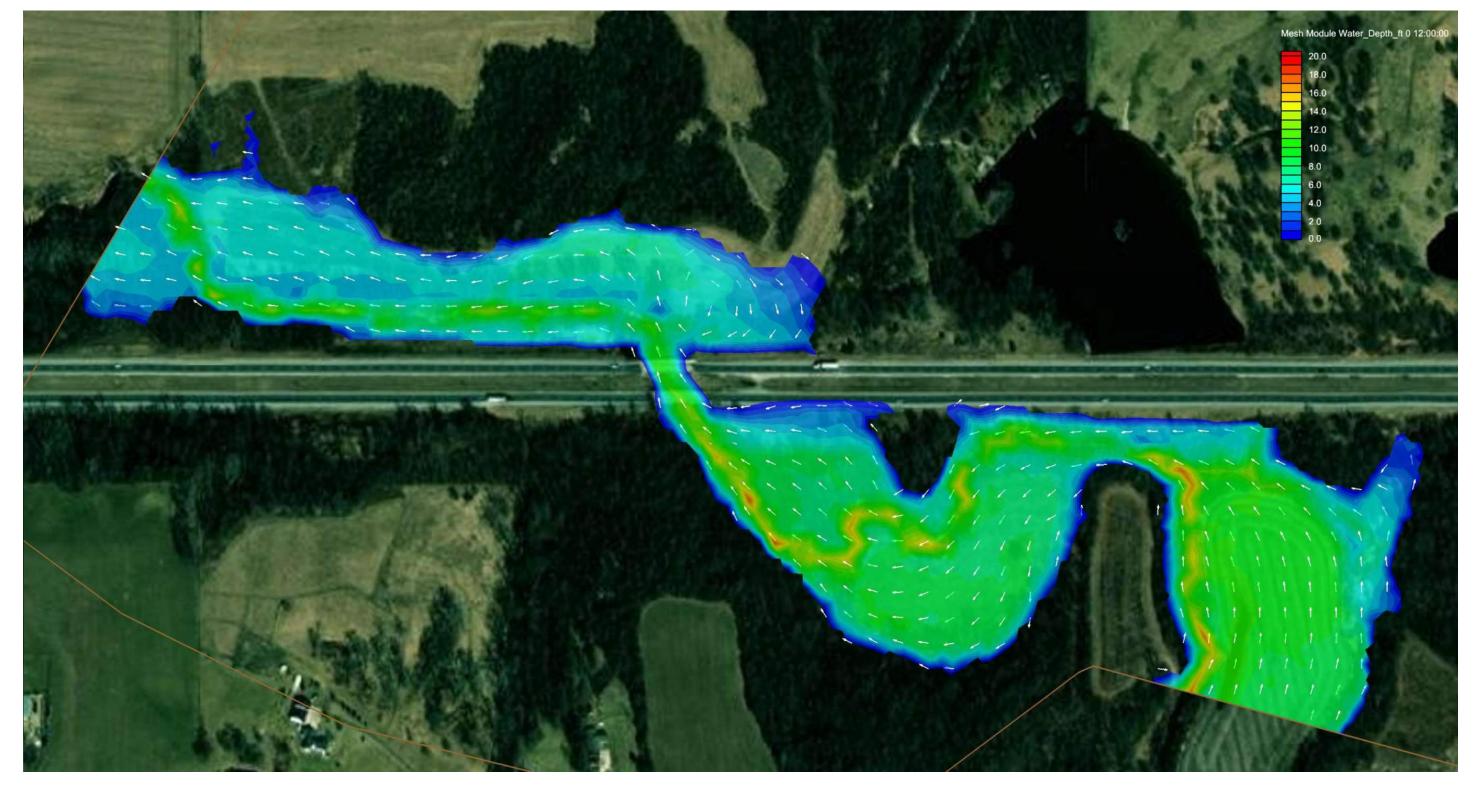
I-80 Over Mineral Creek SMS Quick Check Model 200-Year Storm – Velocity/Depth Results



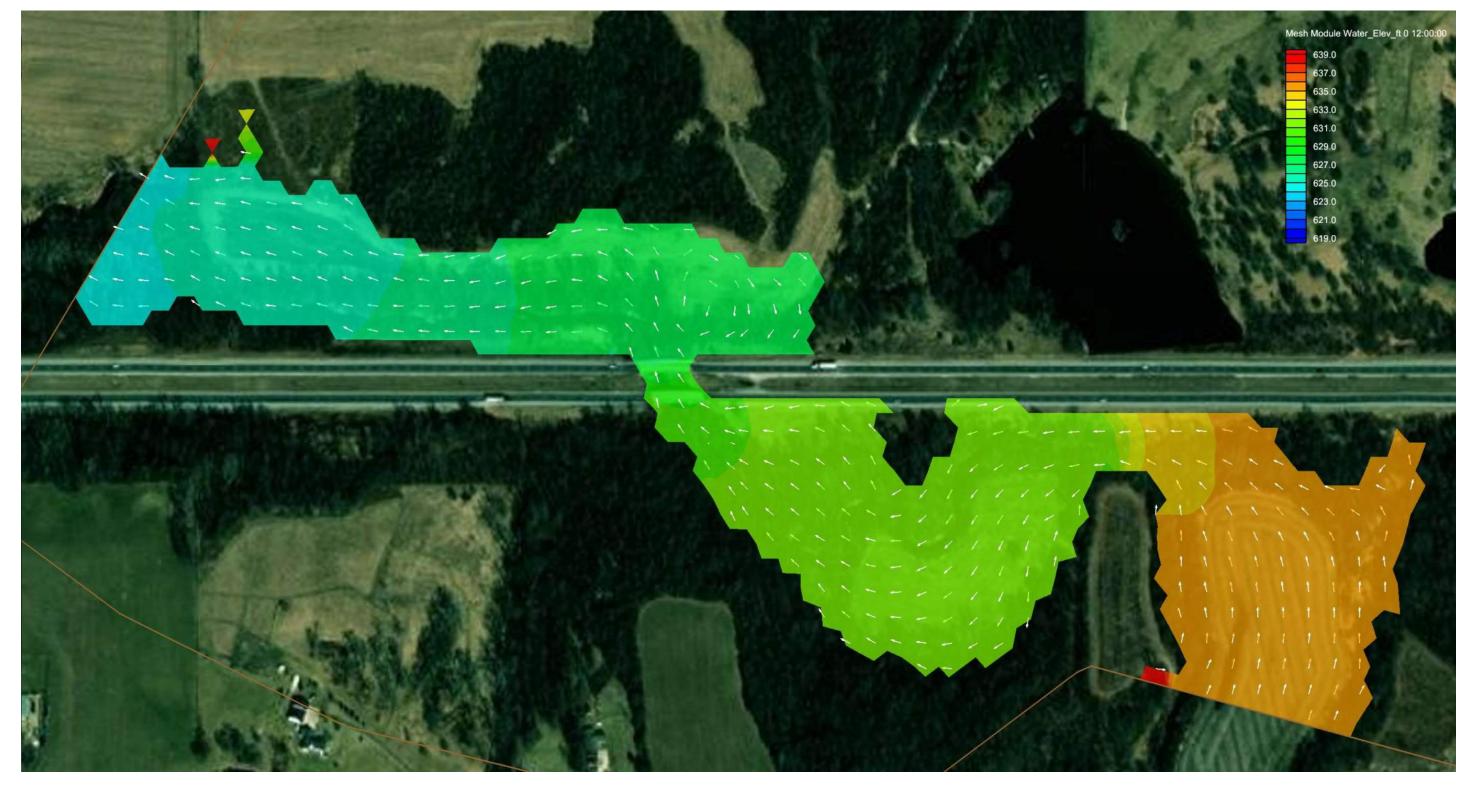
I-80 Over Mineral Creek SMS Quick Check Model 200-Year Storm – Velocity/Elevation Results



I-80 Over Mineral Creek SMS Quick Check Model 500-Year Storm – Velocity/Depth Results



I-80 Over Mineral Creek SMS Quick Check Model 500-Year Storm – Velocity/Elevation Results



SUPPLEMENT to QUICK CHECK GUIDEBOOK

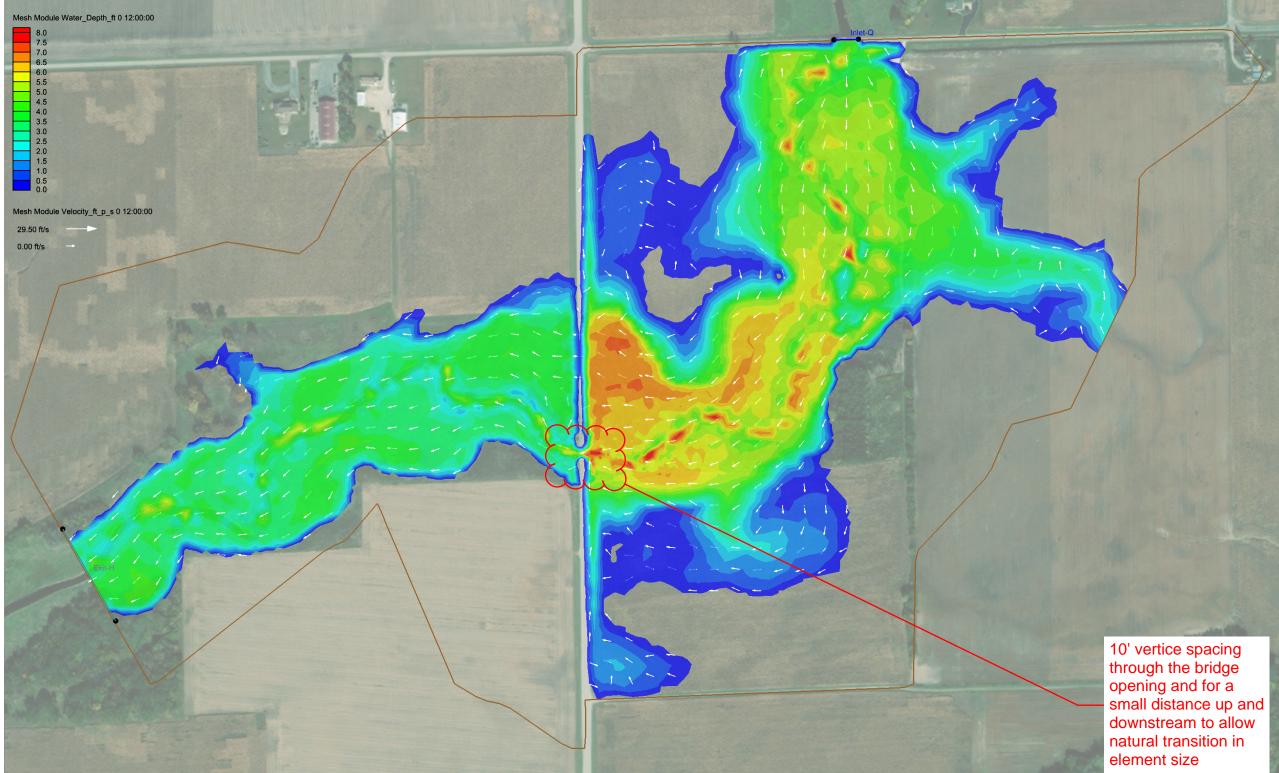


038-0017 – IL 1 over Little Beaver Creek – District 3 – 2-span Bridge 63 feet

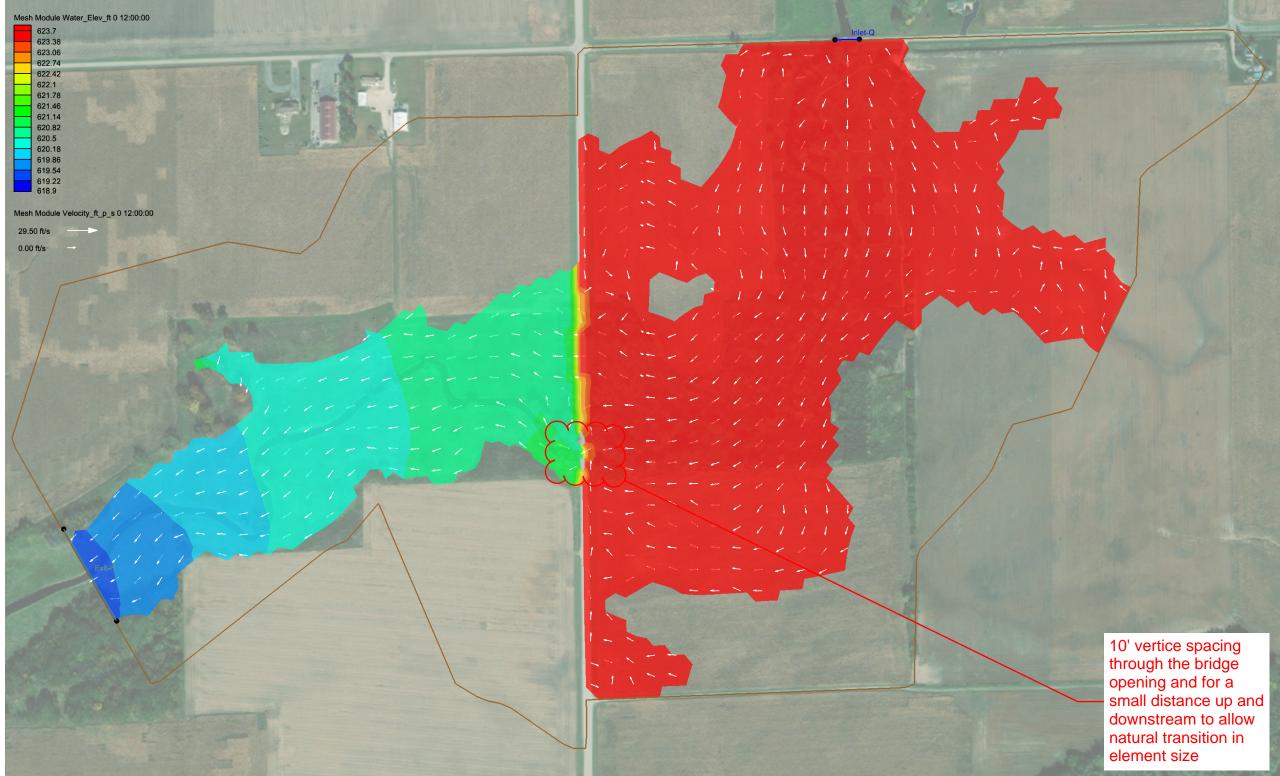
I

Date: 09/09/2021 County: Iroquois										
Route: IL 1										
Watercourse: Litt	tle Beaver	Creek								
ESN: 038-0017					Structure	Type: 🛛	Bridge	□ Culv	vert	
Drainage Area: 57	7.86 Sq. M	li. (37,030	acres)							
Hydrology Metho	d (check a	all that app	<u>oly):</u>							
□FIS StreamStats □HEC-HMS □TR-20 □Rational Method □Other: Discharges/ Flows										
Y	2	5	10	25	50	100	200	500		
Analyzed			\boxtimes		\boxtimes	\boxtimes	\boxtimes			
BC ID: 1	795	1390	1820	2380	2810	3250	3706	4310		
BC ID:			<u> </u>		<u> </u>					
BC ID:										
BC ID:			T		[
Source of Topogra			•							
□SMS ⊠LiDA	AR □B	athymetry	/ □Cros	ss Sections	□Text	File 🗆 I	LandXML	,		
Mesh Generator C										
Mesh Name: QC										
	⊠Paving			Patching						
Vertices Spacing:										
Mesh Density (Ele	ements/ A	cre): 11,4	1997207-	33.33						
Monitor Lines & I Number of Monite			lumber of N	Monitor Po	oints: 0					
<u>Materials Coverag</u> Manning's "n" Va		0.06								
Boundary Conditi Number of BC Ar		rage:								
BC ID: 1		Гуре: 🗵	Inlet-Q	$\Box Ex$	kit-H	Location: NE				
BC ID: 2]Inlet-Q	⊠Ex	kit-H	Locatio	n: <mark>SW</mark>			
BC ID:		• 1]Inlet-Q	$\Box Ex$		Locatio				
BC ID:]Inlet-Q	$\Box Ex$		Locatio				
BC ID:		21	Inlet-Q	$\Box Ex$		Locatio				
Exit-H Channel C			~			Sour		DEM	□FIS Profile	
Model Control:										
Time Step (sec.):	10	Simulatio	ons Length	(hrs.): 12						
Output Method:	⊠Specifie	d Frequen	ncy □Speo	cified Time	es □Simu	lation End	Unste	ady Ou	tput	
Model Convergen	ice.									
Time of Converge		·c)· 4								
This of converge	/// ut (3.j.								
Results:										
Roadway Overt	topping oc	curs betw	een the 0	Y & 10Y						
Ghere Ratio (Mes					/ 4 = 13.8	39				
<u>Notes:</u> Smaller ve opening is			used throug accurate re		bridge ope	ening becau	use one el	ement	in the	

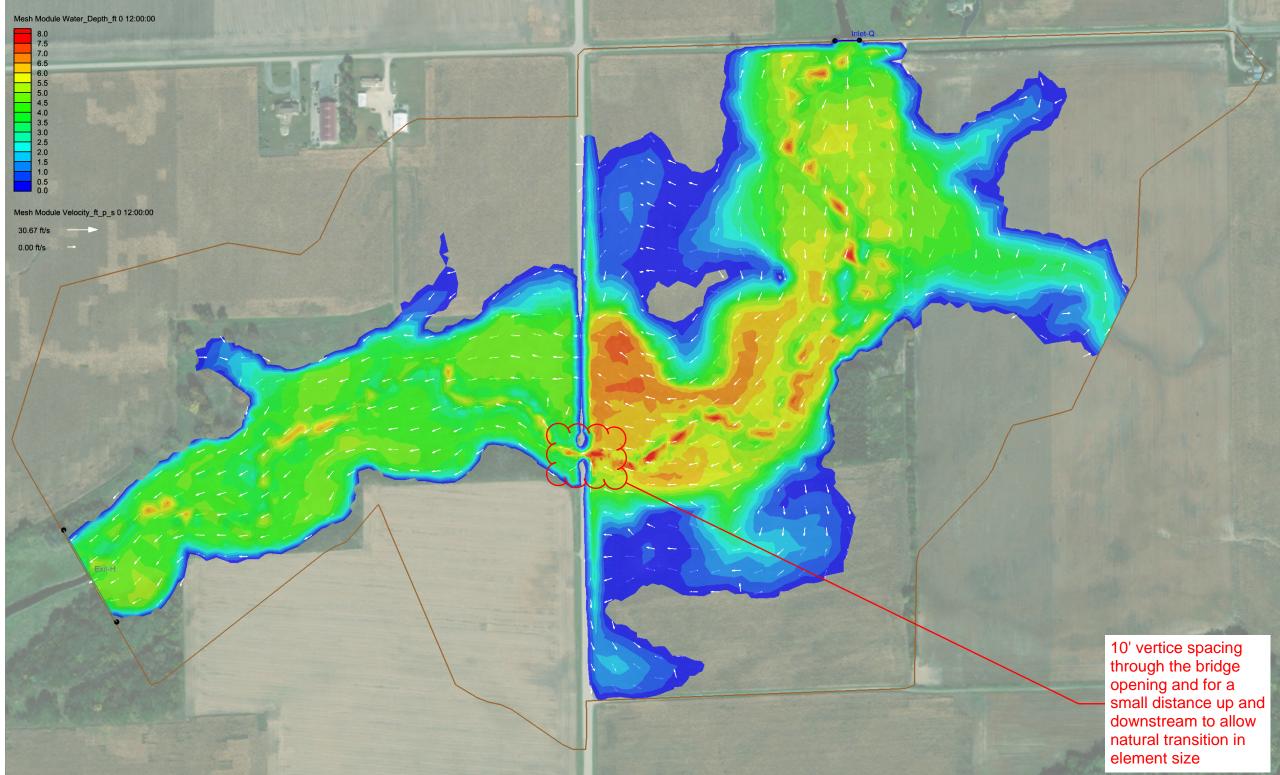
10-Year Storm – Velocity/Depth Results



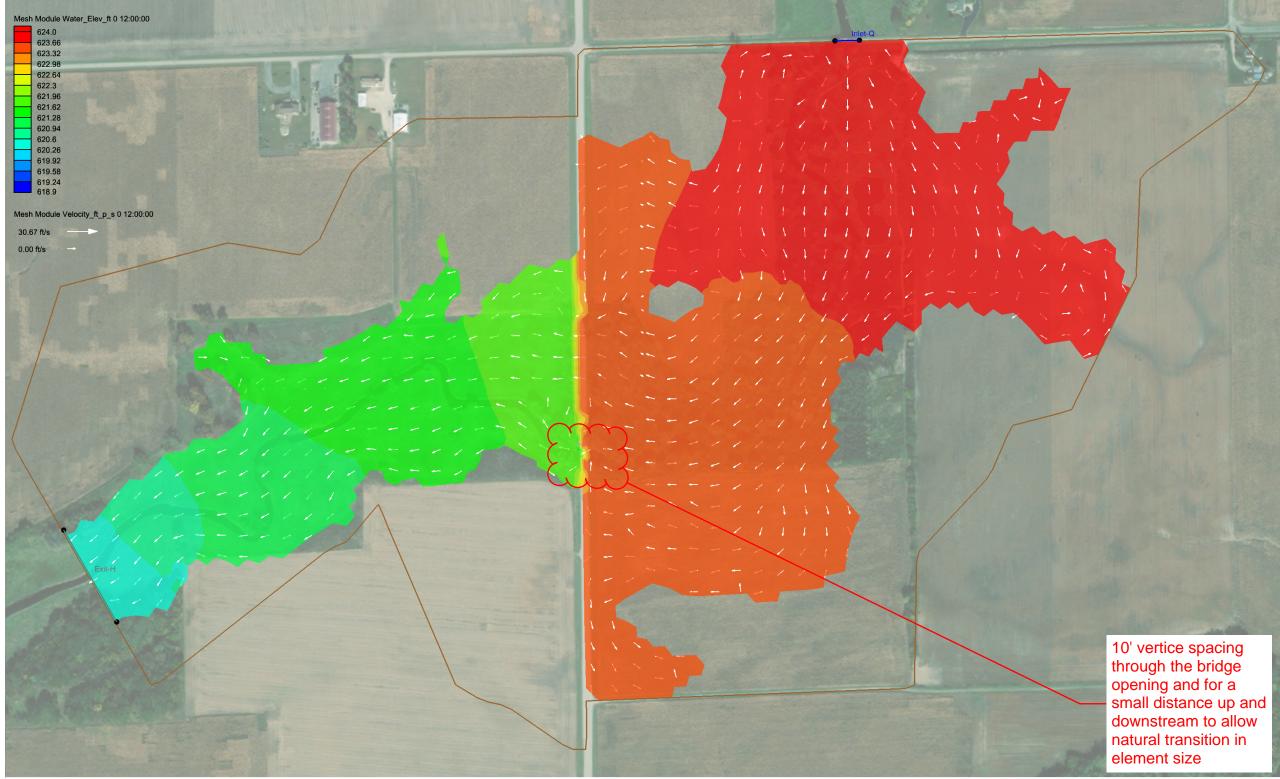
10-Year Storm – Velocity/Elevation Results



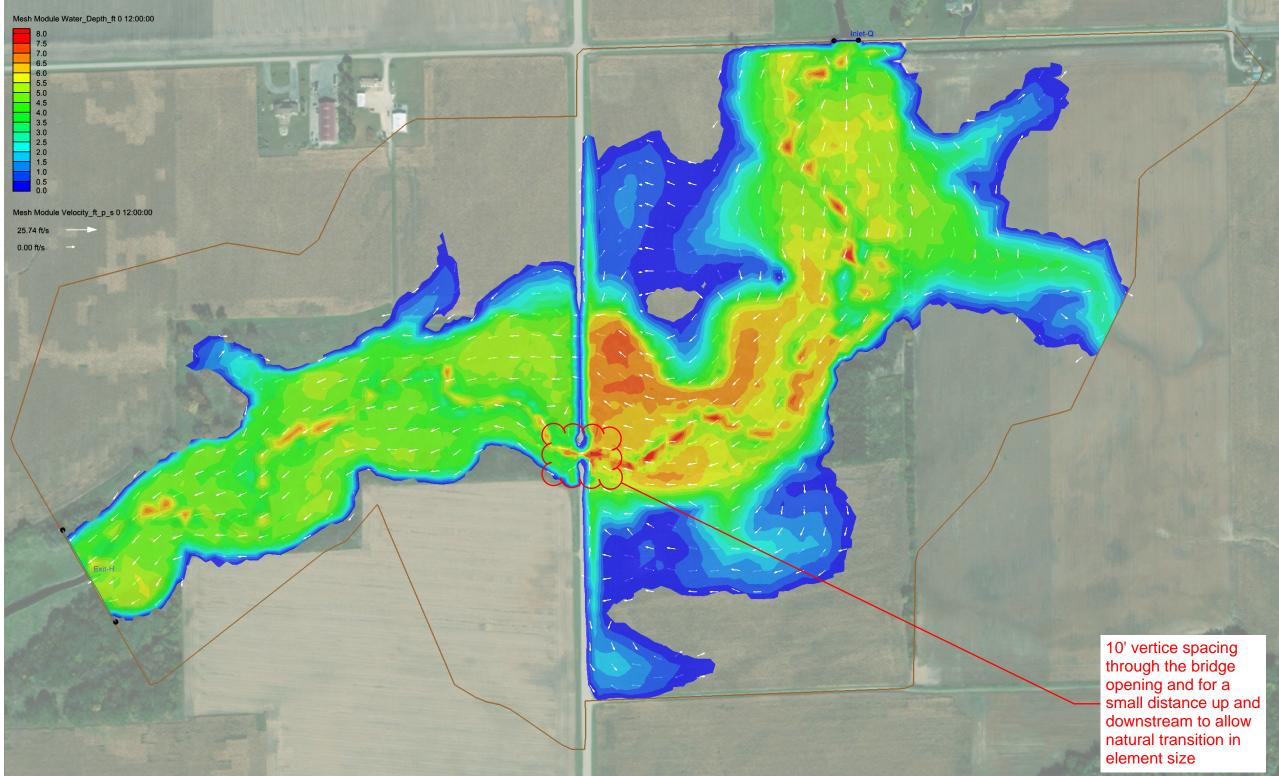
50-Year Storm – Velocity/Depth Results



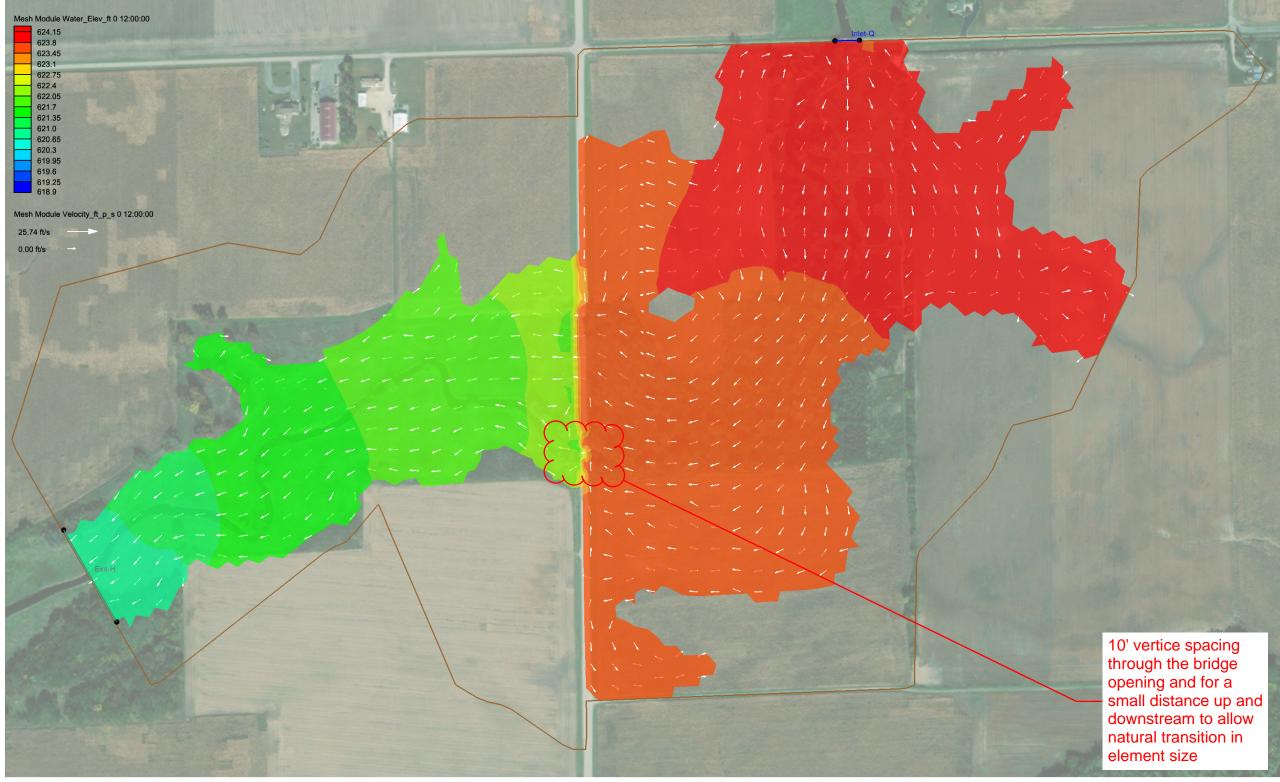
50-Year Storm – Velocity/Elevation Results



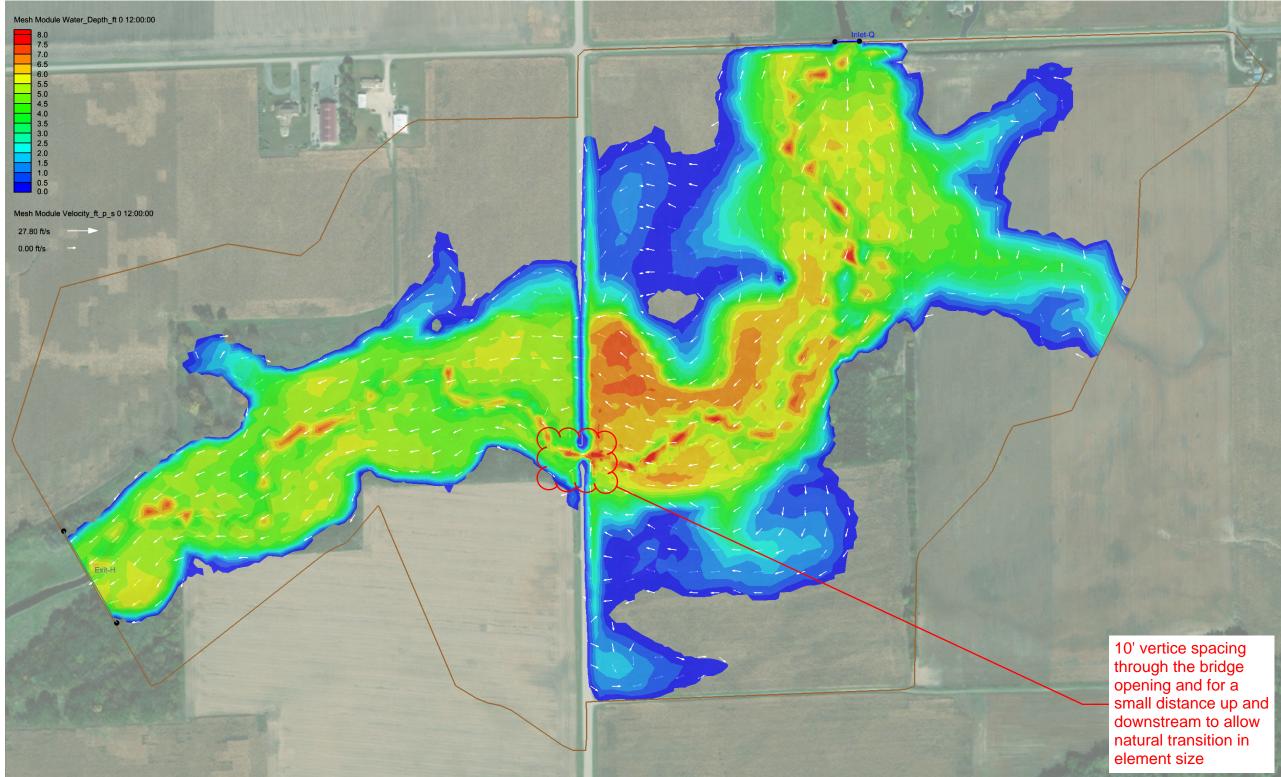
100-Year Storm – Velocity/Depth Results



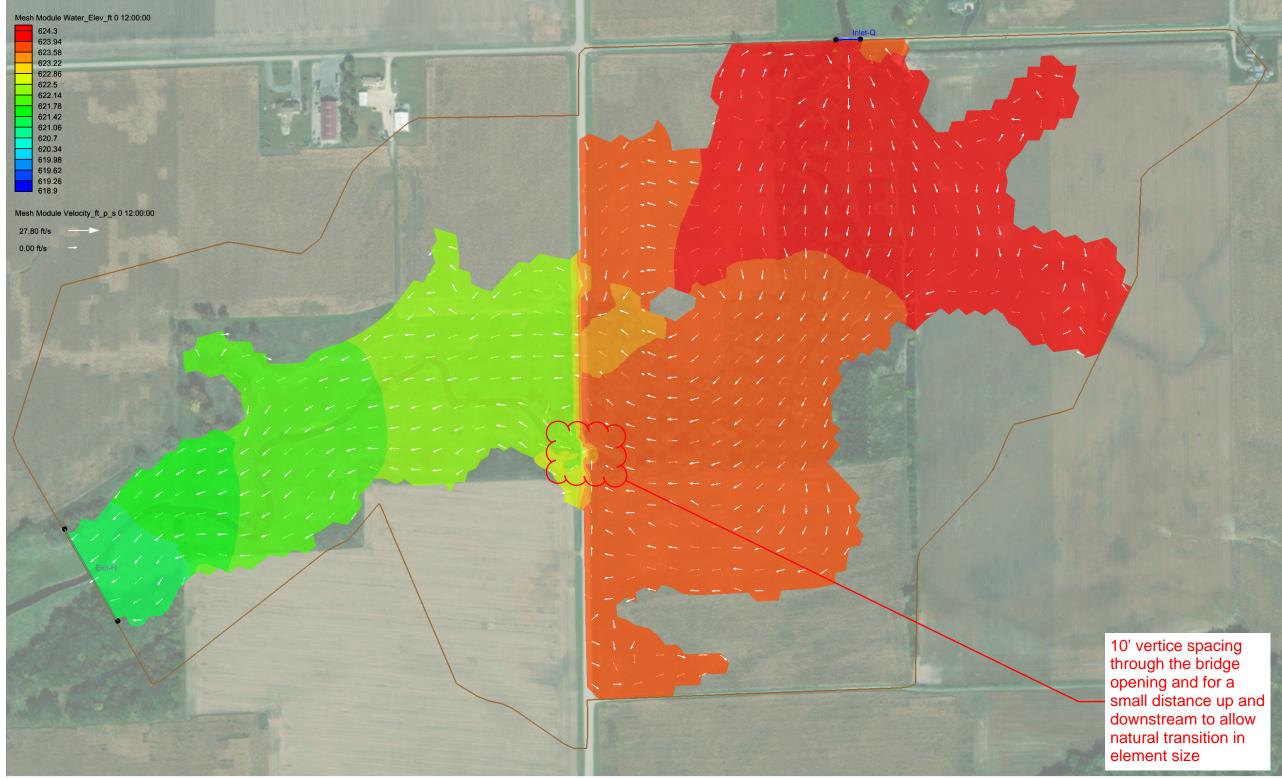
100-Year Storm – Velocity/Elevation Results



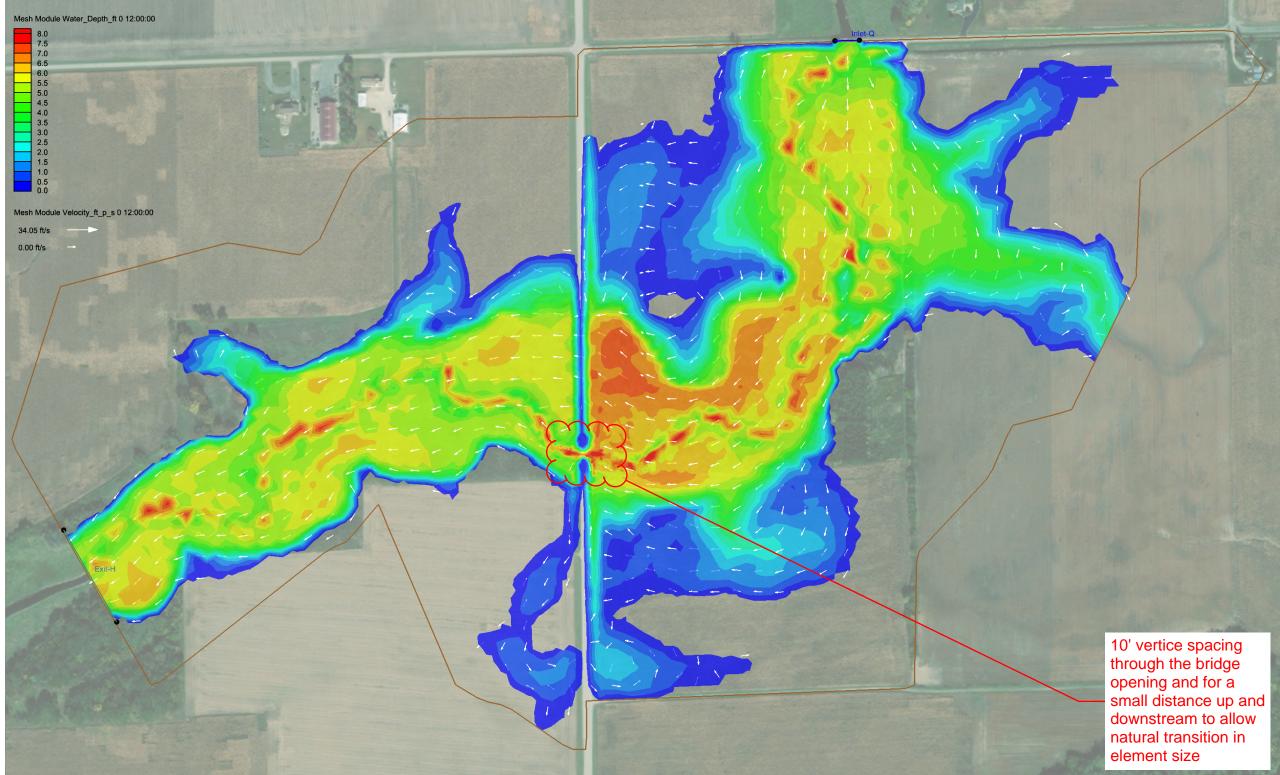
200-Year Storm – Velocity/Depth Results



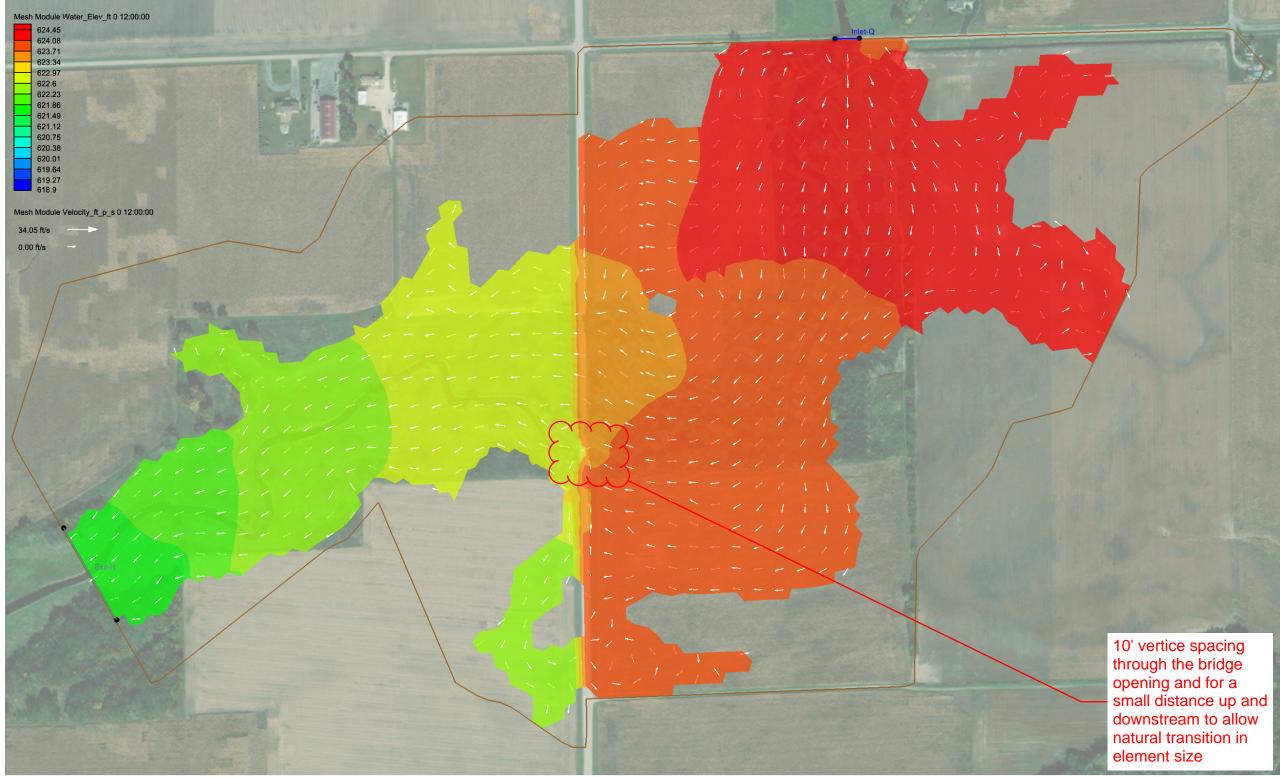
200-Year Storm – Velocity/Elevation Results



500-Year Storm – Velocity/Depth Results



500-Year Storm – Velocity/Elevation Results



SUPPLEMENT to QUICK CHECK GUIDEBOOK

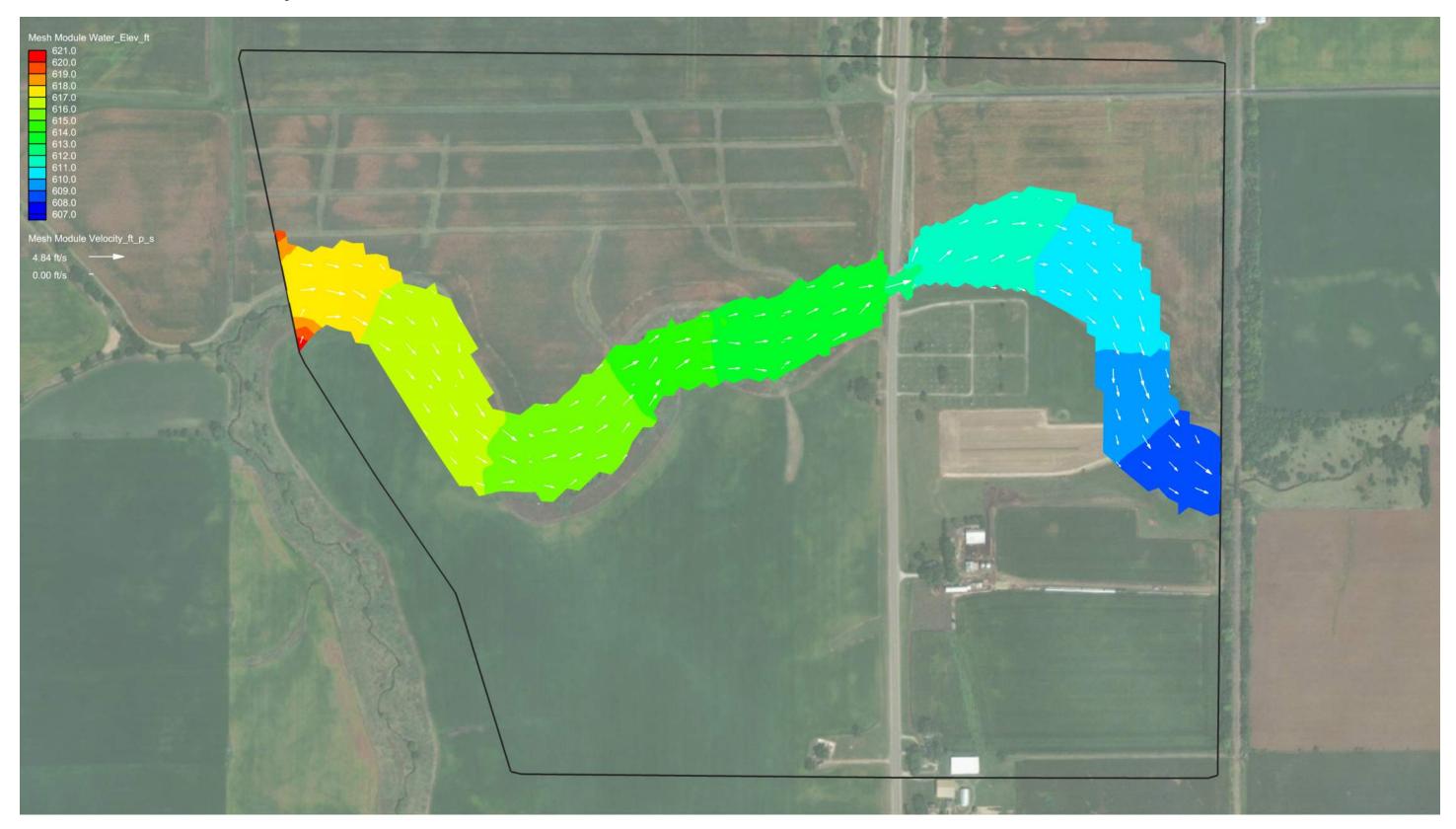


050-0048 – IL 23 over Tributary to Covel Creek – District 3 – 3-span Bridge 102 feet

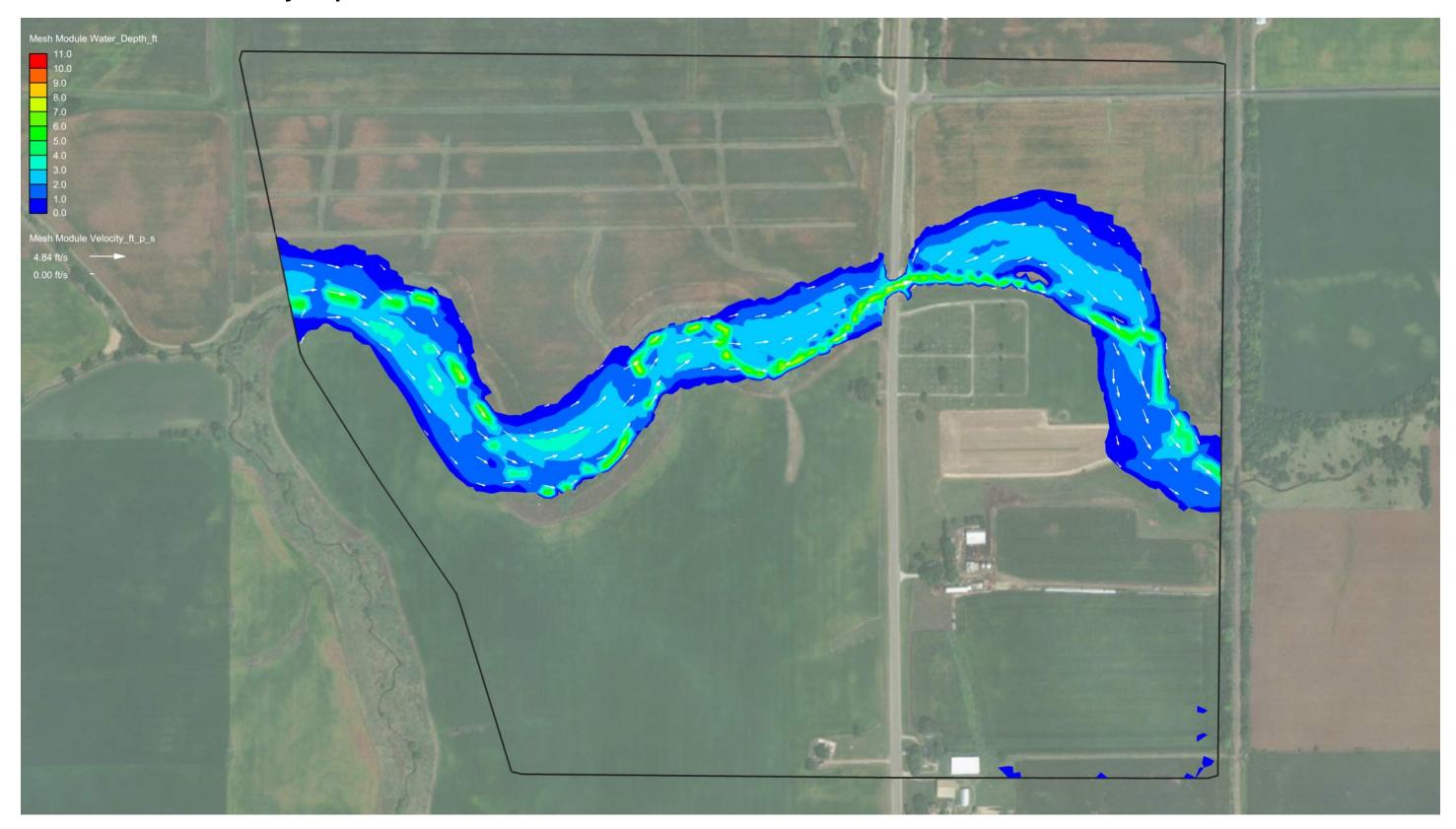
Date: 9/17/2021 County: LaSalle Route: IL 23 Watercourse: Tri ESN: 050-0048 Drainage Area: 8					Structure 7	Туре: 🖂	Bridge	□ Culvert			
Hydrology Method (check all that apply): □FIS ⊠StreamStats □HEC-HMS □TR-20 □Rational Method □Other: Discharges/ Flows											
Y	2	5	10	25	50	100	200	500			
Analyzed			\boxtimes		\boxtimes	\boxtimes					
BC ID: 1	375	685	918	1,230	1,470	1,720	1,974	2,320			
BC ID:				,	,						
BC ID:											
BC ID:											
Source of Topogr	aphy/ Surf	face Data (check all th	at apply):	·						
□SMS □LiDAR □Bathymetry □Cross Sections □Text File □LandXML											
Mesh Generator Coverage: Mesh Name: QC_{IL23} TribToCovelCreek_Mesh Mesh Type: $\Box Patching$ Vertices Spacing: Max: 50 ft.; Min: 25 ft. Mesh Density (Elements/ Acre): 16,966 / 5,555 = 3.1Monitor Lines & Points Coverage: Number of Monitor Lines: 4Number of Monitor Lines: 4Number of Monitor Points: 0Materials Coverage: Manning's "n" Value used: 0.06Boundary Conditions Coverage: Number of BC Arcs: 2 BC ID: 1Monitor 1Type: \Box Inlet-QExit-HLocation: W Location: E											
BC ID:			Inlet-Q	$\Box Ex$	it-H	Location:					
BC ID:	1	• •	Inlet-Q	$\Box Ex$	it-H	Location	n:				
BC ID:		* 1	Inlet-Q	$\Box Ex$		Location	n:				
Exit-H Channel C	Calculator 1	Normal De	epth Slope ((ft/ft): 0.00	3 Sou	irce:	DEM	\Box FIS Profil	e		
Model Control: Time Step (sec.): 1 Simulations Length (hrs.): 7 Output Method: □Specified Frequency □Specified Times Simulation End □Unsteady Output											
Model Convergence: Time of Convergence at (hrs.): 7											
Results: \Box Roadway Overtopping occurs between the >500Y & YGhere Ratio (Mesh Density/ Time of Convergence): $3.1 / 7 = 0.44$											
Notes:											

Revised: June 21, 2021

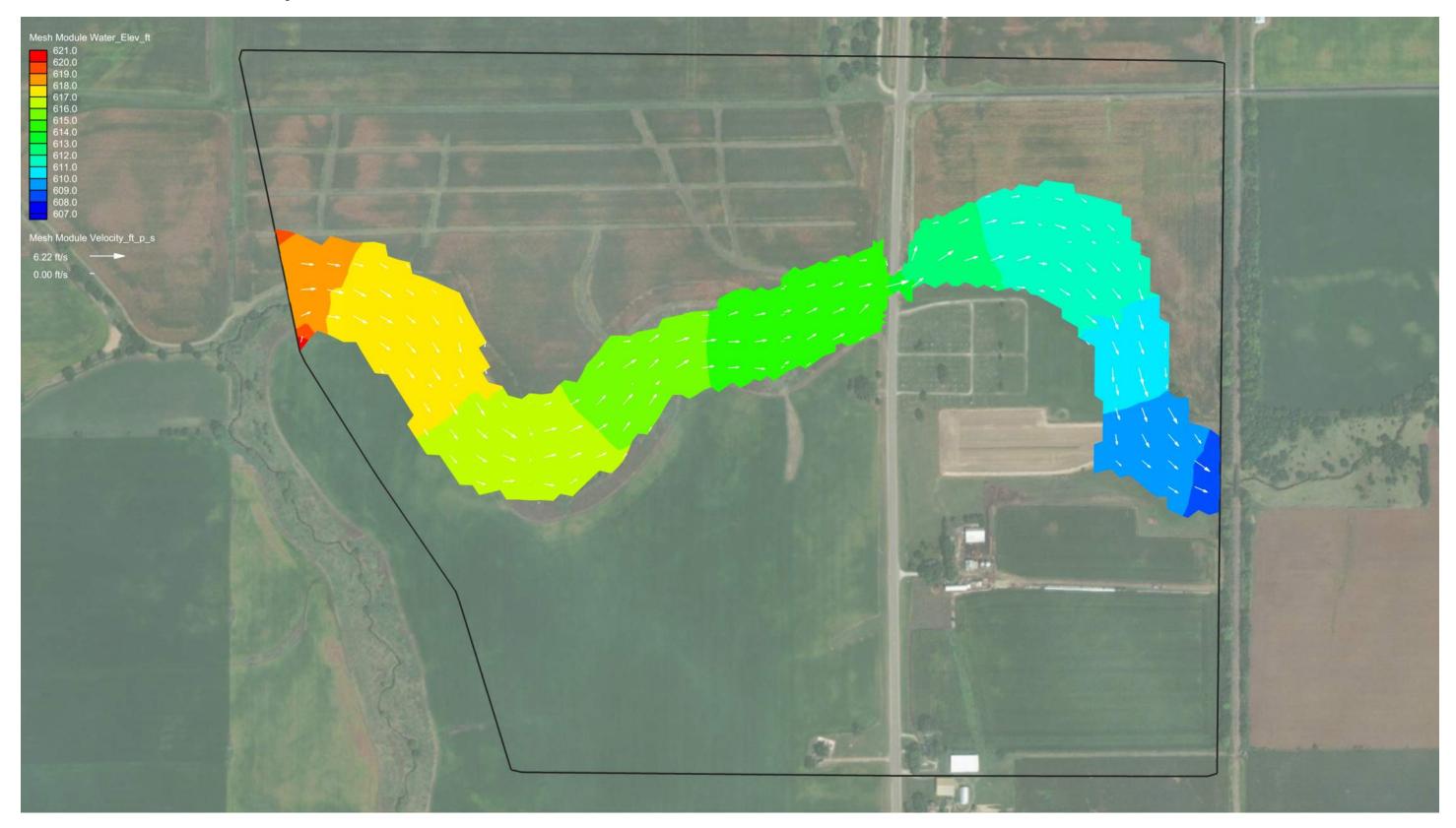
IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



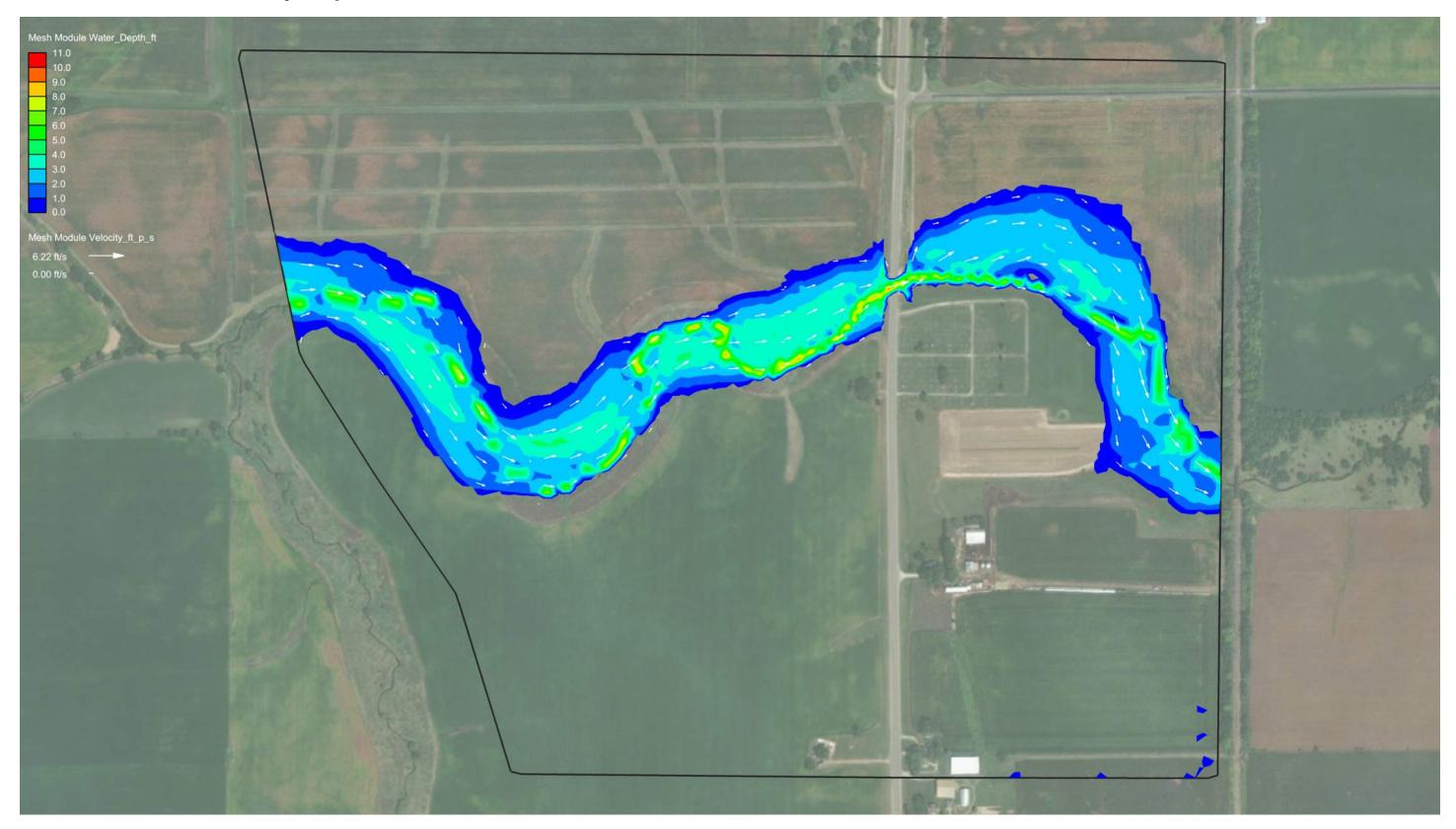
IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



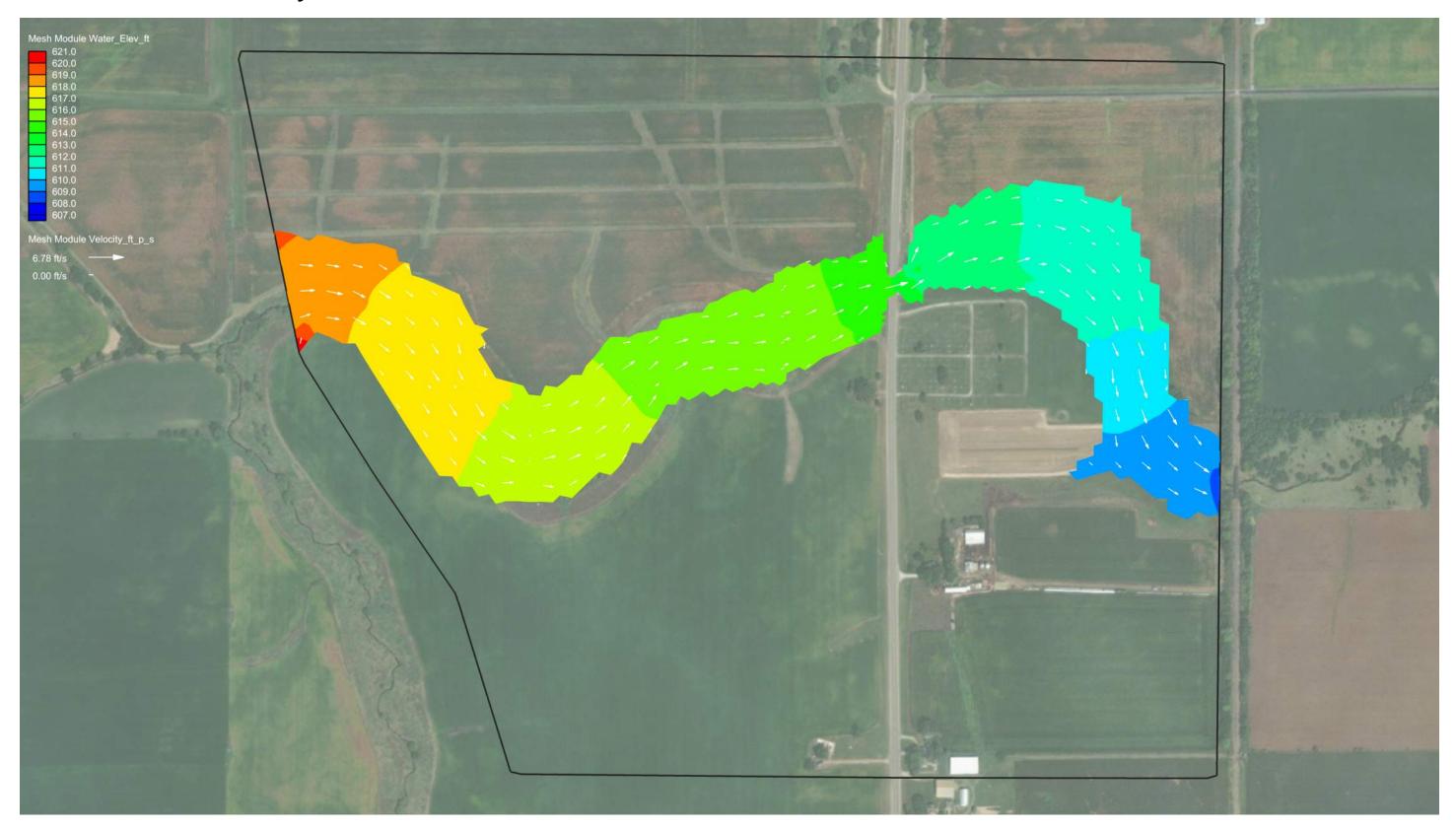
IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



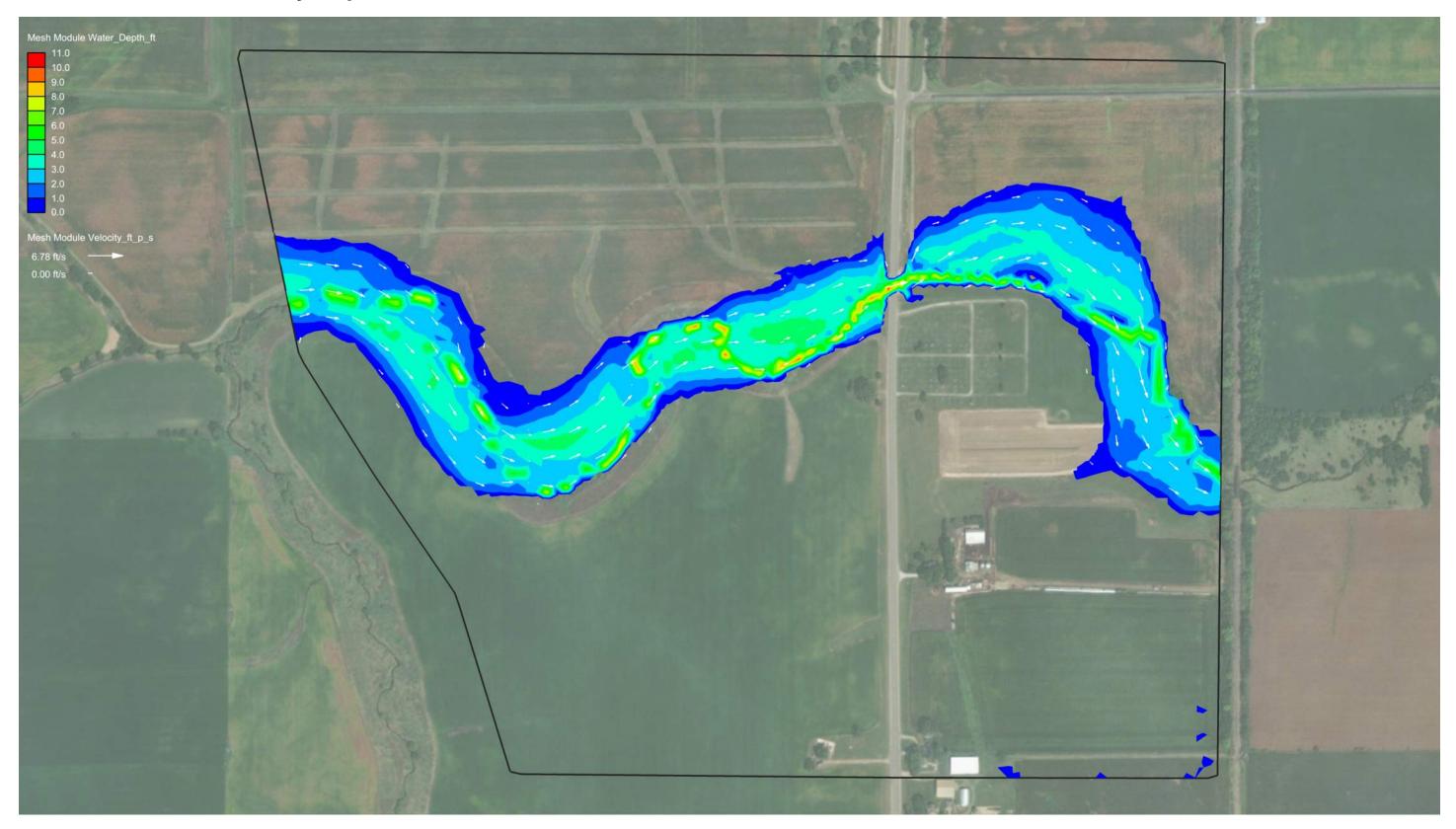
IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



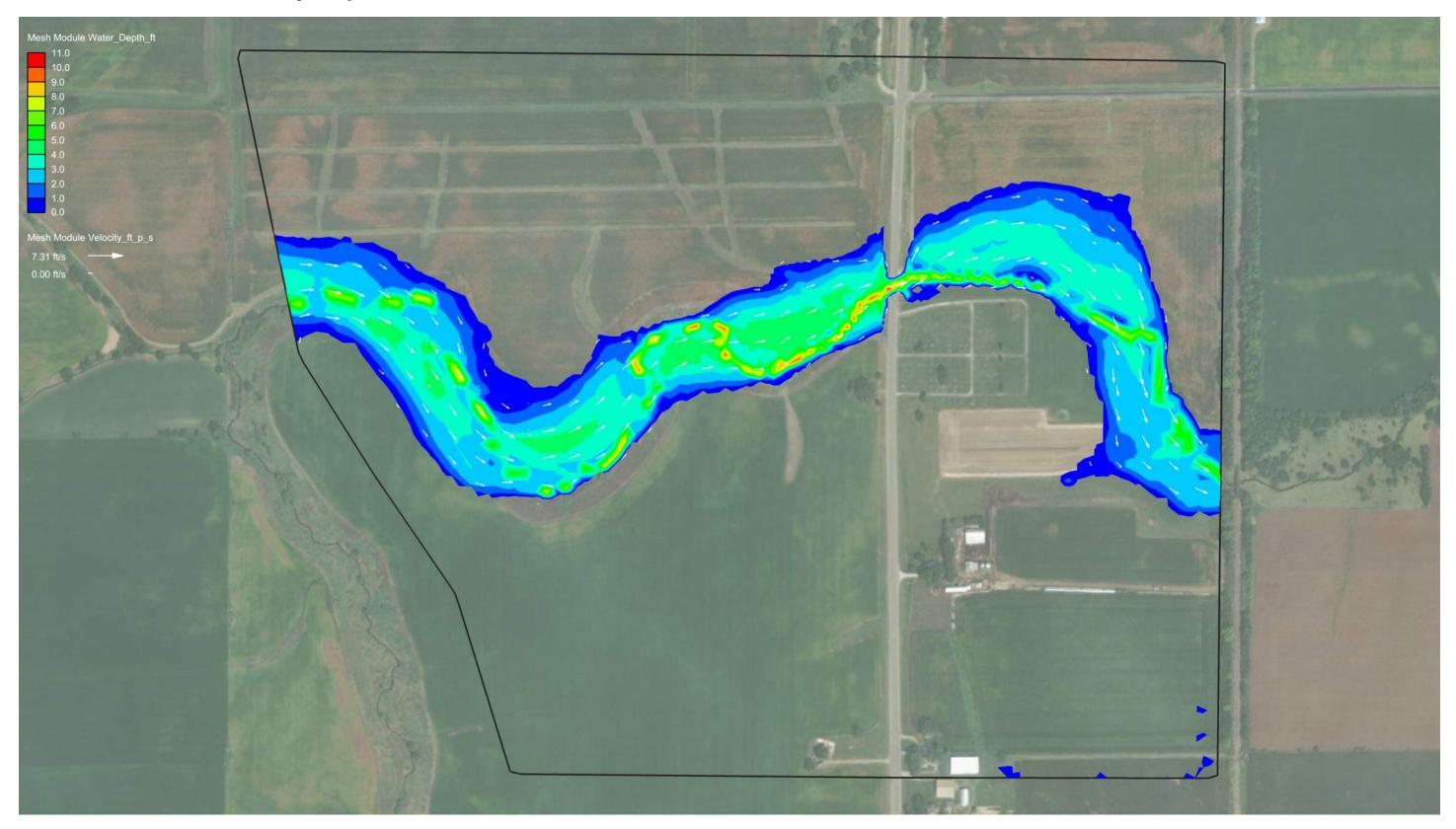
IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



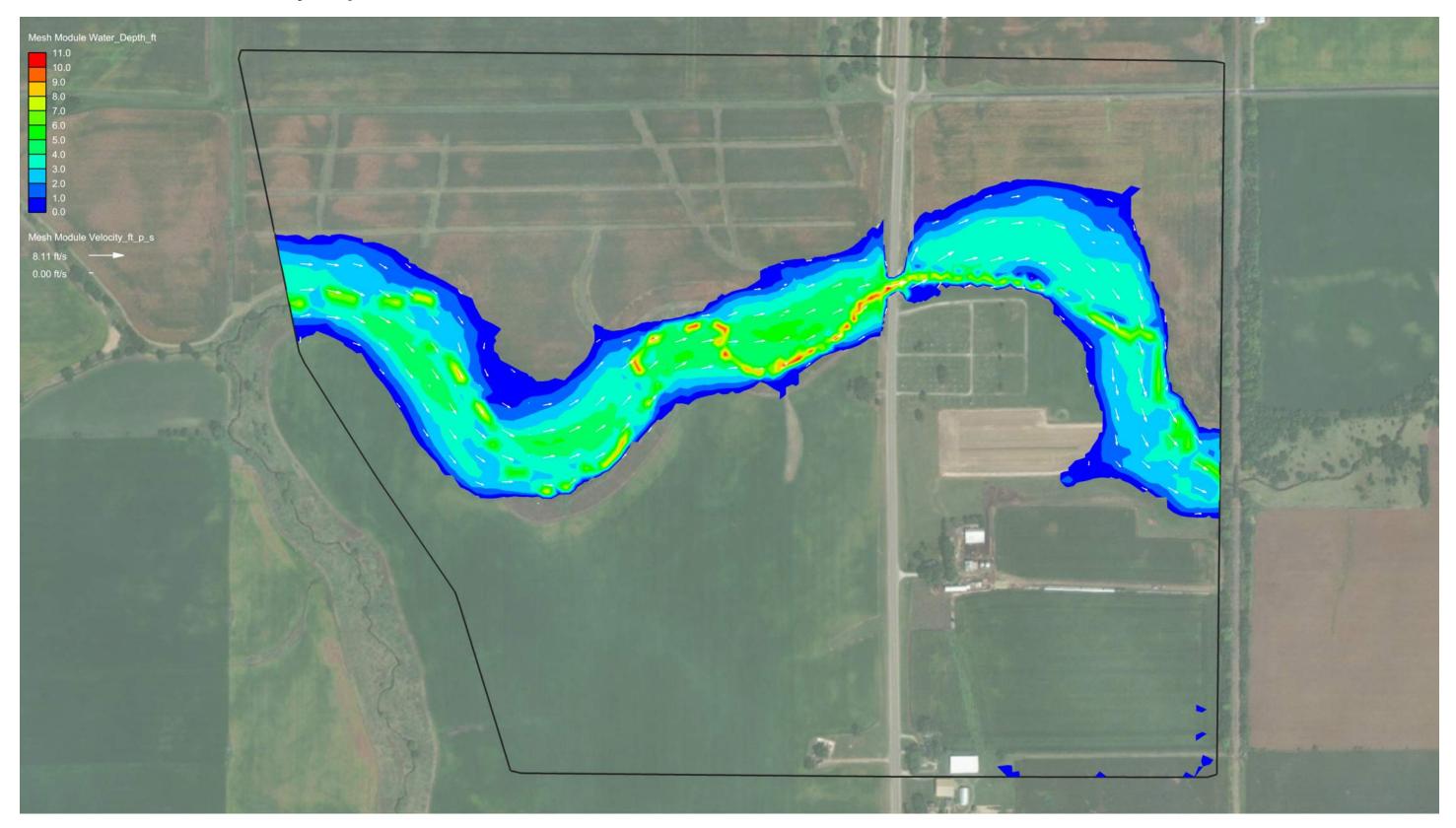
IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



IL-23 Over the Tributary to Covel Creek SMS Quick Check Model 500-Year Storm - Velocity/Depth Results



SUPPLEMENT to QUICK CHECK GUIDEBOOK

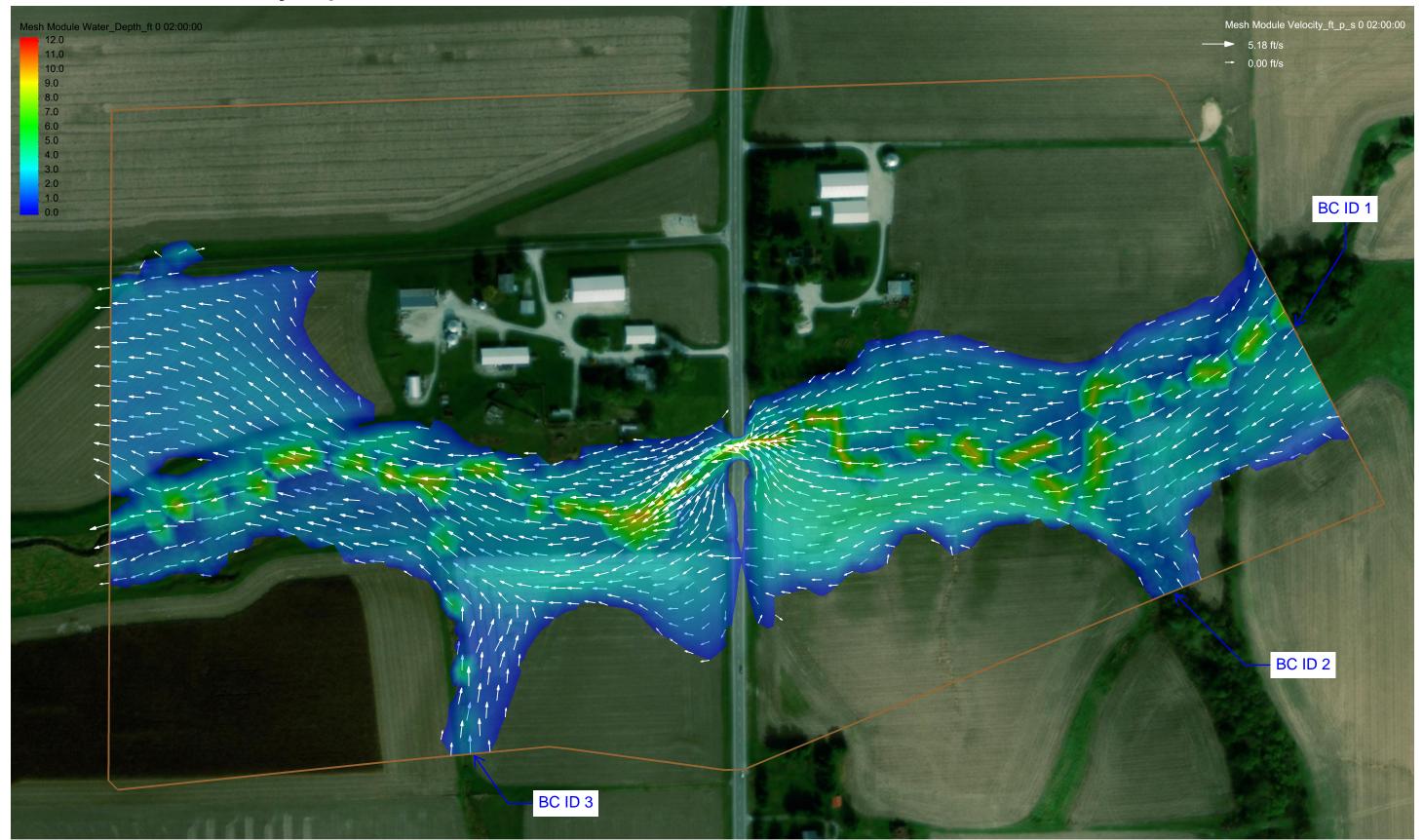


069-0023 – IL 111 over Apple Creek – District 6 – Single Span Bridge 55 feet

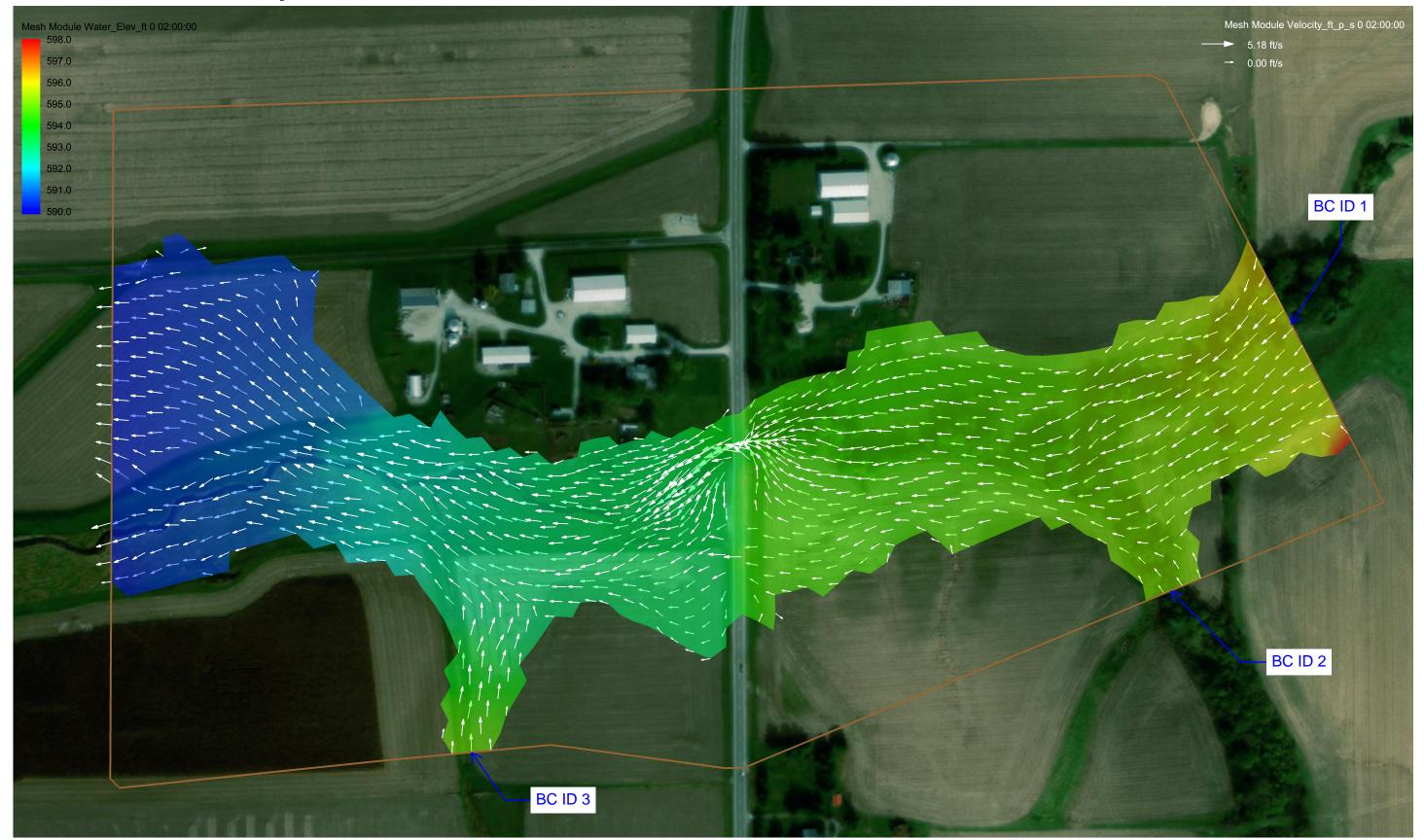
Date: 11/12/2021 County: Morgan Route: IL-111 Watercourse: Apple Creek ESN: 069-0023 Structure Type: 🛛 Bridge □ Culvert Drainage Area: 8.97 Sq. Mi. (5,741 acres) Hydrology Method (check all that apply): ⊠ StreamStats □HEC-HMS \Box TR-20 □Rational Method Other: Discharges/ Flows Y 2 5 10 25 50 100 200 500 \times \boxtimes \times \times \times Analyzed BC ID: 1 1490 2370 2770 3180 3730 30 70 BC ID: 2 50 50 59 BC ID: 3 250 427 510 596 718 BC ID: Source of Topography/ Surface Data (check all that apply): ⊠LiDAR Bathymetry Text File \Box SMS Cross Sections Mesh Generator Coverage: Mesh Name: QC IL111 AppleCreek Mesh Mesh Type: ⊠Paving □Patching Vertices Spacing: Max: 50 ft.; Min: 25 ft. Mesh Density (Elements/ Acre): 5038 / 107.6 = 46.8Monitor Lines & Points Coverage: Number of Monitor Lines: 6 Number of Monitor Points: 0 Materials Coverage: Manning's "n" Value used: 0.06 Boundary Conditions Coverage: Number of BC Arcs: 3 BC ID: 1 □Exit-H Location: E Type: ⊠Inlet-O BC ID: 2 Type: ⊠Inlet-Q Exit-H Location: SE BC ID: 3 Type: ⊠Inlet-Q □Exit-H Location: S BC ID: 4 Type: □Inlet-Q ⊠Exit-H Location: W BC ID: Type: □Inlet-Q □Exit-H Location: Exit-H Channel Calculator Normal Depth Slope (ft/ft): 0.002 ⊠DEM □FIS Profile Source: Model Control: Time Step (sec.): 5 Simulations Length (hrs.): 5 Output Method: ⊠Specified Frequency □Specified Times □Simulation End □Unsteady Output Model Convergence: Time of Convergence at (hrs.): 2 Results: \boxtimes Roadway Overtopping occurs between the 0Y & 10Y Ghere Ratio (Mesh Density/ Time of Convergence): 46.8 / 2 = 23.4

<u>Notes:</u> Two tributaries bringing flow from south. Downstream tributary added to analyze impact on bridge backwater. Smaller vertice spacing used in bridge opening because only 1 element fits with 50ft spacing.

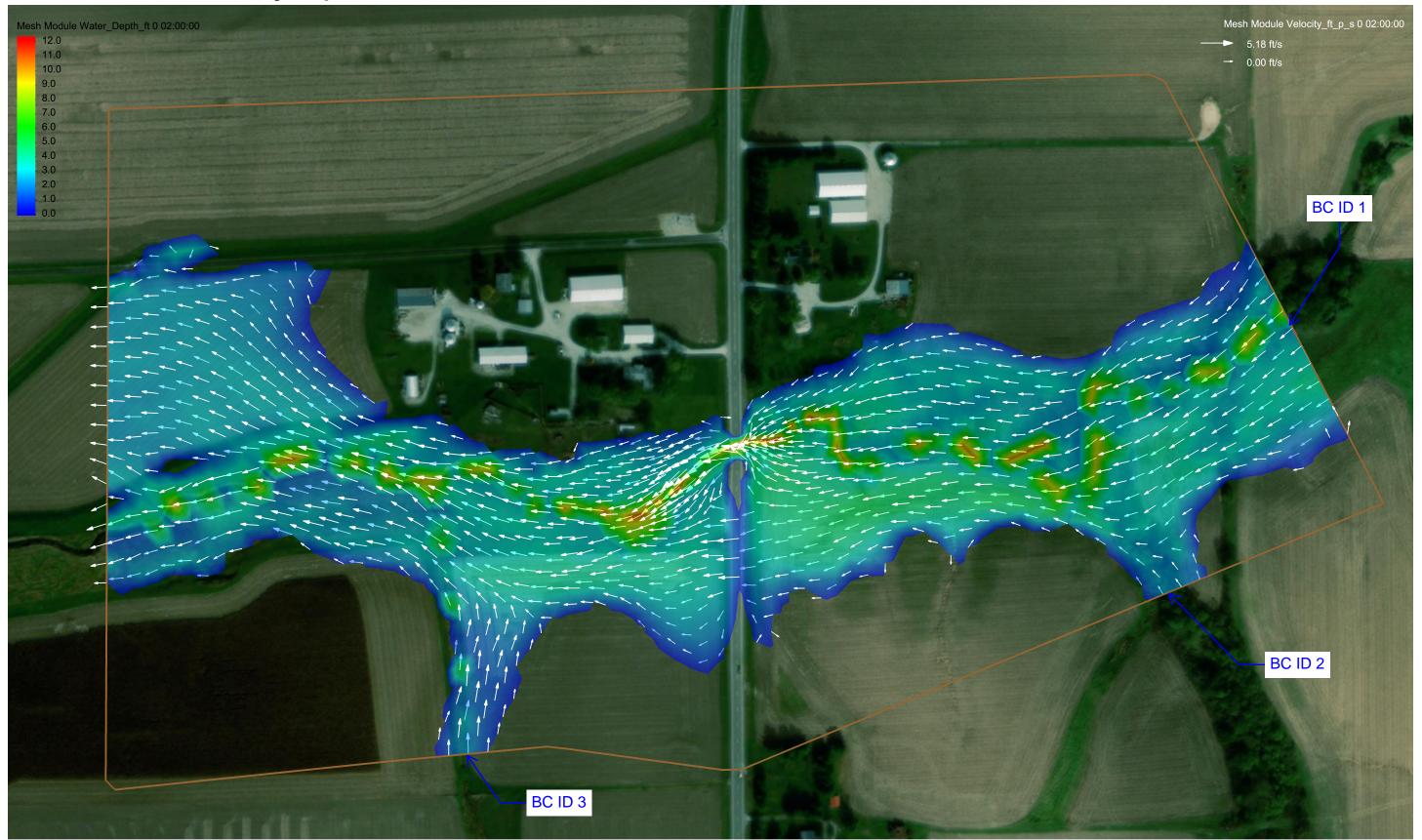
IL 111 over Apple Creek SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



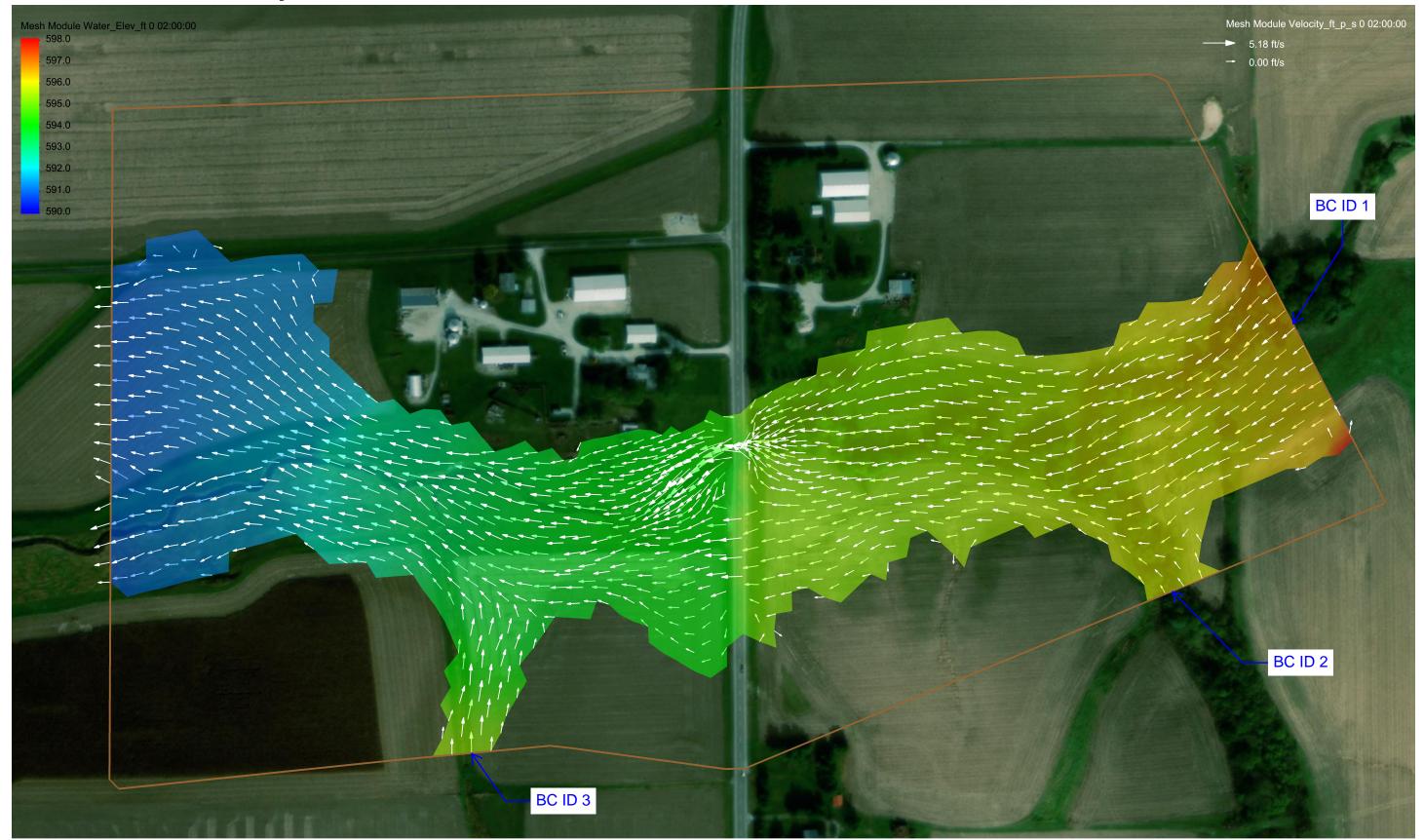
IL 111 over Apple Creek SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



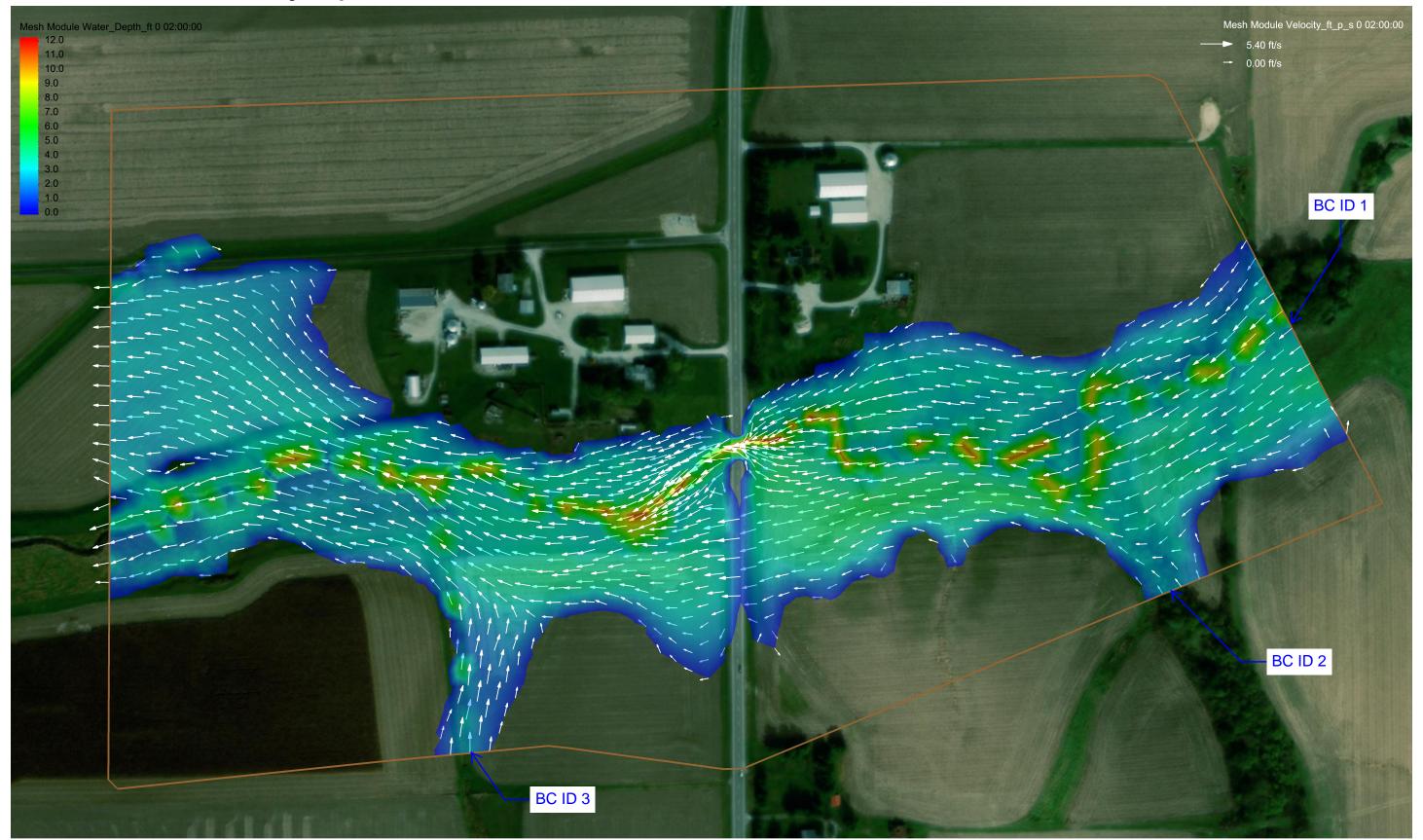
IL 111 over Apple Creek SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



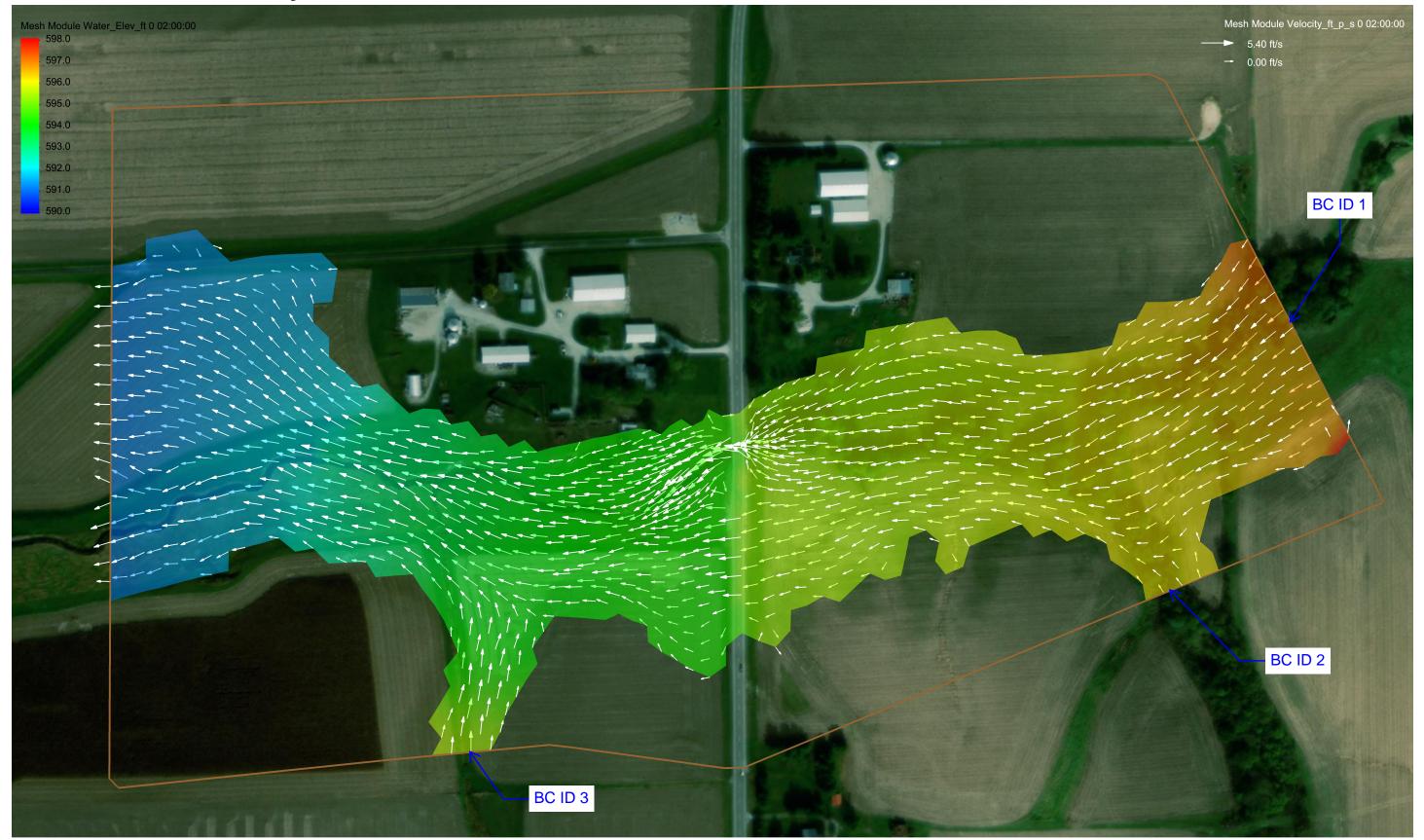
IL 111 over Apple Creek SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



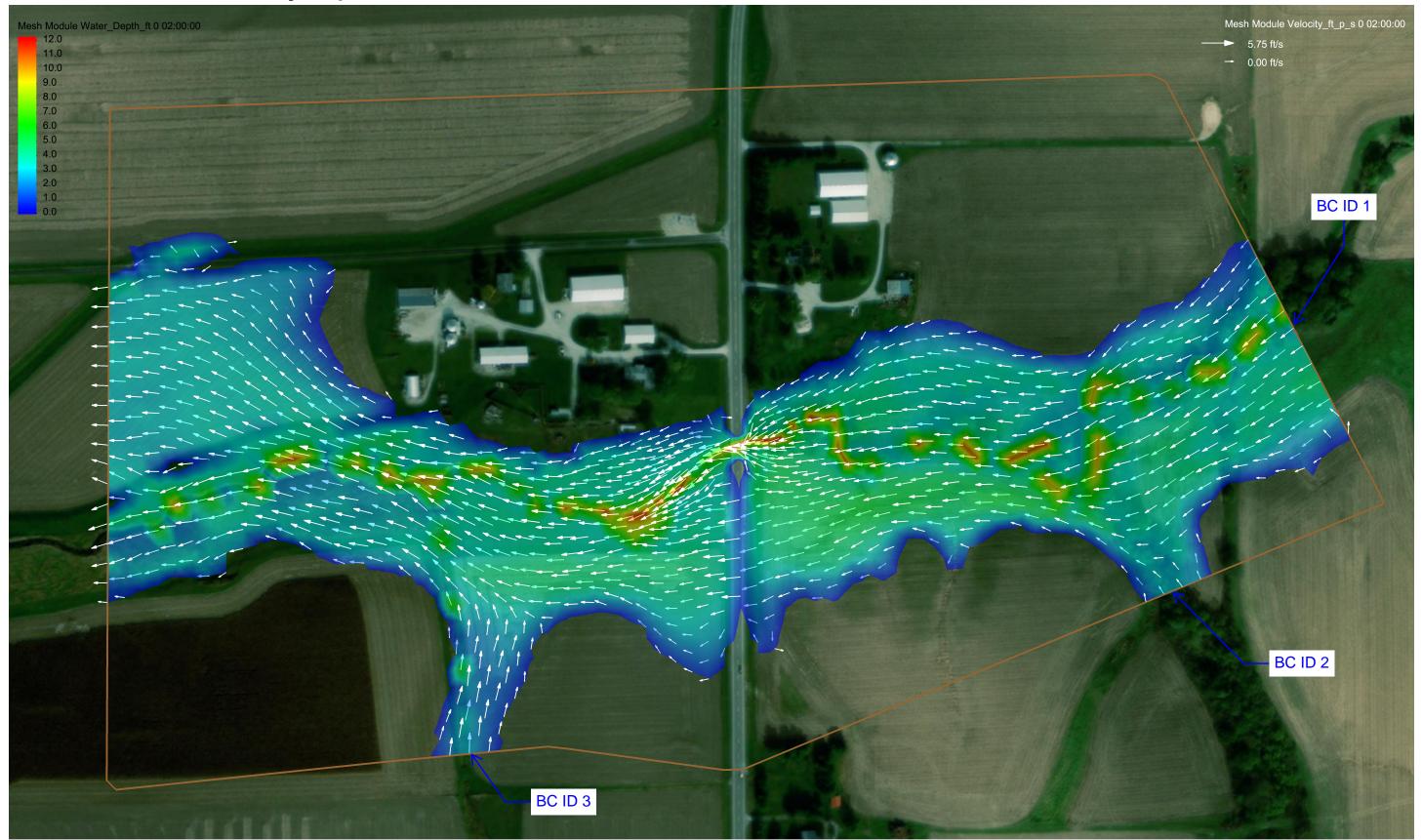
IL 111 over Apple Creek SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



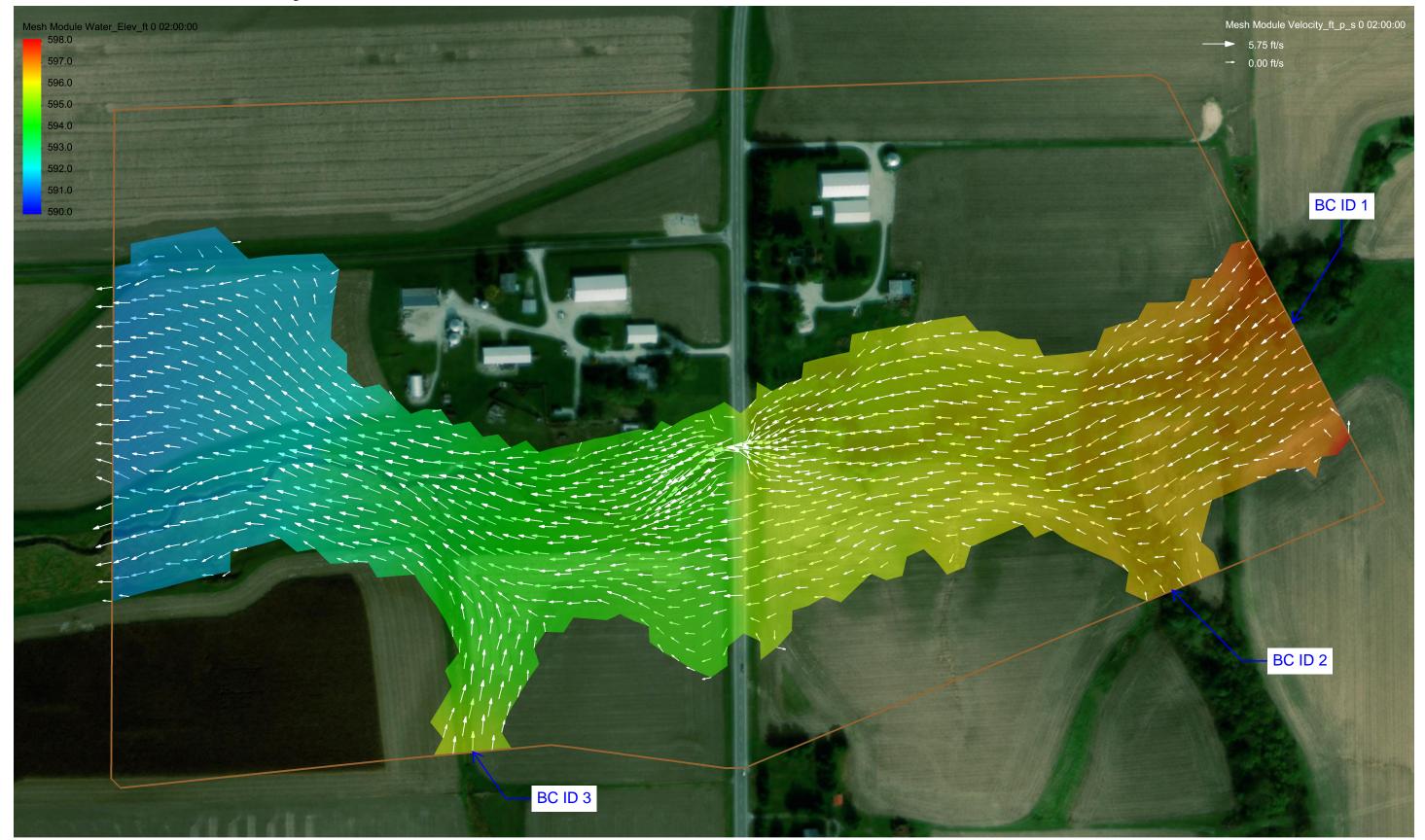
IL 111 over Apple Creek SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



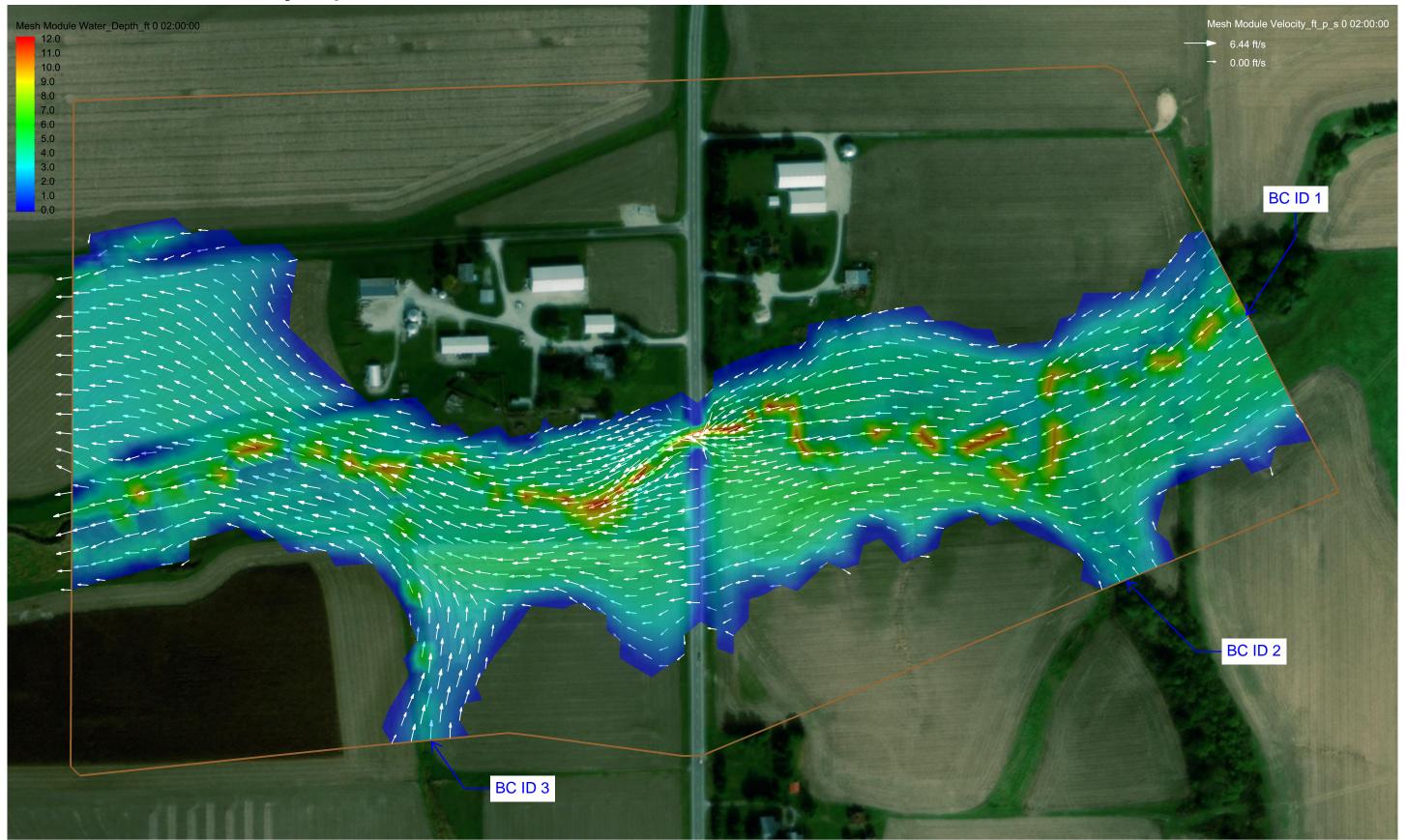
IL 111 over Apple Creek SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



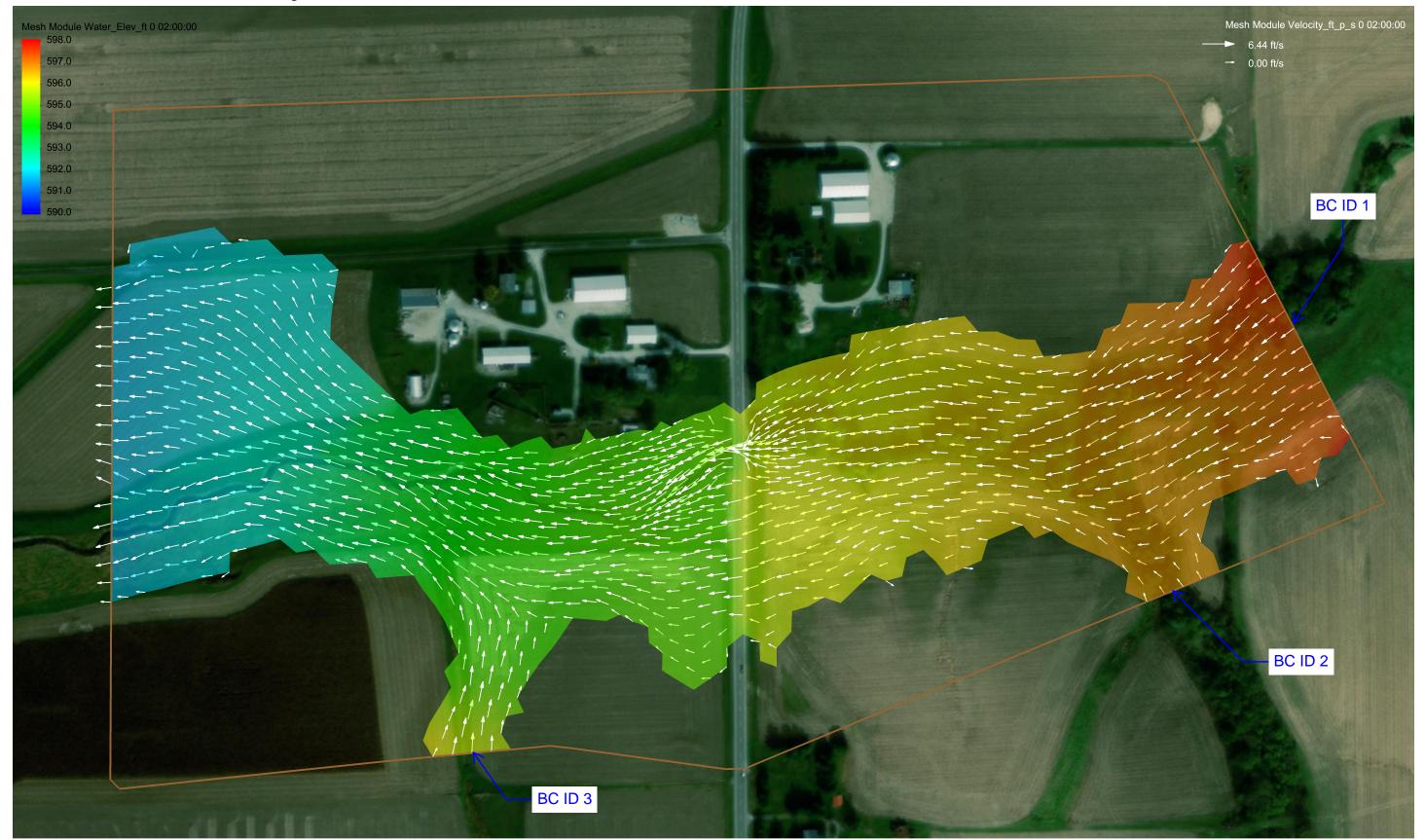
IL 111 over Apple Creek SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results

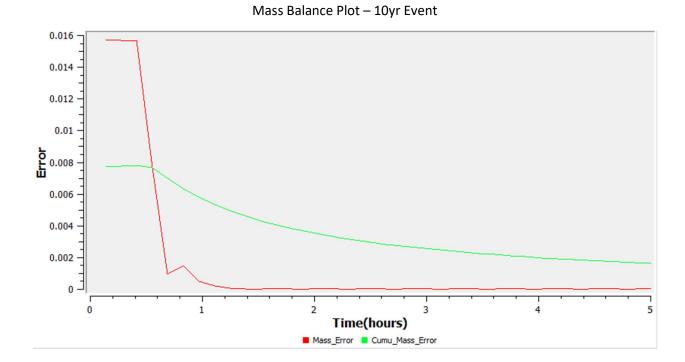


IL 111 over Apple Creek SMS Quick Check Model 500-Year Storm - Velocity/Depth Results

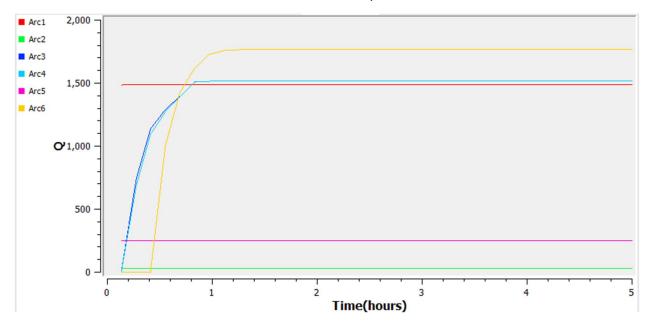


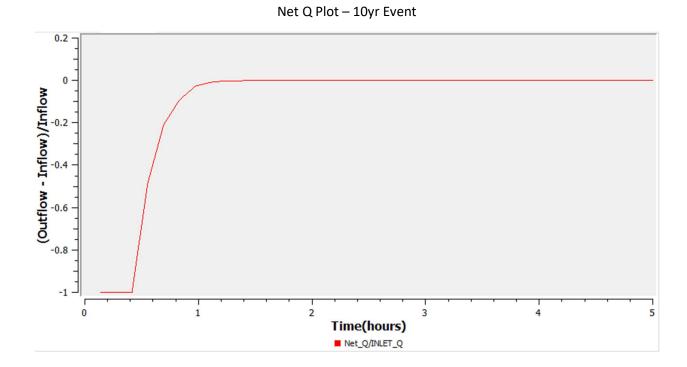
IL 111 over Apple Creek SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



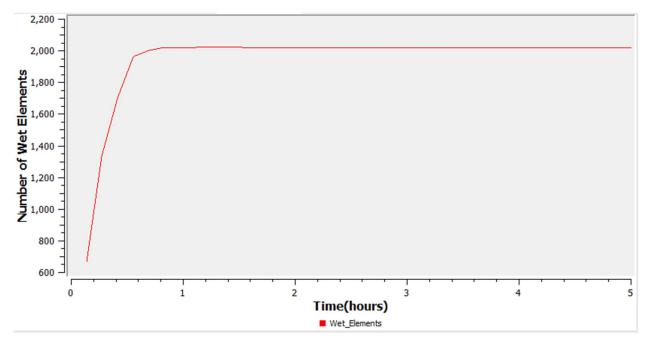


Monitor Line Plot – 10yr Event

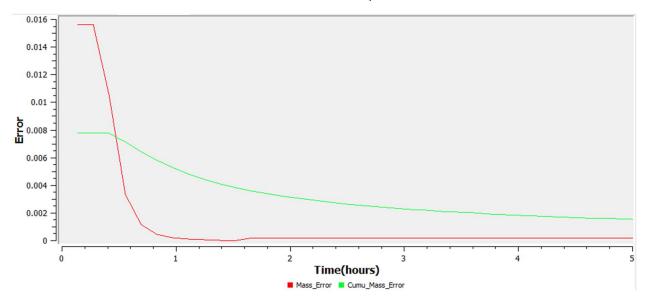


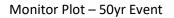


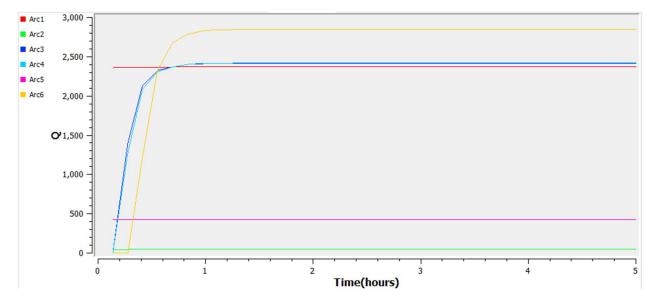
Wet Elements Plot – 10yr Event



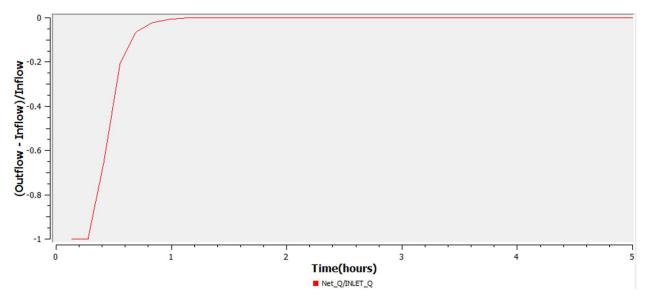
Mass Balance Plot – 50yr Event



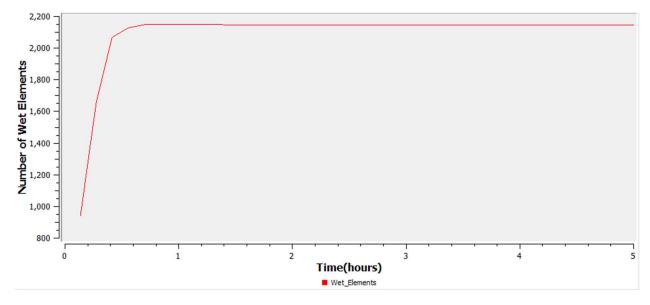




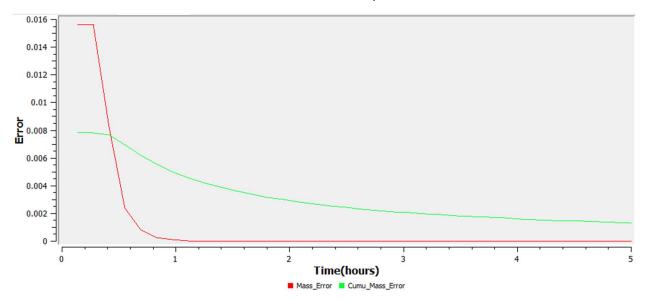
Net Q Plot – 50yr Event

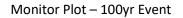


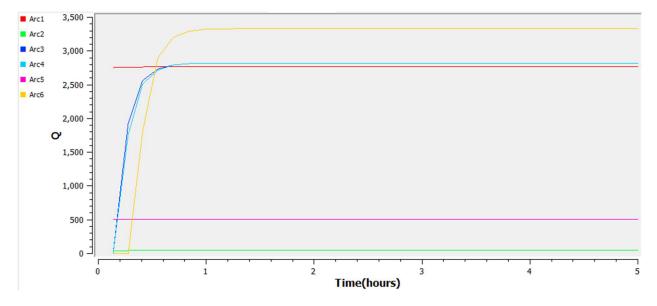


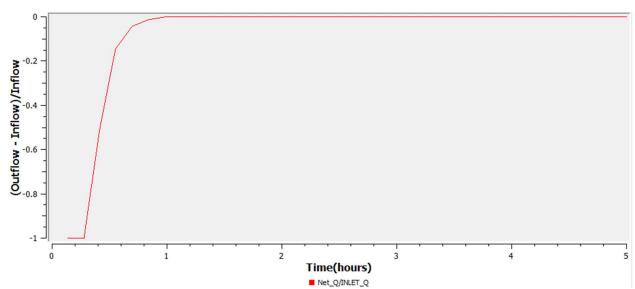


Mass Balance Plot – 100yr Event



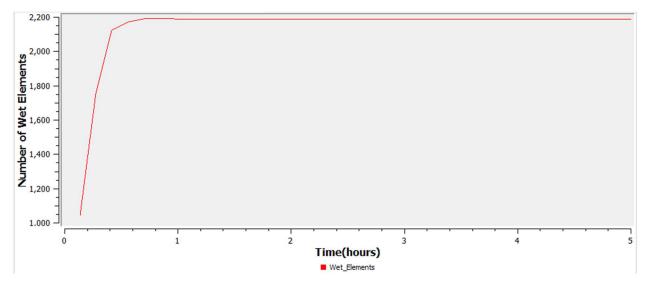




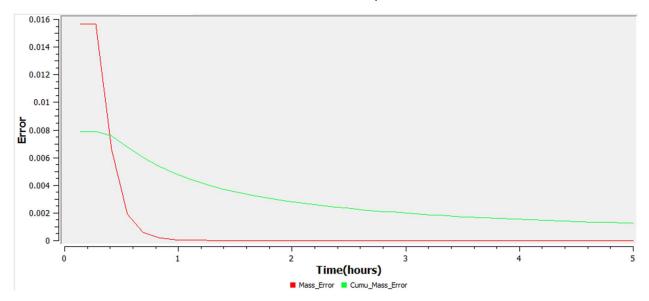


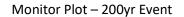
Net Q Plot – 100yr Event

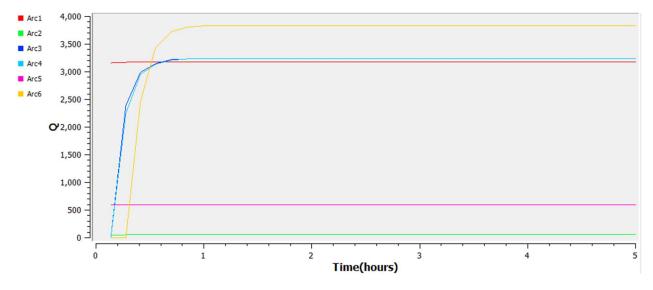


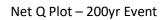


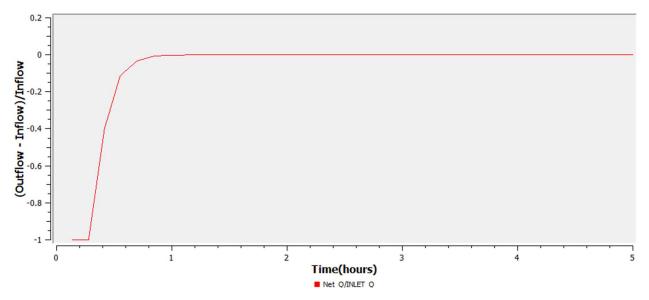
Mass Balance Plot – 200yr Event



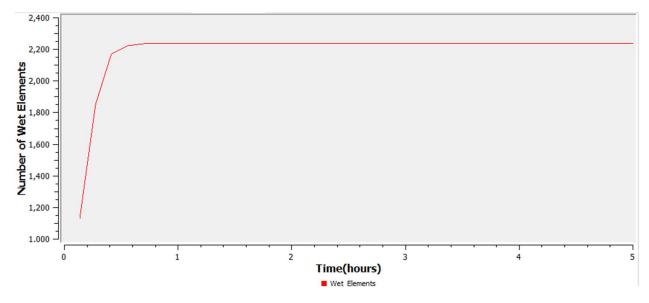




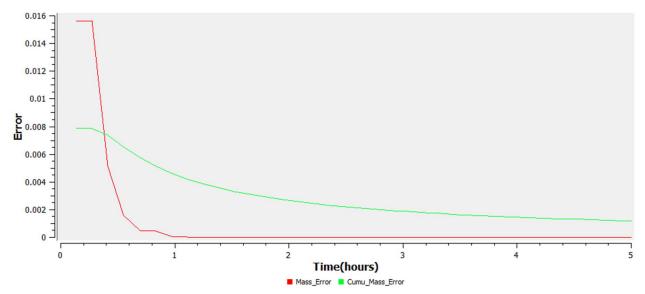


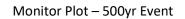


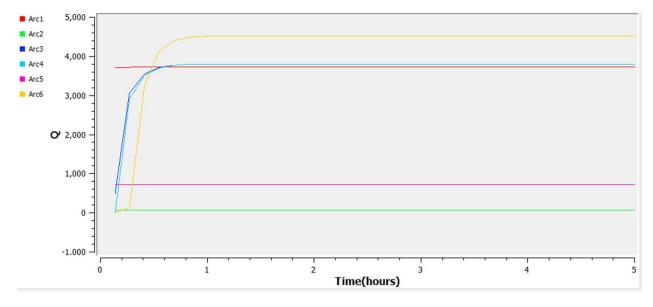


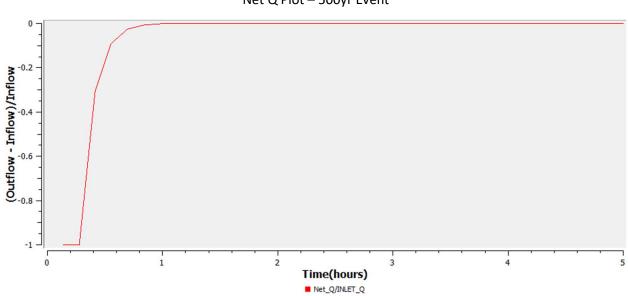




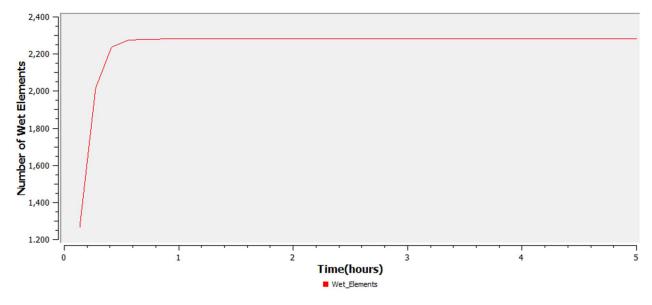








Wet Elements Plot – 500yr Event



Net Q Plot – 500yr Event

SUPPLEMENT to QUICK CHECK GUIDEBOOK



070-0002 – IL 121 over West Okaw River – District 7 – 6-span Bridge 461 feet

Date: 7/9/2021 County: Moultrie Route: IL 121 Watercourse: We ESN: 070-0002 Drainage Area: 10	est Okaw F		8 acres)		Structure	Туре: 🗵	Bridge		:
Hydrology Metho			-	_			_		
□FIS StreamStats □HEC-HMS □TR-20 □Rational Method □Other: Discharges/ Flows									
Y	2	5	10 Di	1scharges/	Flows 50	100	200	500	
Analyzed					\boxtimes		200		
BC ID: 1	2,280	3,920	5,090	6,610	7,770	8,920	8,920	11,600	
BC ID:	2,200	0,720	0,020	0,010	.,	0,720	0,720	11,000	
BC ID:									
BC ID:									
Source of Topography/ Surface Data (check all that apply): SMS □LiDAR □Bathymetry □Cross Sections □Text File □LandXML									
Mesh Type: Vertices Spacing: Mesh Density (El <u>Monitor Lines &</u> Number of Monit <u>Materials Covera</u> Manning's "n" Va	ements/ A <u>Points Cov</u> or Lines: <u>{</u> ge:	cre): 9,87 <u>verage:</u> 5 N	5 <mark>0</mark> ft.		ints: 0				
Boundary Condit	ions Cover								
BC ID: 1]	Гуре: 🗵	⊠Inlet-Q		□Exit-H		Location: N		
BC ID: 2	BC ID: 2 Type:		•		kit-H	Location: S			
BC ID:				□Exit-H		Location:			
BC ID:		• 1	Inlet-Q	Exit-H Location:					
BC ID: Exit-H Channel C		• 1	Inlet-Q epth Slope		kit-H 0007	Locatio Sour		DEM	FIS Profile
Model Control: Time Step (sec.):	1 :	Simulatior	ns Length ((hrs.): 6					
Output Method:	⊠Specifie	d Frequen	icy □Spec	cified Time	es □Simu	lation End	l □Unste	ady Outpu	t
Model Converger Time of Converge		rs.): 3							
<u>Results:</u> ⊠Roadway Over Ghere Ratio (Mes					Y / 3 = 14				

Notes:

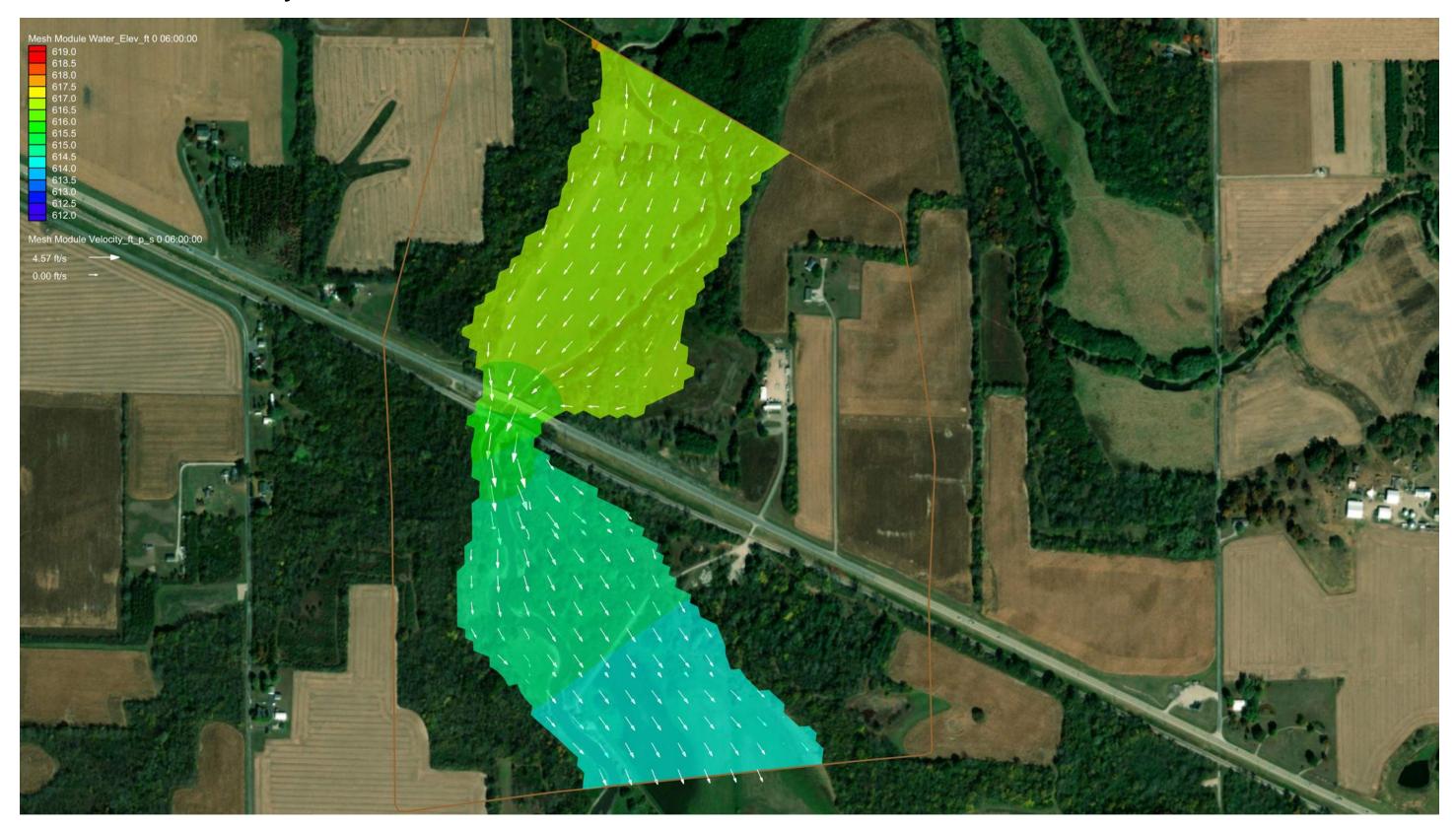
IL-121 Over the West Okaw River SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



IL-121 Over the West Okaw River SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



IL-121 Over the West Okaw River SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



IL-121 Over the West Okaw River SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



IL-121 Over the West Okaw River SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



IL-121 Over the West Okaw River SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



IL-121 Over the West Okaw River SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



IL-121 Over the West Okaw River SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



IL-121 Over the West Okaw River SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



IL-121 Over the West Okaw River SMS Quick Check Model 500-Year Storm - Velocity/Depth Results



SUPPLEMENT to QUICK CHECK GUIDEBOOK



081-0047 – 27th Street over Rock River – District 2 – 9-span Bridge 919 feet – FIS Hydrology

27th Street Over Rock River



SMS Quick Check Model

SMS Quick Check Model for 27th Street Over Rock River

TO:	Neil Vanbebber, IDOT
	Rich Guise, IDOT
	Nicholas Jack, IDOT
From:	2IM Group, LLC.; Hanson Professional Services Inc.
SUBJECT:	SMS Quick Check Model for 27 th Street Over Rock River
DATE:	September 9 th , 2021

Introduction

This crossing is located in Rock Island County on 27th Street. It is 4.4 miles west of the Henry County line. Rock River flows from the east towards 27th Street. The US 6 bridge crosses Rock River 1,100-ft upstream of 27th Street. Both the 27th Street and US 6 crossings are modelled as an opening in the 2D mesh. The 27th Street opening is approximately 900'. The quick check summary table and exhibits are attached. The following paragraph contains a brief description of the site hydrology.

Hydrology

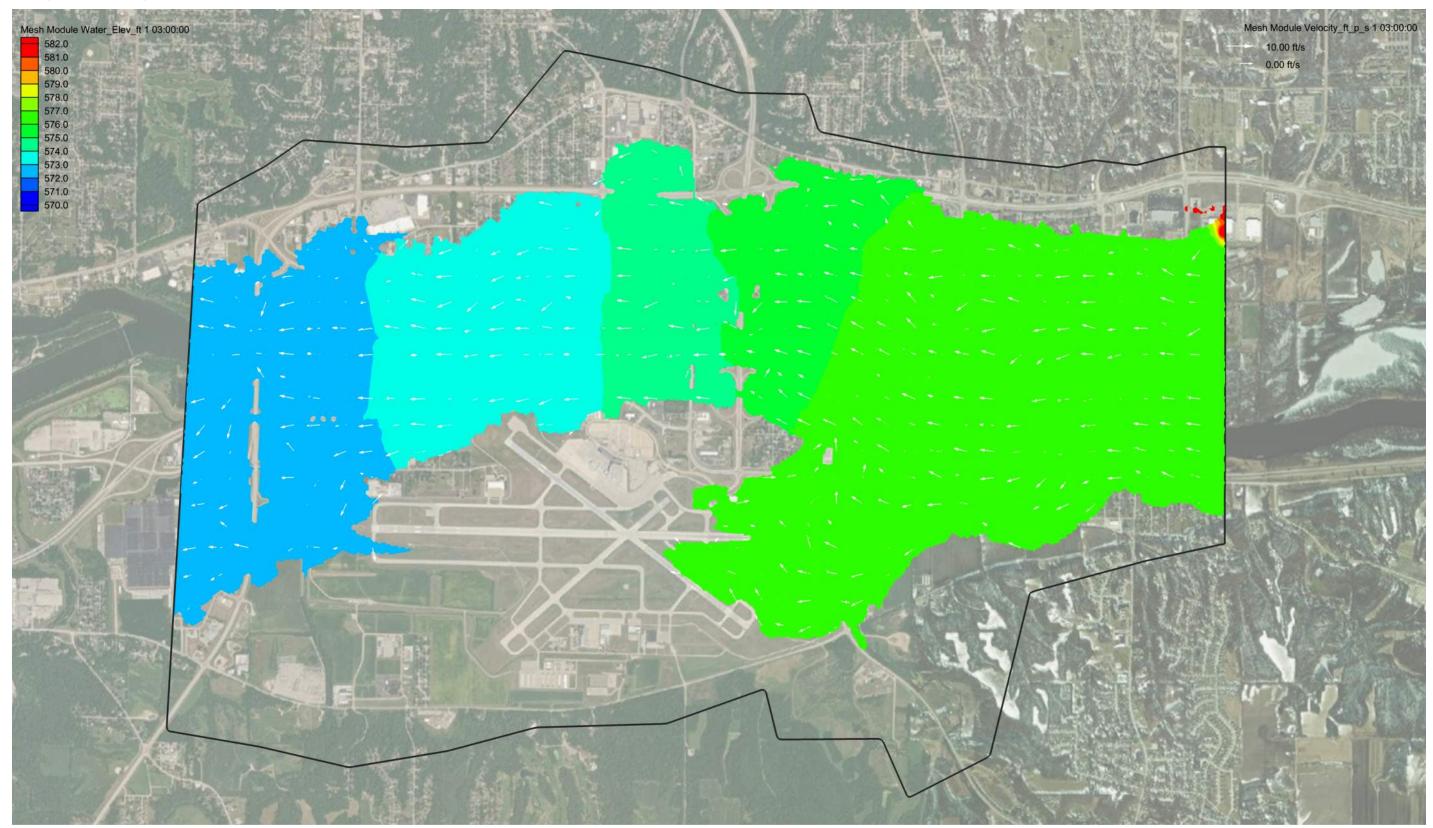
The hydrology for this site was developed from the FIS report for Rock Island County. The location of the flows reported in the FIS report is just downstream of US 6. The 10-year, 50-year, 100-year, and the 500-year storm events were taken from the FIS report and applied to the model boundary. A 200-year discharge was interpolated from the Streamstats output. See the summary table on the following page for the flow rates used.

Date: 9/9/2021 County: Rock Isl Route: 27 th Street Watercourse: Rov ESN: 081-0047	t				Structure	Туре: 🗵	Bridge	□ Culvert	
Drainage Area: 10	0821 Sq. N	Mi. (69254	40 acres)			-) [-]	8-		
Hydrology Metho ⊠FIS □Strear		all that app ⊐HEC-HN	∕IS □TH	R-20 □I scharges/1	Rational M Flows	lethod []Other:		
Y	2	5	10	25	50	100	200	500	
Analyzed			\boxtimes		\boxtimes	\boxtimes	\boxtimes	\boxtimes	
BC ID: 1			43000		65000	76000	90000	108000	
BC ID:									
BC ID:									
BC ID:									
Source of Topogr	aphy/ Sur	face Data (check all t	hat apply):	<u>.</u>				
⊠SMS □LiD	AR □B	athymetry	□Cros	s Sections	□Text	File □I	LandXML		
Mesh Generator C Mesh Name: Mes Mesh Type: Vertices Spacing: Mesh Density (El Monitor Lines & Number of Monit	sh ⊠Paving Max: 75 ements/ A <u>Points Co</u> or Lines: :	ft.; Min: 5 cre): 1650 <u>verage:</u>	<mark>0</mark> ft.		ints: 5				
Manning's "n" Va Boundary Conditi	alue used:								
Number of BC An		France 🖂	Inlat O		.:+ II	Leastia	m. East		
BC ID: 1 BC ID: 2		• •	Inlet-Q Inlet-Q	∐Ex ⊠Ex		Location: East Location: West			
BC ID: 2 BC ID:		• 1	Inlet-Q						
BC ID: BC ID:			Inlet-Q		□Exit-H Location: □Exit-H Location:				
BC ID: BC ID:			Inlet-Q	□Exit-H Location: □Exit-H Location:					
Exit-H Channel C		• •	~					FIS Profil	9
Exit-fi Channel C	alculator	Normai De	epui siope	(11/11). 0.0	501 500				e
Model Control: Time Step (sec.): 1 Simulations Length (hrs.): 40									
Output Method:	⊠Specifie	ed Frequen	cy □Spec	rified Time	es □Simu	lation End	l □Unstea	ady Output	
Model Convergen Time of Converge		rs.): 27							
<u>Results:</u> ⊠Roadway Over Ghere Ratio (Mes				Y & 10 ce): 21.1					
<u>Notes:</u> The approa overtopped by the									

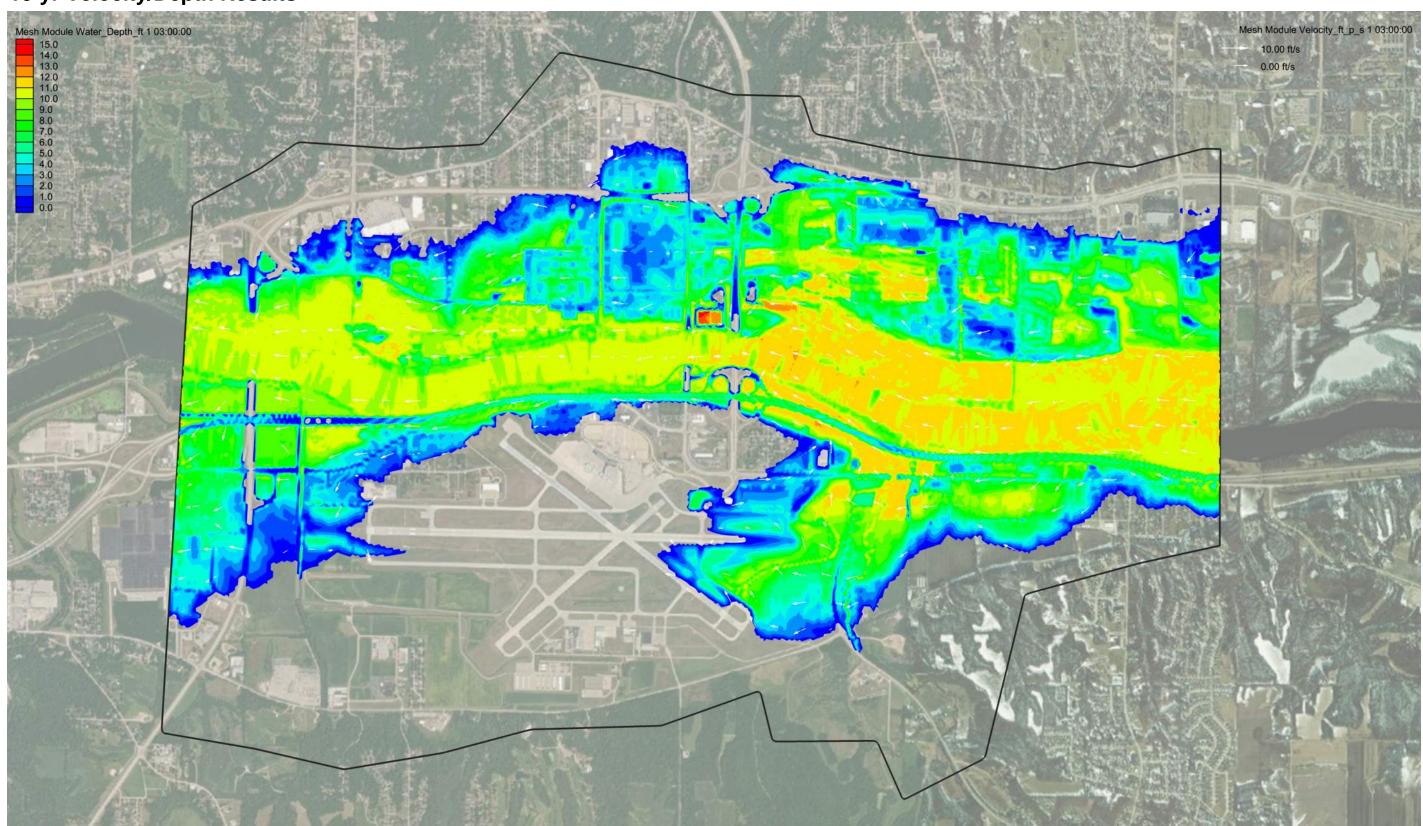
overtopped by the 0.2-% chance storm. However, water predicted by this model due to the missing channel bed.

Revised: June 21, 2021

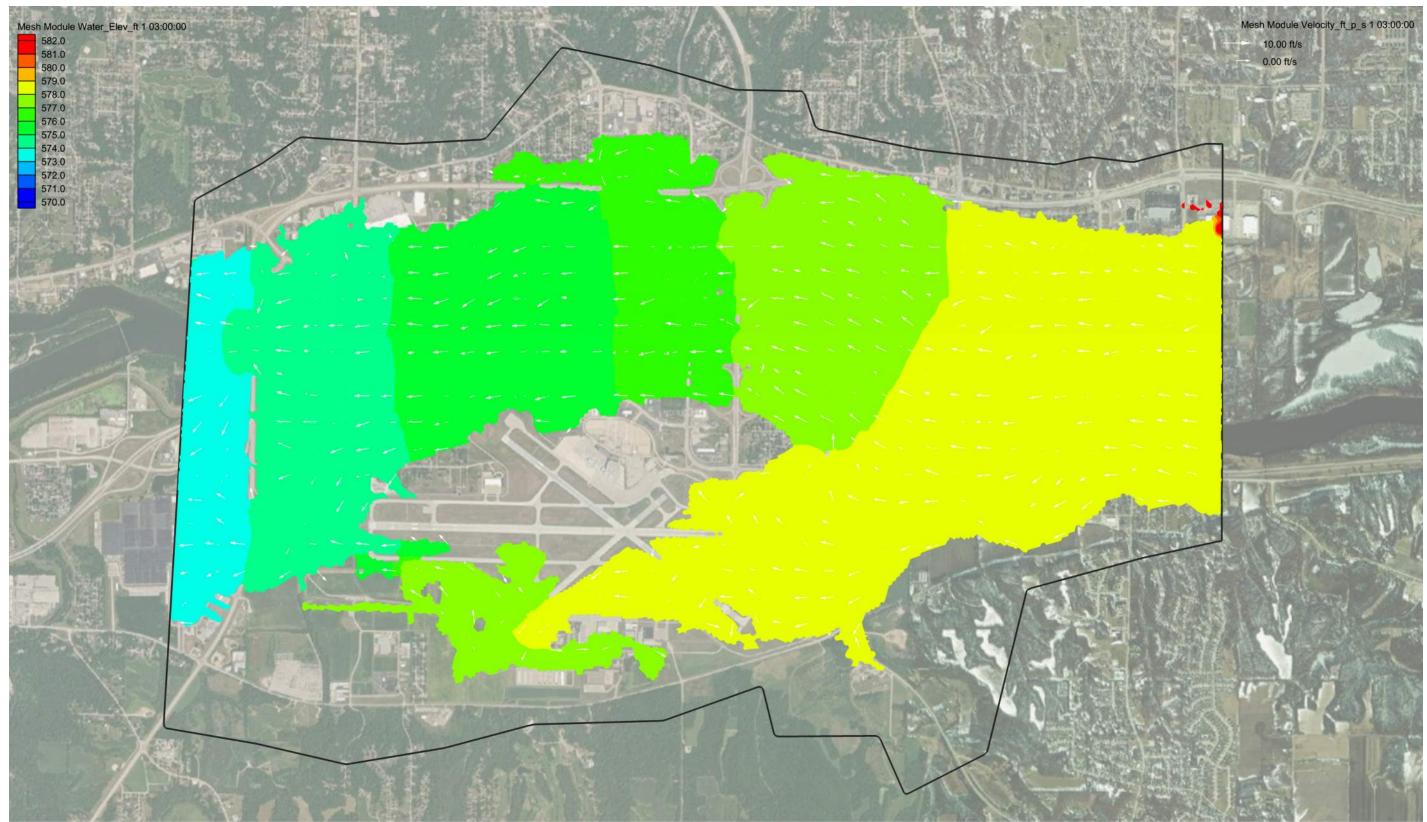
27th Street Over Rock River SMS Quick Check Model 10-yr Velocity/Elevation Results



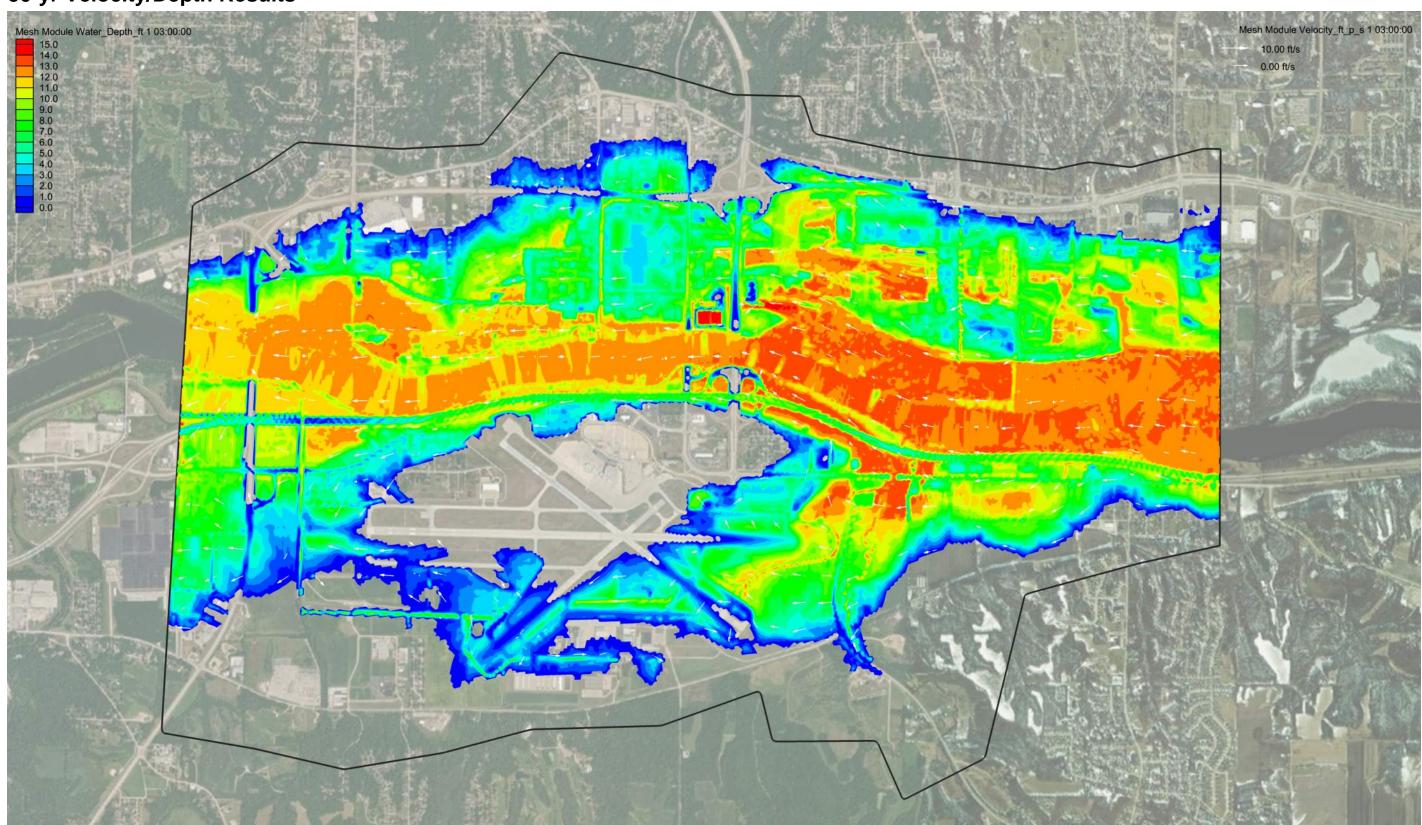
27th Street Over Rock River SMS Quick Check Model 10-yr Velocity/Depth Results



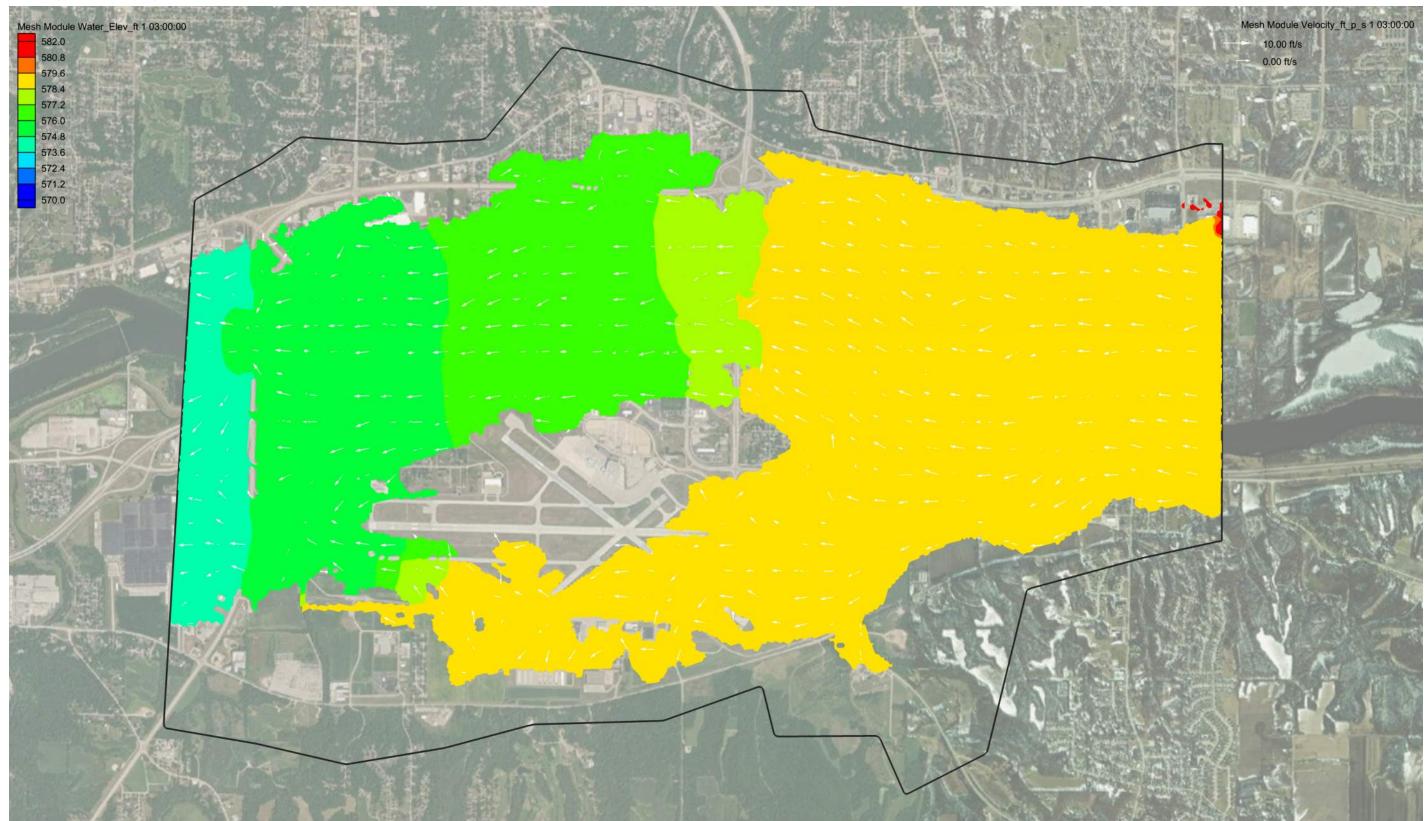
27th Street Over Rock River SMS Quick Check Model 50-yr Velocity/Elevation Results



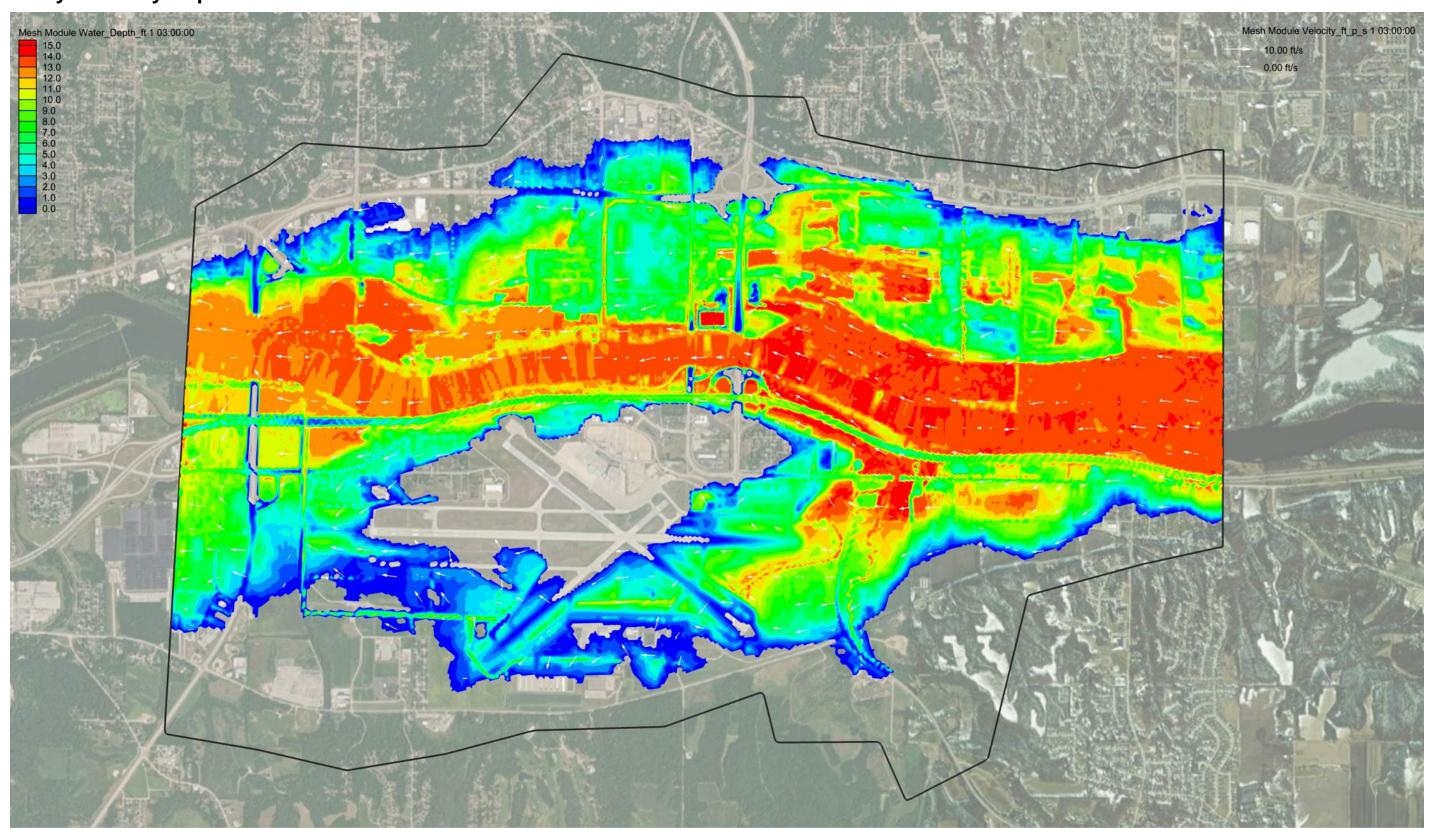
27th Street Over Rock River SMS Quick Check Model 50-yr Velocity/Depth Results



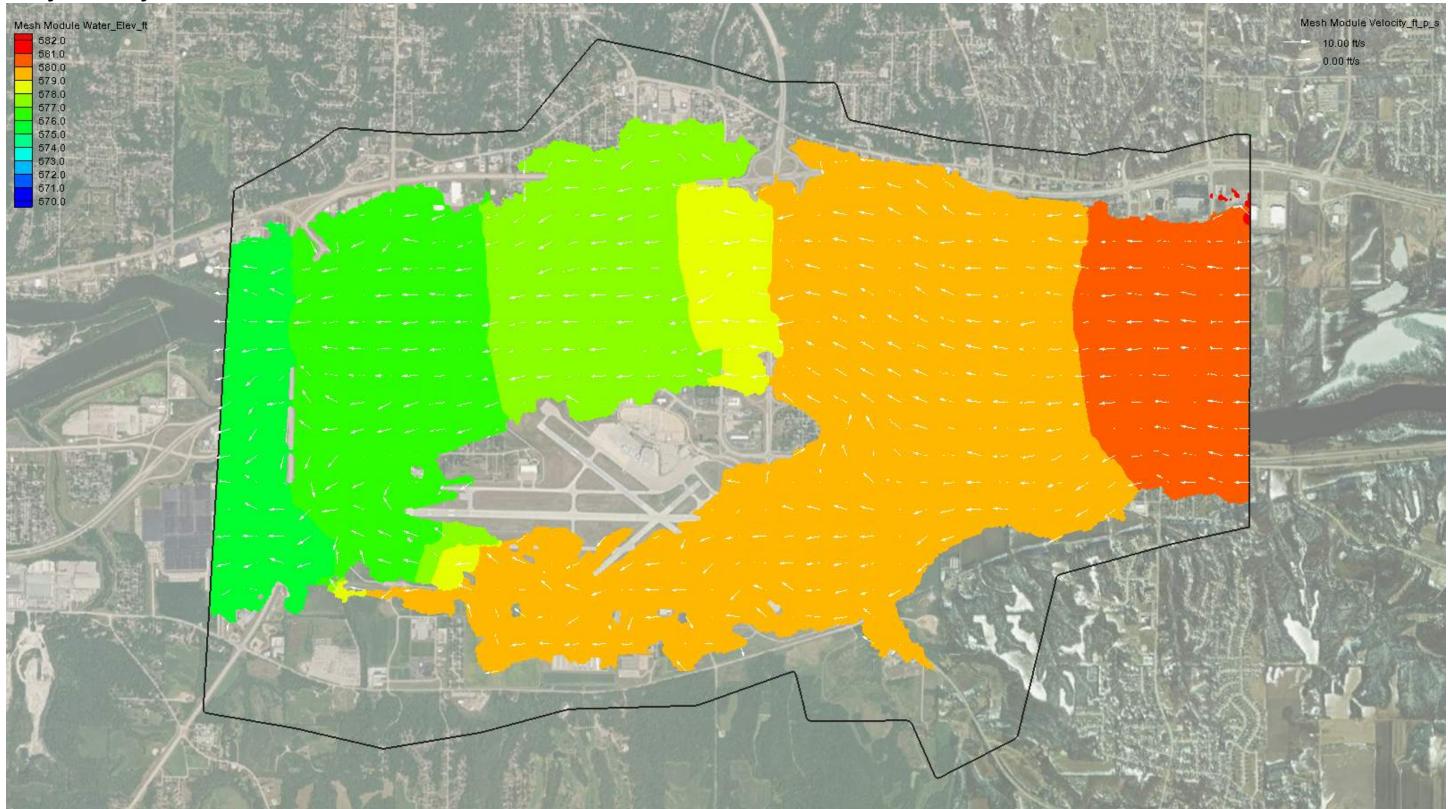
27th Street Over Rock River SMS Quick Check Model 100-yr Velocity/Elevation Results



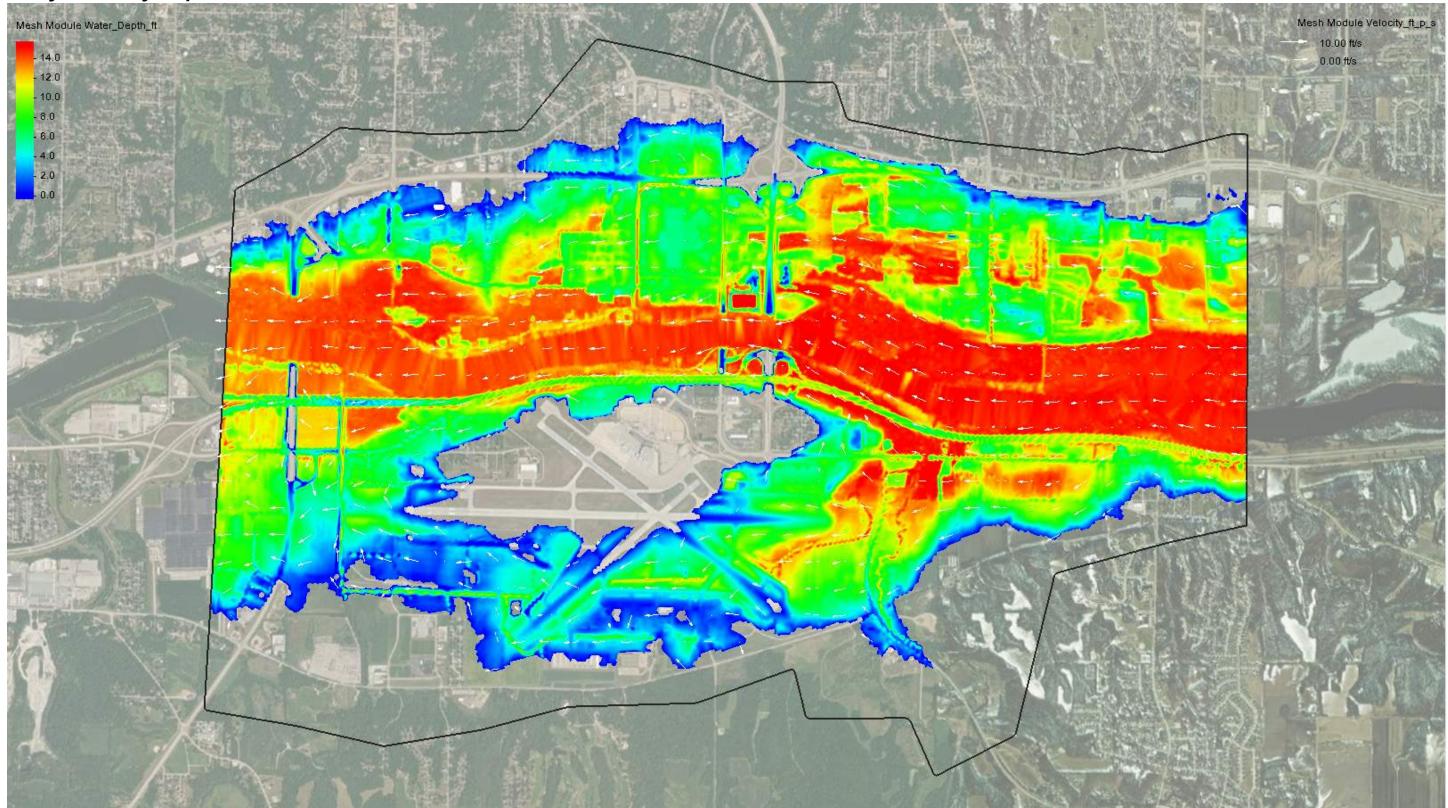
27th Street Over Rock River SMS Quick Check Model 100-yr Velocity/Depth Results



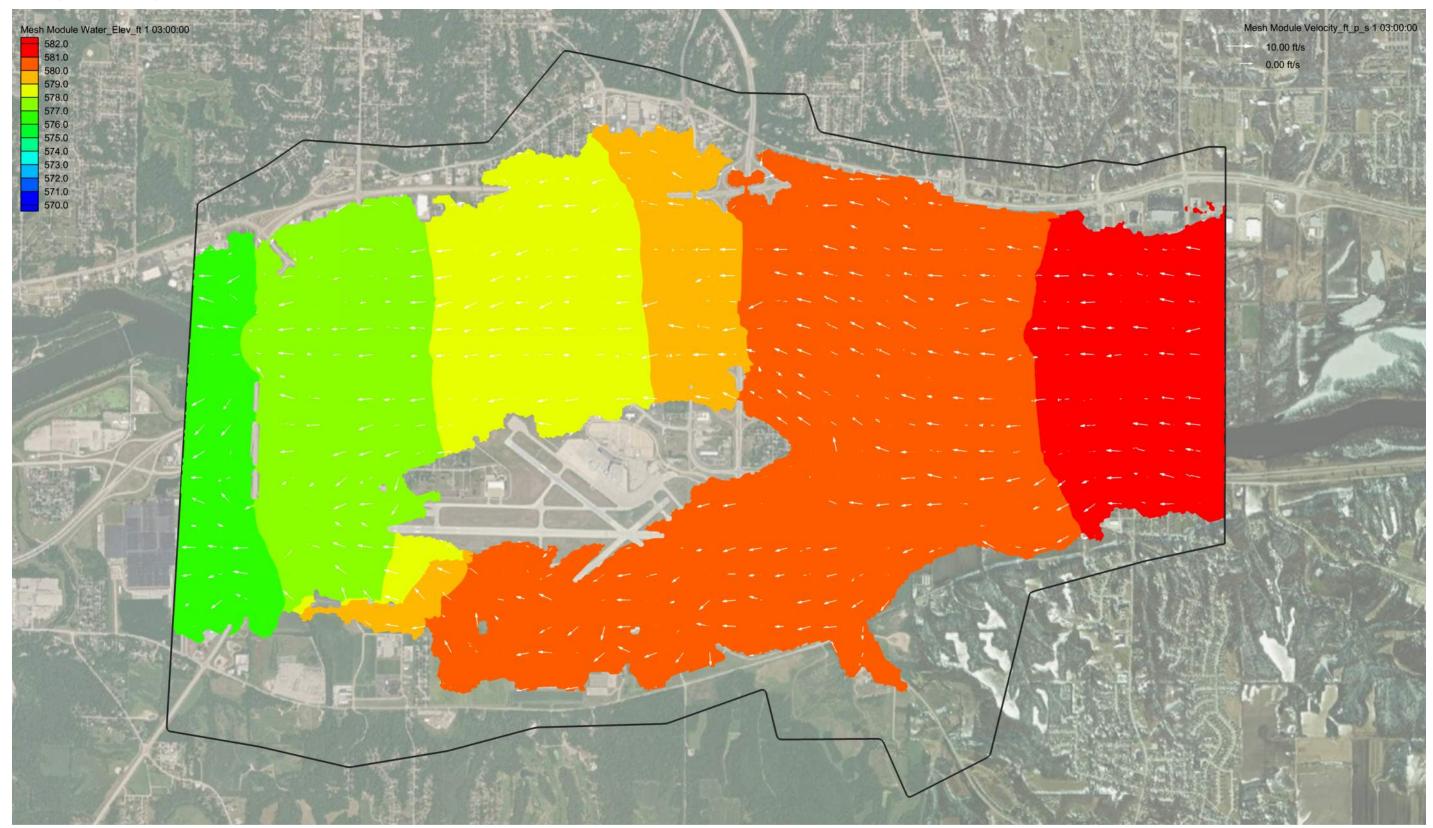
27th Street Over Rock River SMS Quick Check Model 200-yr Velocity/Elevation Results



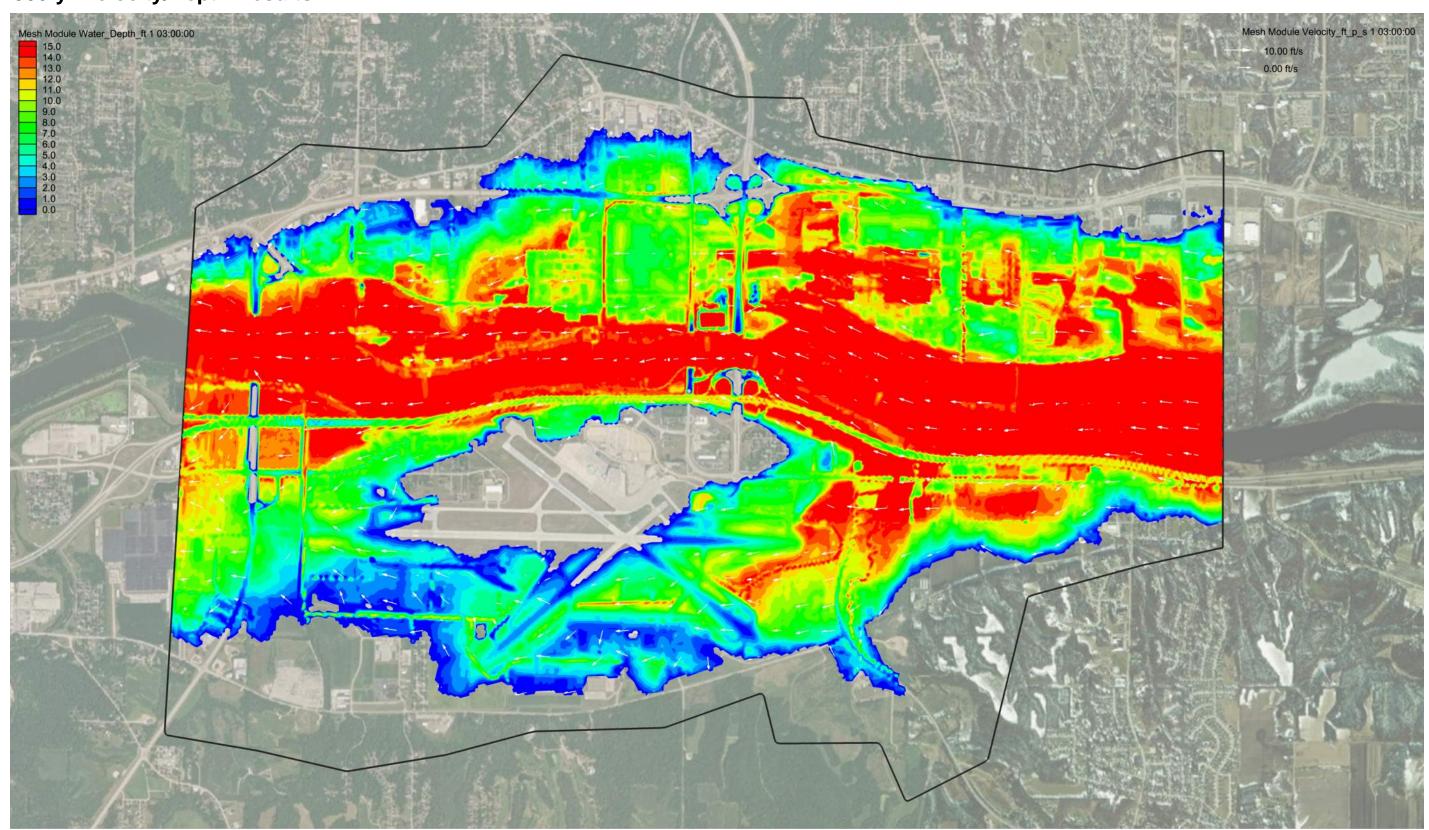
27th Street Over Rock River SMS Quick Check Model 200-yr Velocity/Depth Results



27th Street Over Rock River SMS Quick Check Model 500-yr Velocity/Elevation Results



27th Street Over Rock River SMS Quick Check Model 500-yr Velocity/Depth Results



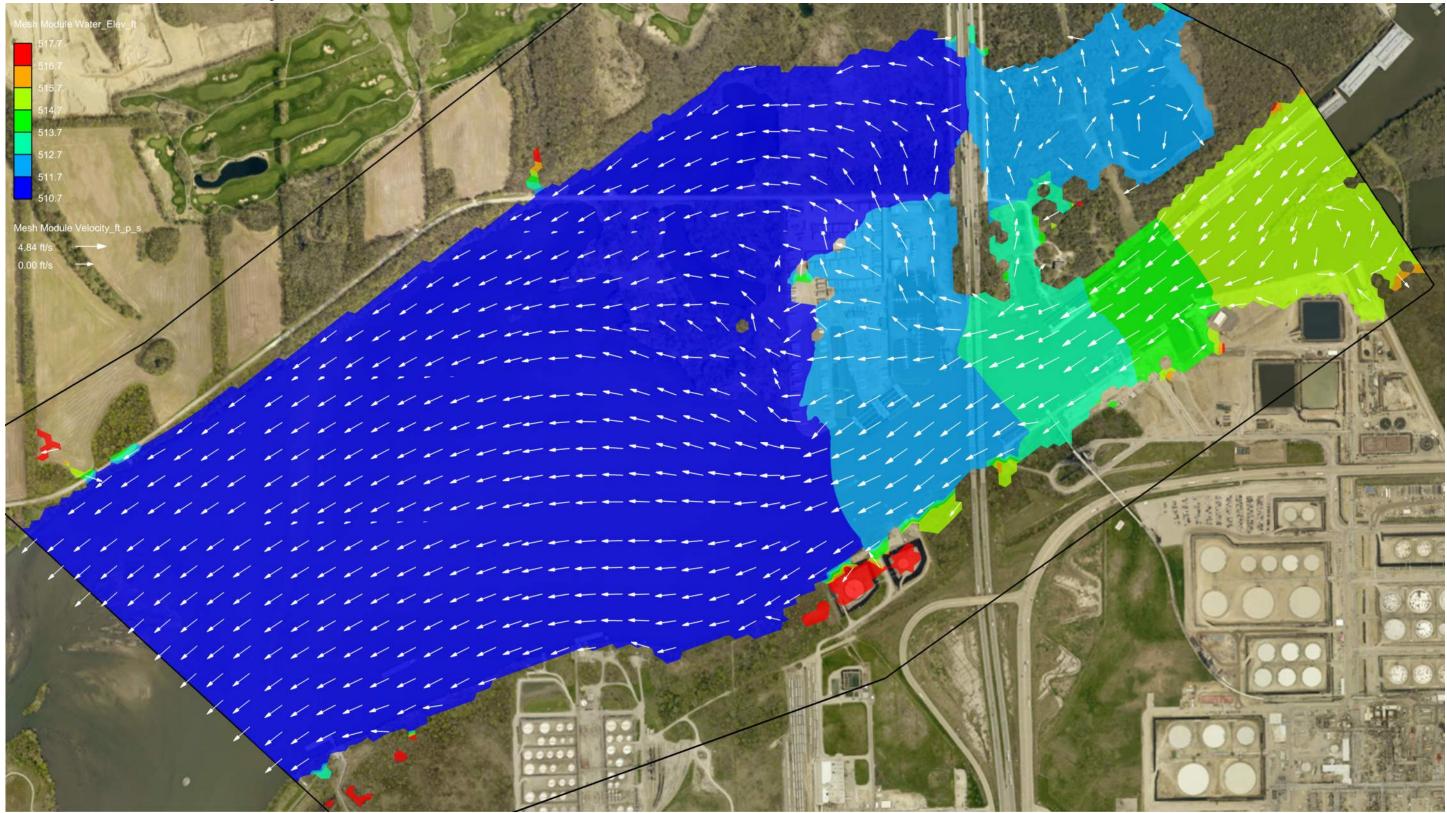
SUPPLEMENT to QUICK CHECK GUIDEBOOK



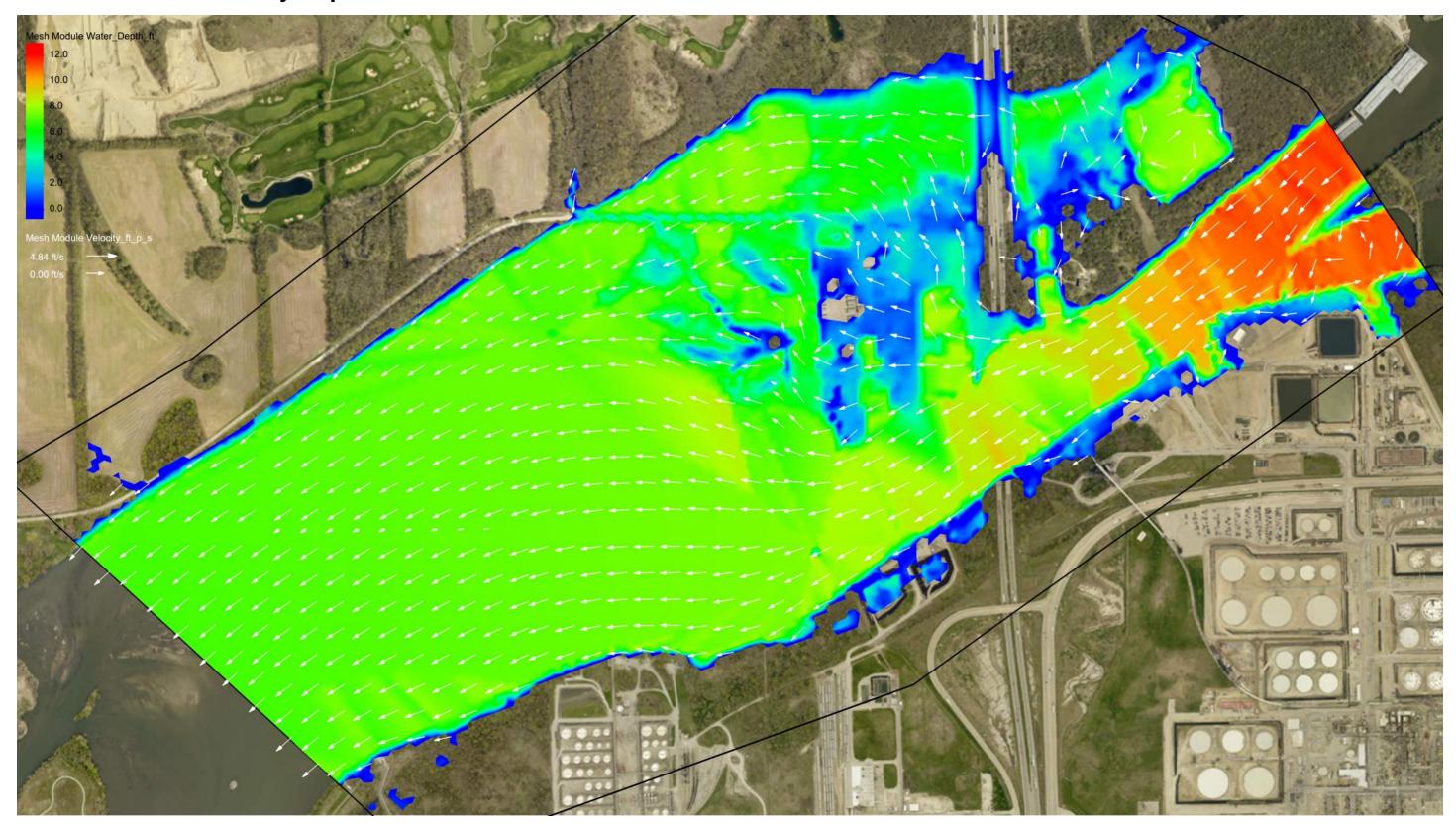
099-0008 (SB) and 099-0009 (NB) - I-55 over Des Plaines River - District 1-7-span Dual Bridges 1,406 feet - FIS Hydrology

Date: 9/17/2021 County: Will Route: I-55 Watercourse: DesPlaines River ESN: 099-0005 Structure Type: ⊠ Bridge □ Culvert Drainage Area: 13.58 Sq. Mi. (8,691 acres)											
Hydrology Method (check all that apply): ⊠FIS □StreamStats □HEC-HMS □TR-20 □Rational Method □Other: Discharges/ Flows											
Y	2	5	10	25	50	100	200	500			
Analyzed			\boxtimes		\boxtimes	\boxtimes	\boxtimes				
BC ID: 1			21000		27000	30000	32800	36000			
BC ID: 1 BC ID:			21000		27000	50000	52000	50000			
BC ID:											
BC ID: BC ID:											
Source of Topogr	ophy/ Sur	faco Data (chock all t	hat apply)							
		athymetry					LandXML				
Mesh Generator Coverage: Mesh Name: QC_155_DesPlainesRiver_Mesh Mesh Type: \square Paving \square Patching Vertices Spacing: Max: 50 ft.; Min: 25 ft. Mesh Density (Elements/ Acre): 34626 / 8691 = 3.98Monitor Lines & Points Coverage: Number of Monitor Lines: 3Number of Monitor Points: 0Materials Coverage: Manning's "n" Value used: 0.06Number of Monitor Coverage: Number of BC Arcs: 2 BC ID: 1 BC ID: 2 Type: \square Inlet-Q BC ID: 1 Coverage: \square Inlet-Q 											
Model Control: Time Step (sec.): 5 Simulations Length (hrs.): 12 Output Method: □Specified Frequency □Specified Times Simulation End □Unsteady Output											
Sulput Method:		a riequen	cy Lisped		.₀ ⊠omu	nation End		acry Outp	ul		
Model Convergence: Time of Convergence at (hrs.): 10											
Results: \Box Roadway Overtopping occurs between the >500Y & YGhere Ratio (Mesh Density/ Time of Convergence): $3.98 / 10 = 0.40$											
Notes:									1		

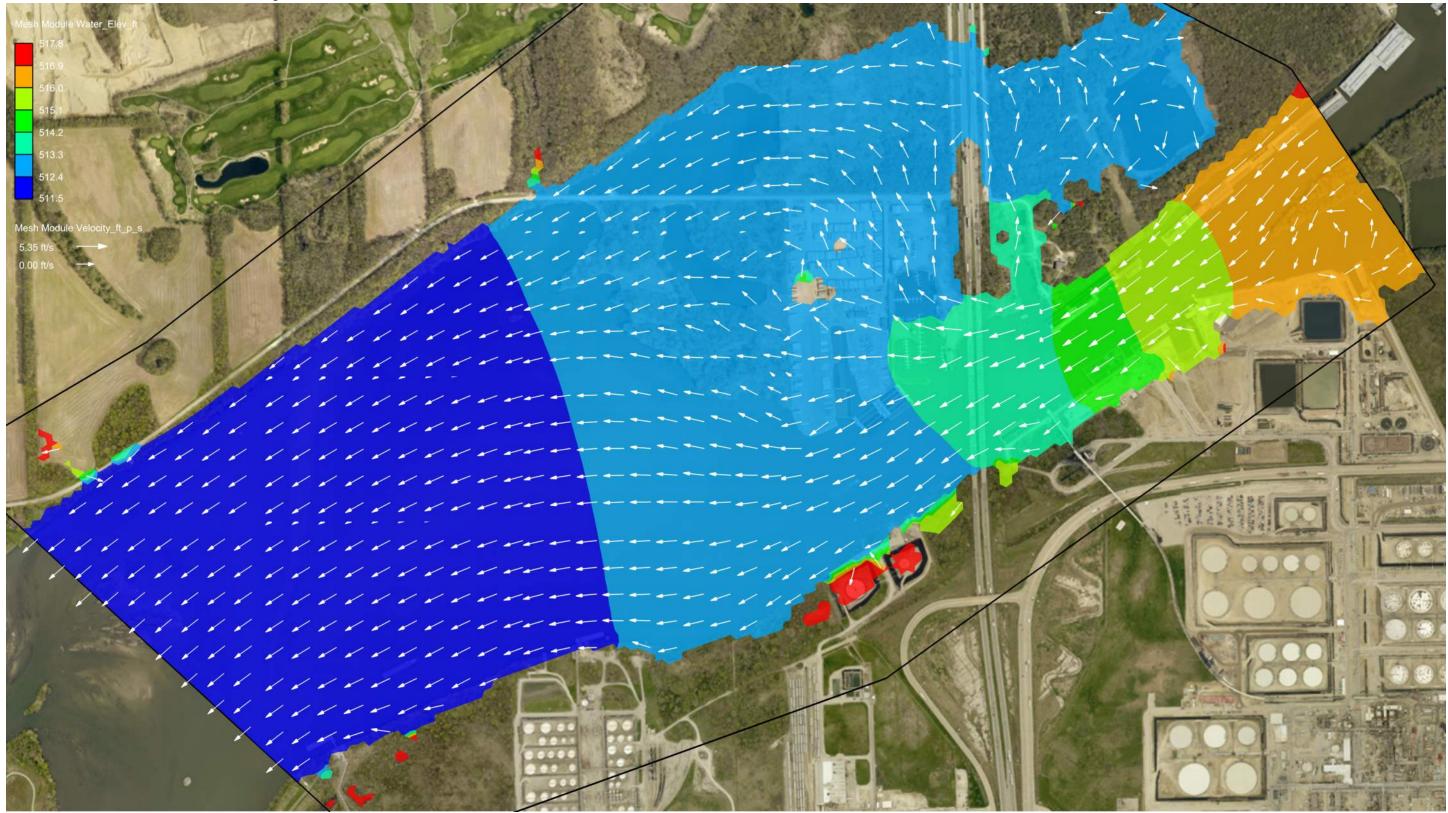
I-55 over Des Plaines River SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



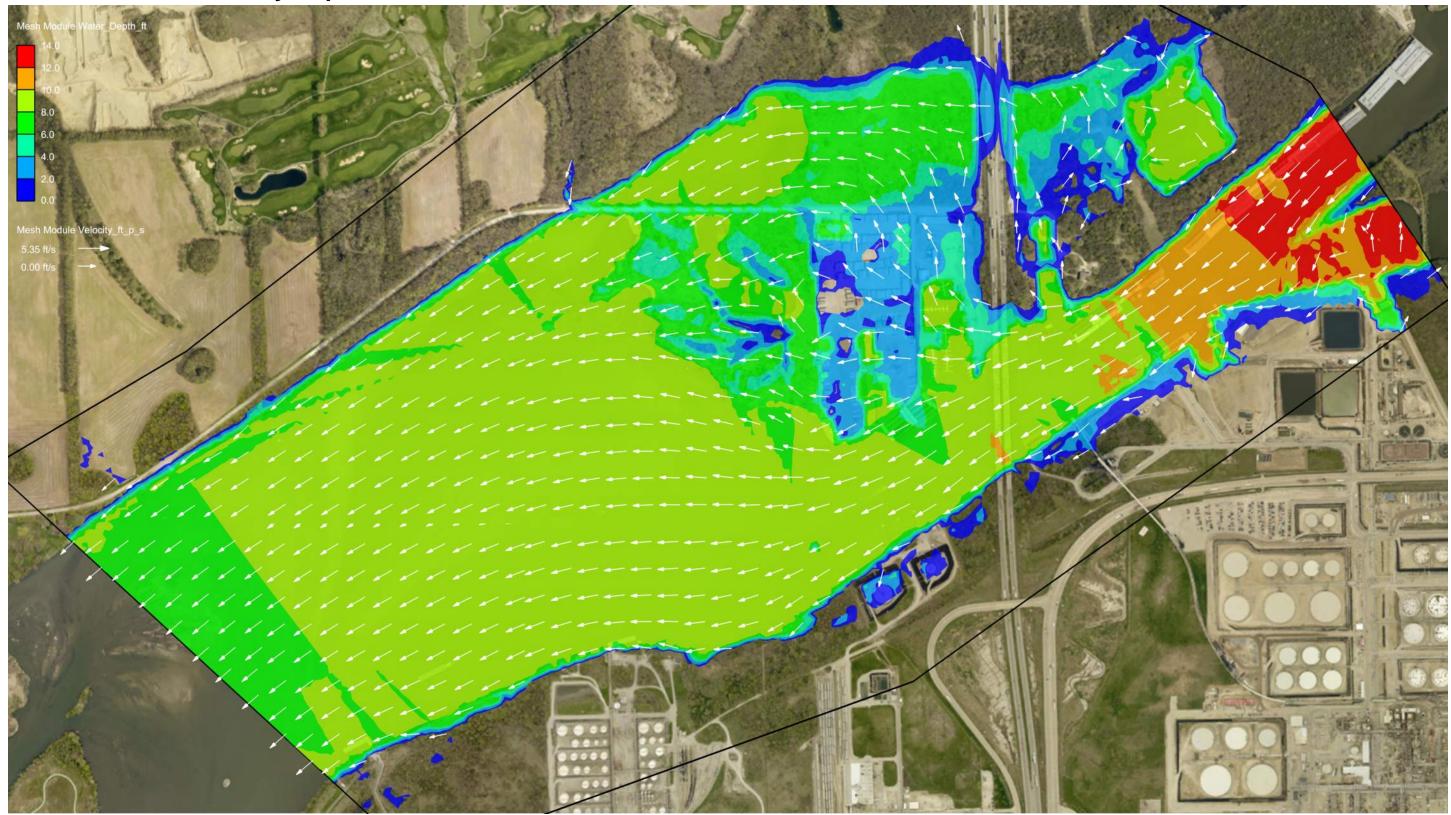
I-55 over Des Plaines River SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



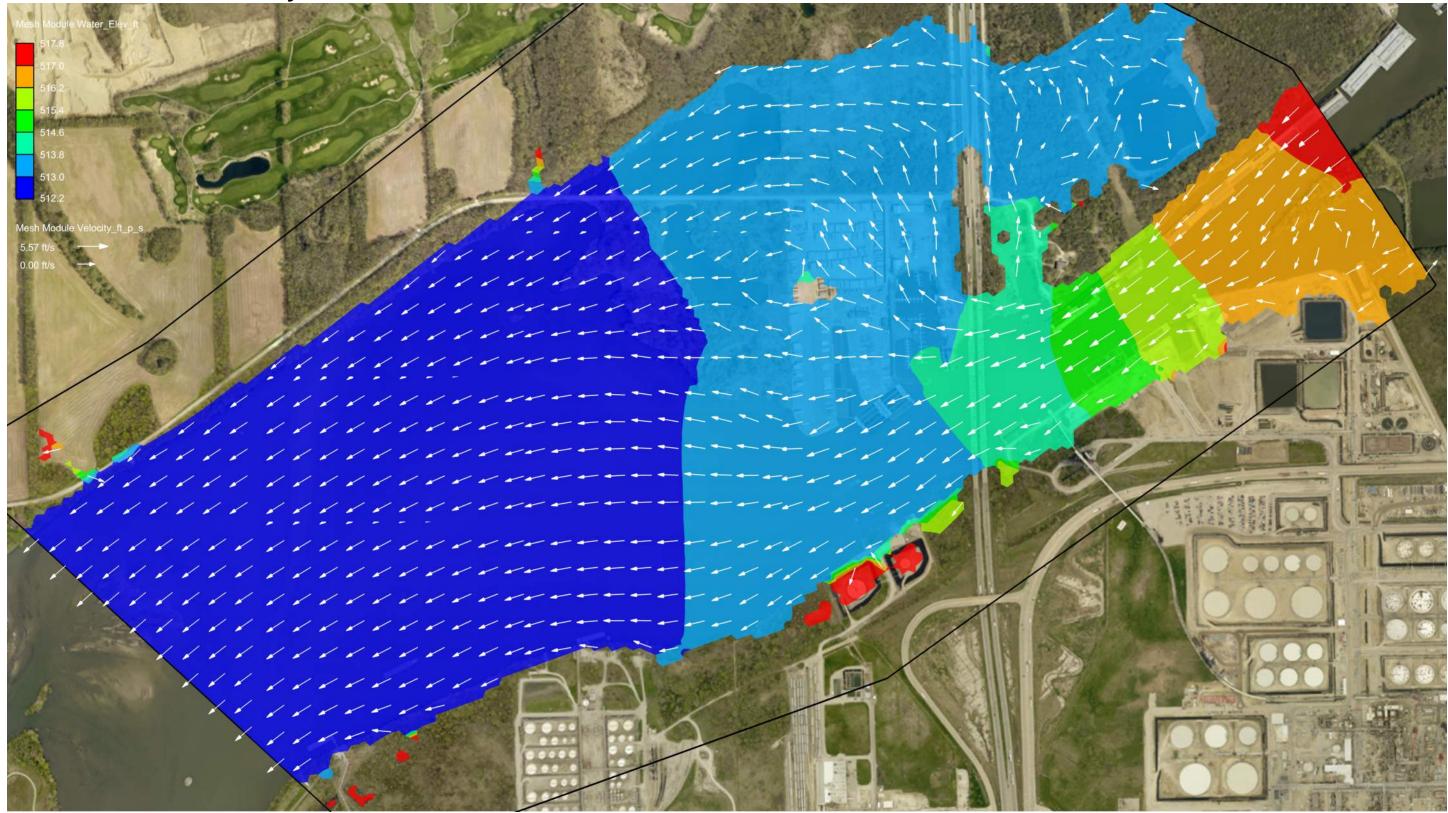
I-55 over Des Plaines River SMS Quick Check Model 50-Year Storm - Velocity/Elevation Results



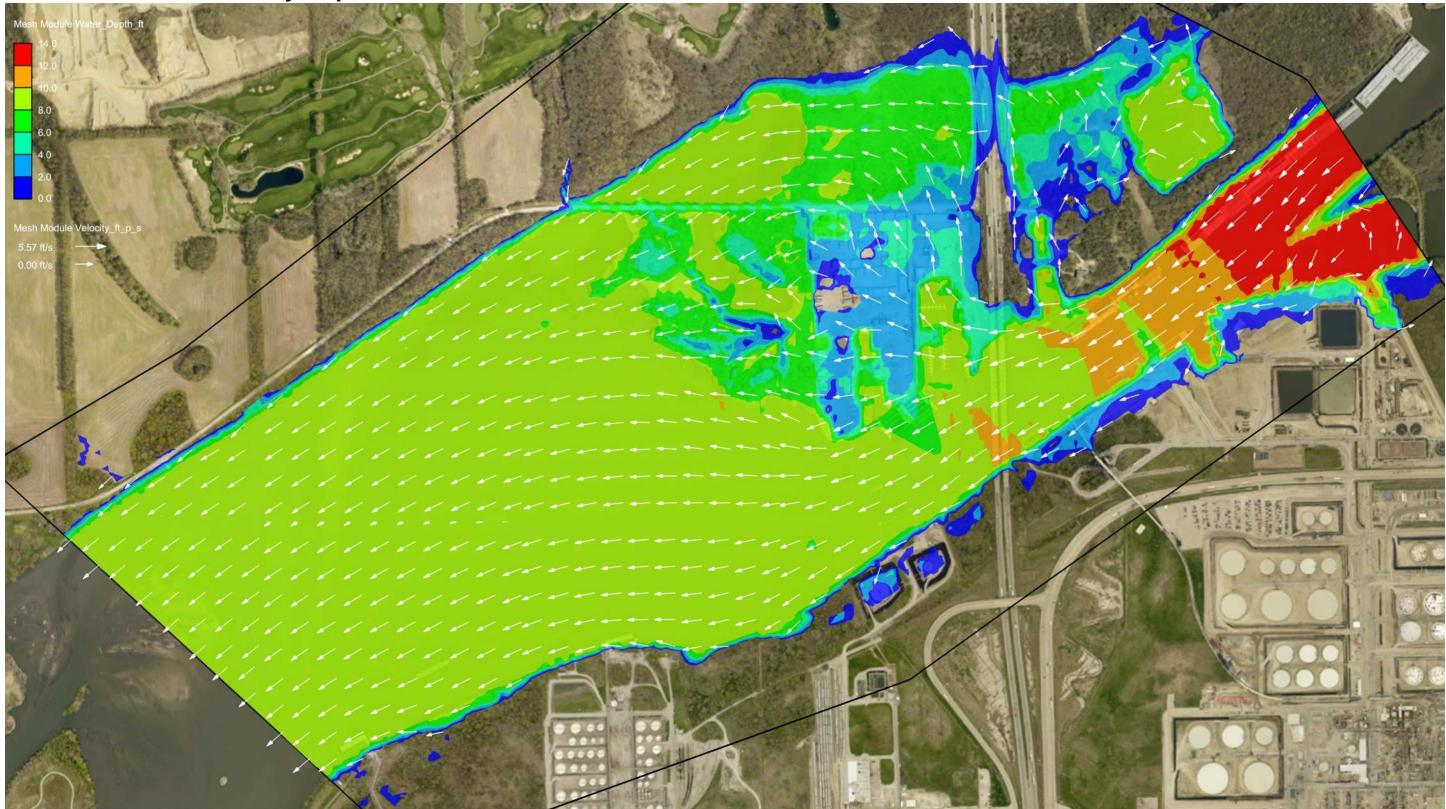
I-55 over Des Plaines River SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



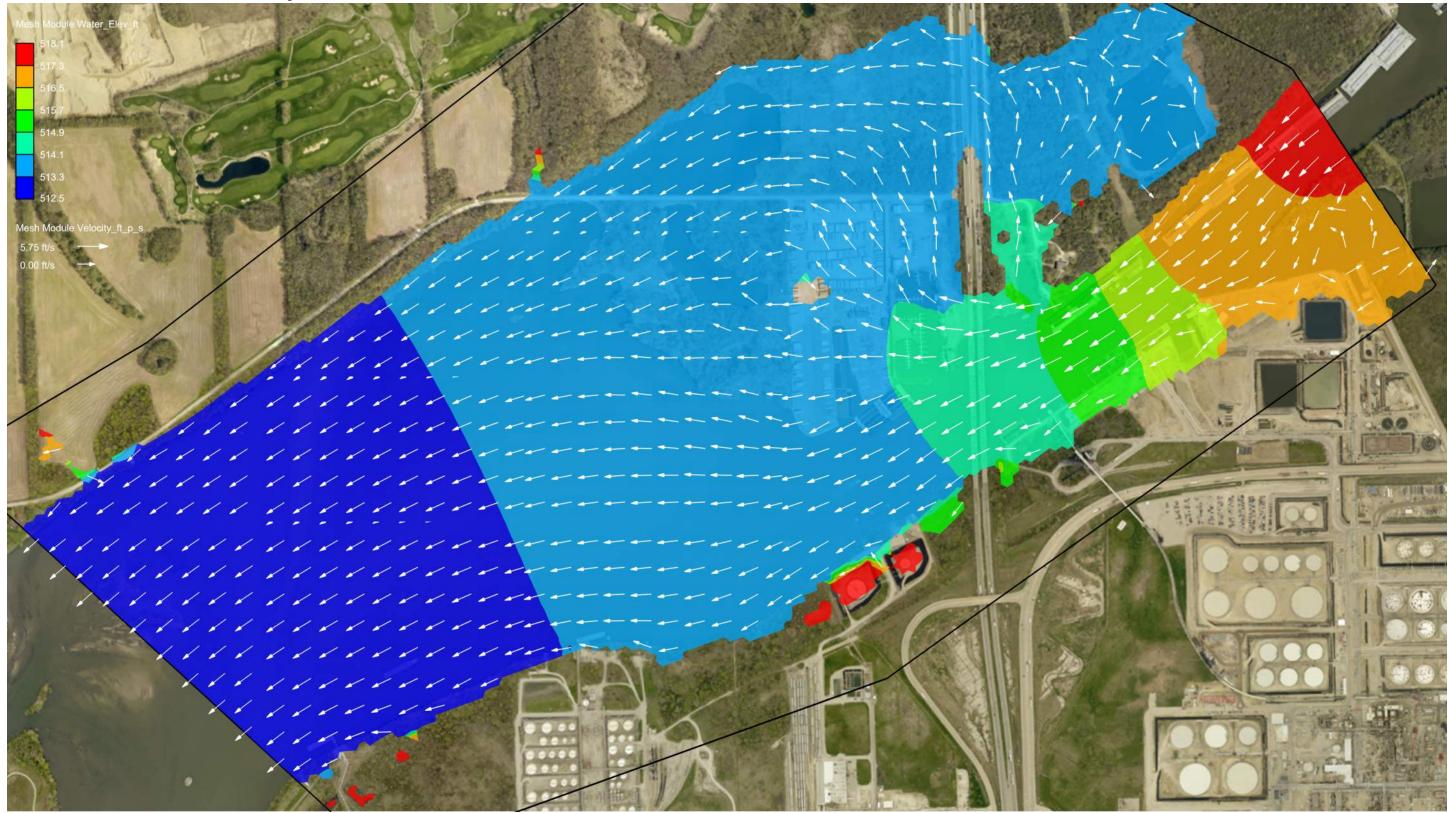
I-55 over Des Plaines River SMS Quick Check Model 100-Year Storm - Velocity/Elevation Results



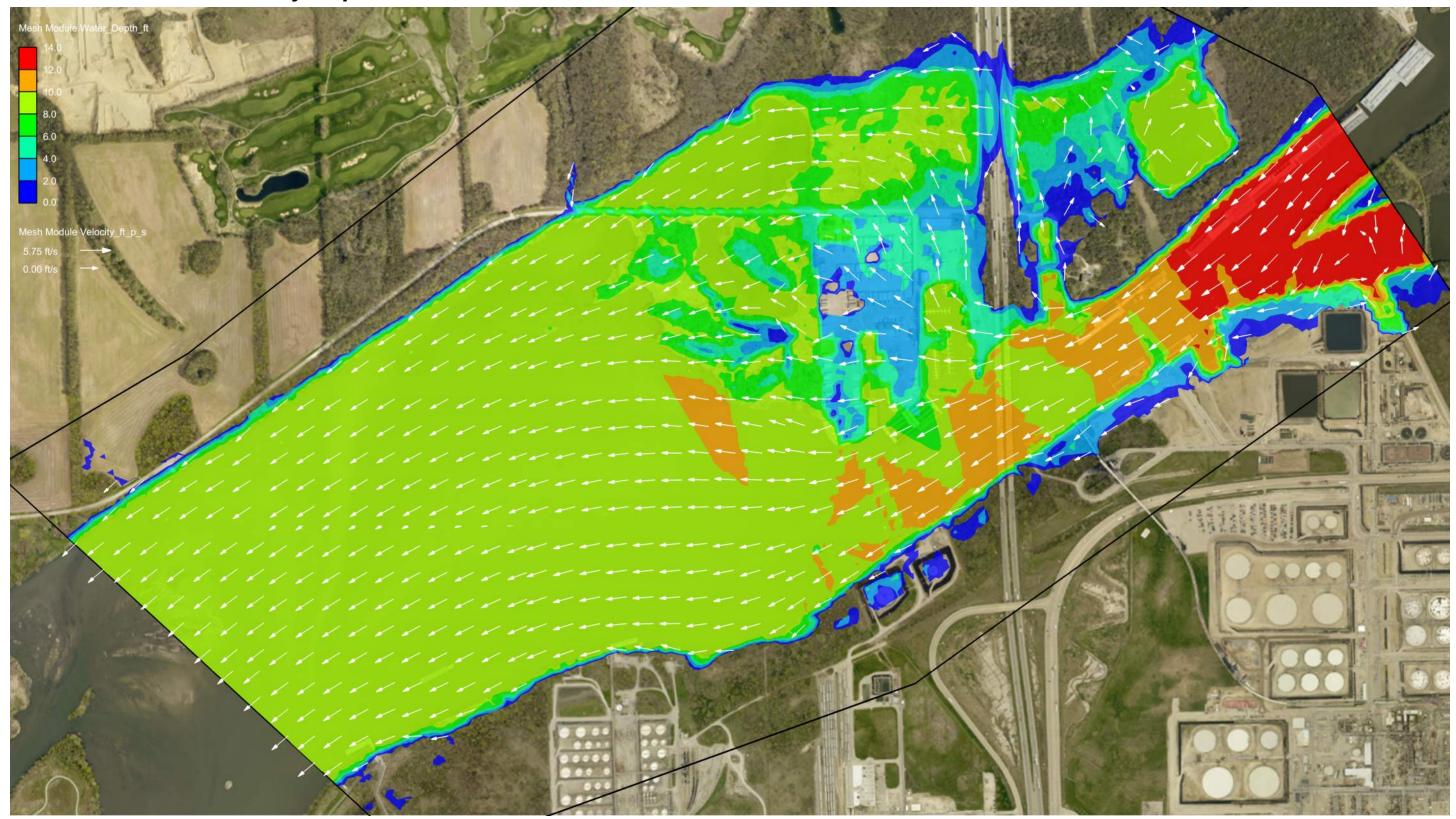
I-55 over Des Plaines River SMS Quick Check Model 100-Year Storm - Velocity/Depth Results



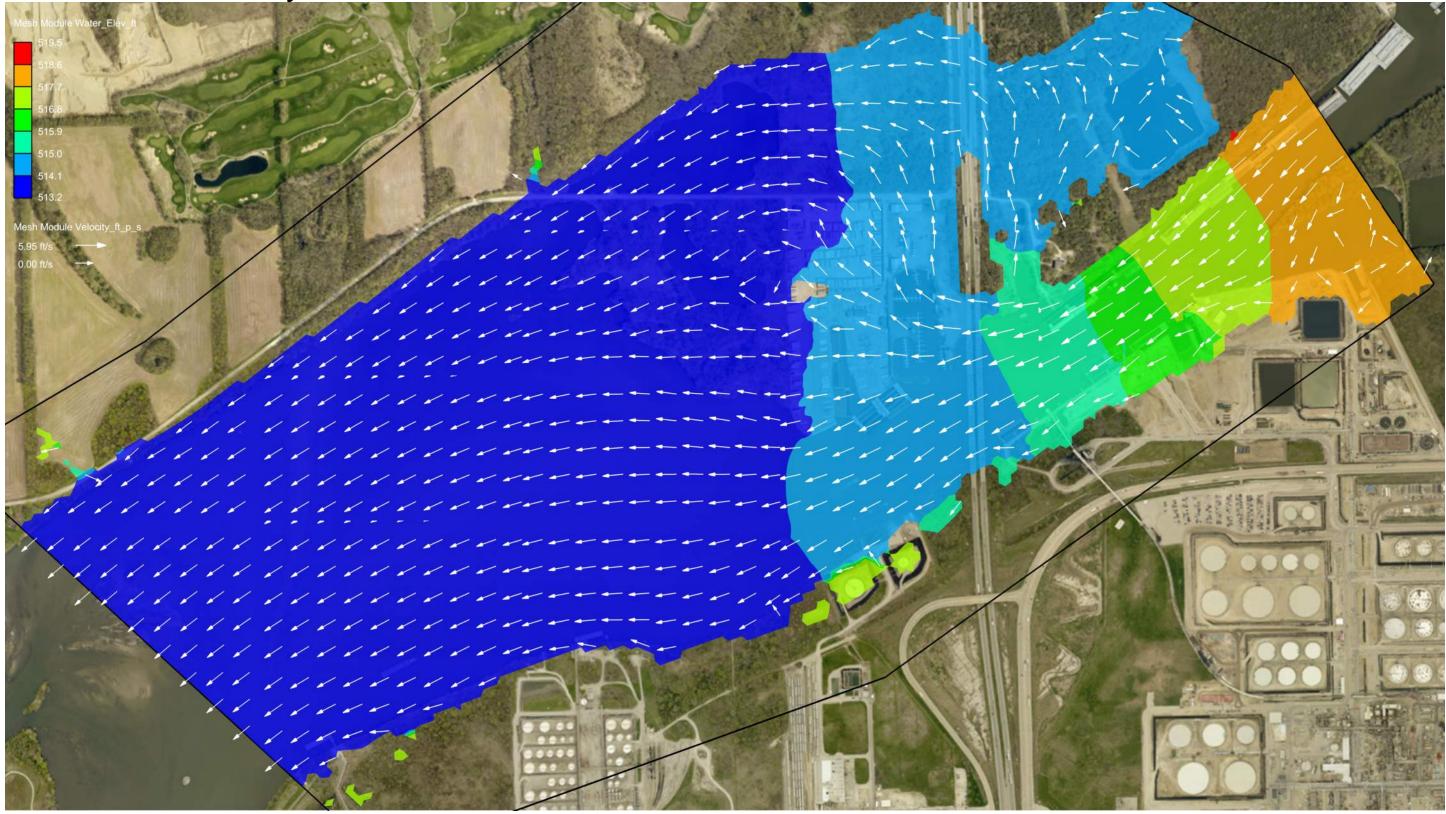
I-55 over Des Plaines River SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



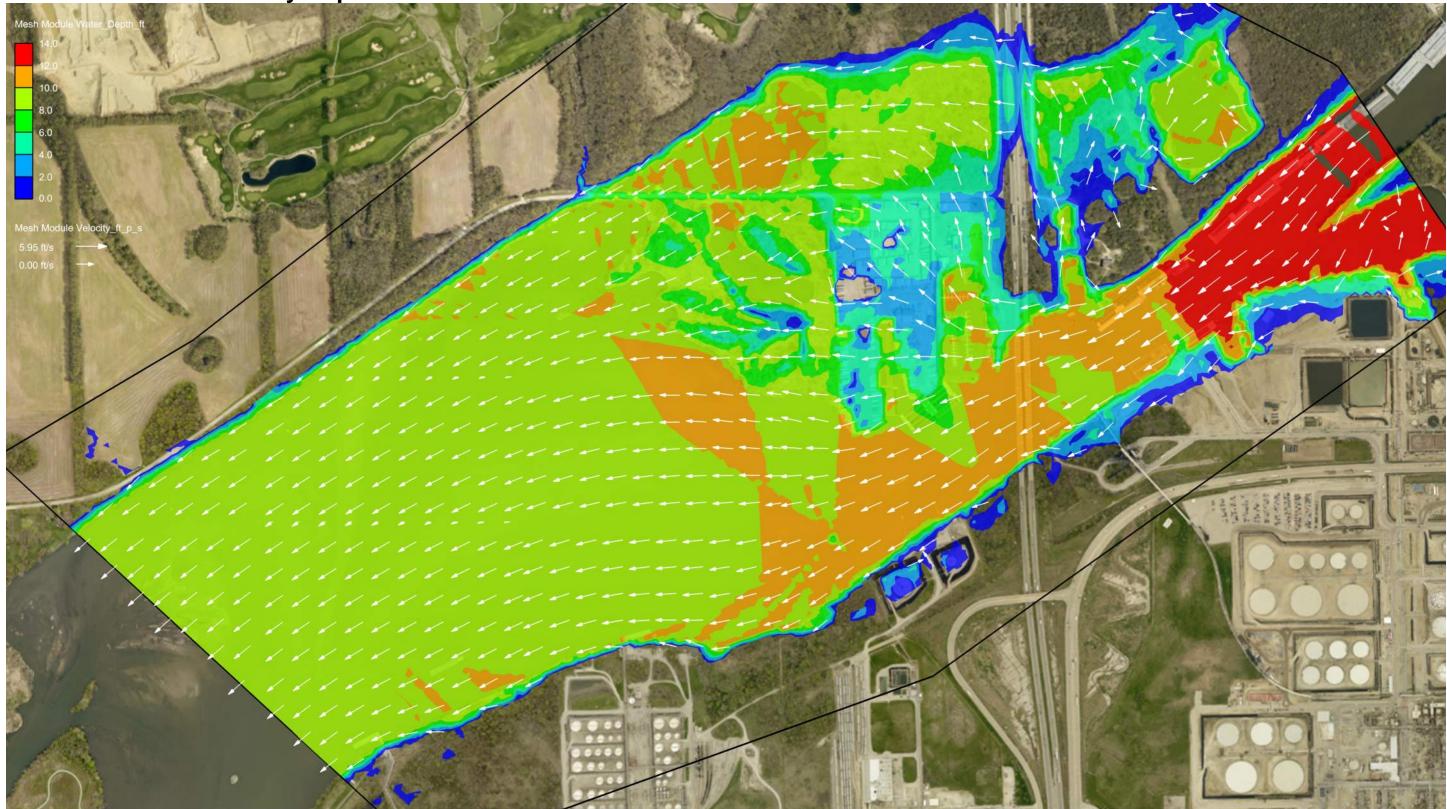
I-55 over Des Plaines River SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



I-55 over Des Plaines River SMS Quick Check Model 500-Year Storm - Velocity/Elevation Results



I-55 over Des Plaines River SMS Quick Check Model 500-Year Storm - Velocity/Depth Results







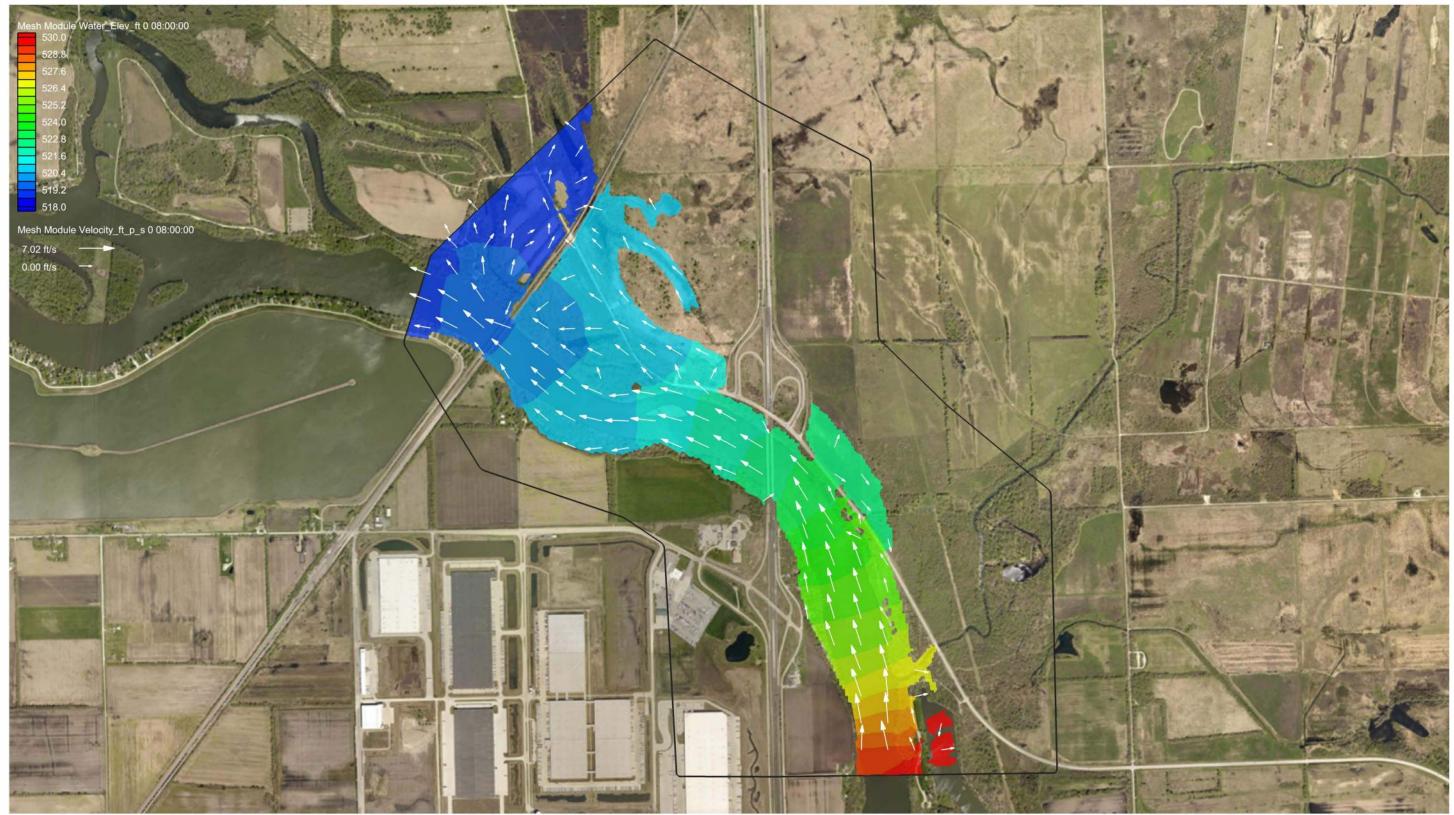
099-0001 (NB) and 099-0002 (SB) – I-55 over Kankakee River – District 1 – 12-span Dual Bridges 1,000 feet – FIS Hydrology

Date: 7/9/2021 County: Will Route: I-55 Watercourse: Ka ESN: 099-0001, 0 Drainage Area: 5	099-0002		000 acres)		S	Structure 7	∑ype: ⊠ E	Bridge □] Culvert	
Hydrology Method (check all that apply): ⊠FIS □StreamStats □HEC-HMS □TR-20 □Rational Method □Other: Discharges/ Flows										
Y	2	5	10	25	50	100	200	500		
Analyzed			\boxtimes		\boxtimes	\boxtimes	\boxtimes	\boxtimes		
BC ID:	29,840	39,999	42,500	57,845	71,000	78,000	80,902	86,000		
BC ID:			,		,	,				
BC ID:										
BC ID:										
	aphy/ Sur	face Data (check all t	hat apply)	:				I	
Source of Topography/ Surface Data (check all that apply): SMS LiDAR Bathymetry Cross Sections Text File LandXML Mesh Generator Coverage: Sections Sections Sections Sections Sections										
Mesh Name: 50_	\square Paving			Datahing						
Mesh Type: Vertices Spacing:	U			Patching						
Vertices Spacing: Max: 50 ft.; Min: 50 ft. Mesh Density (Elements/ Acre): 62,496 / 1557 = 40.1										
Monitor Lines & Points Coverage:Number of Monitor Lines: 4Number of Monitor Points: 0										
Materials Coverage: Manning's "n" Value used: 0.06										
Boundary Condit Number of BC A		rage:								
BC ID:	BC ID: 1 Type: ⊠Inlet-Q □Exit-H Location: S				n: <mark>S</mark>					
BC ID: 2	2 7	Гуре: 🗆	Inlet-Q	$\boxtimes Ex$	kit-H	Locatio	n: <mark>NW</mark>			
BC ID:	r	Гуре: 🗆	Inlet-Q	$\Box Ex$	kit-H	Locatio	n:			
BC ID:	r	Гуре: 🗆	Inlet-Q	$\Box Ex$	kit-H	Location:				
BC ID:	- -	Гуре: 🗆	Inlet-Q	$\Box Ex$	it-H	Locatio	n:			
Exit-H Channel C	Calculator	Normal De	epth Slope	(ft/ft): 0.0	00513	Source:		⊿ I ⊠FIS	Profile	
Model Control:Time Step (sec.): 5Simulations Length (hrs.): 8										
Output Method:	□Specifie	ed Frequen	cy □Spec	cified Time	es ⊠Simu	lation End	l □Unstea	ady Outpu	t	
Model Converger Time of Converg		rs.): 3								
Results: \Box Roadway Overtopping occurs between theY & YGhere Ratio (Mesh Density/ Time of Convergence): $40.1 / 3 = 13$										
Notes:										

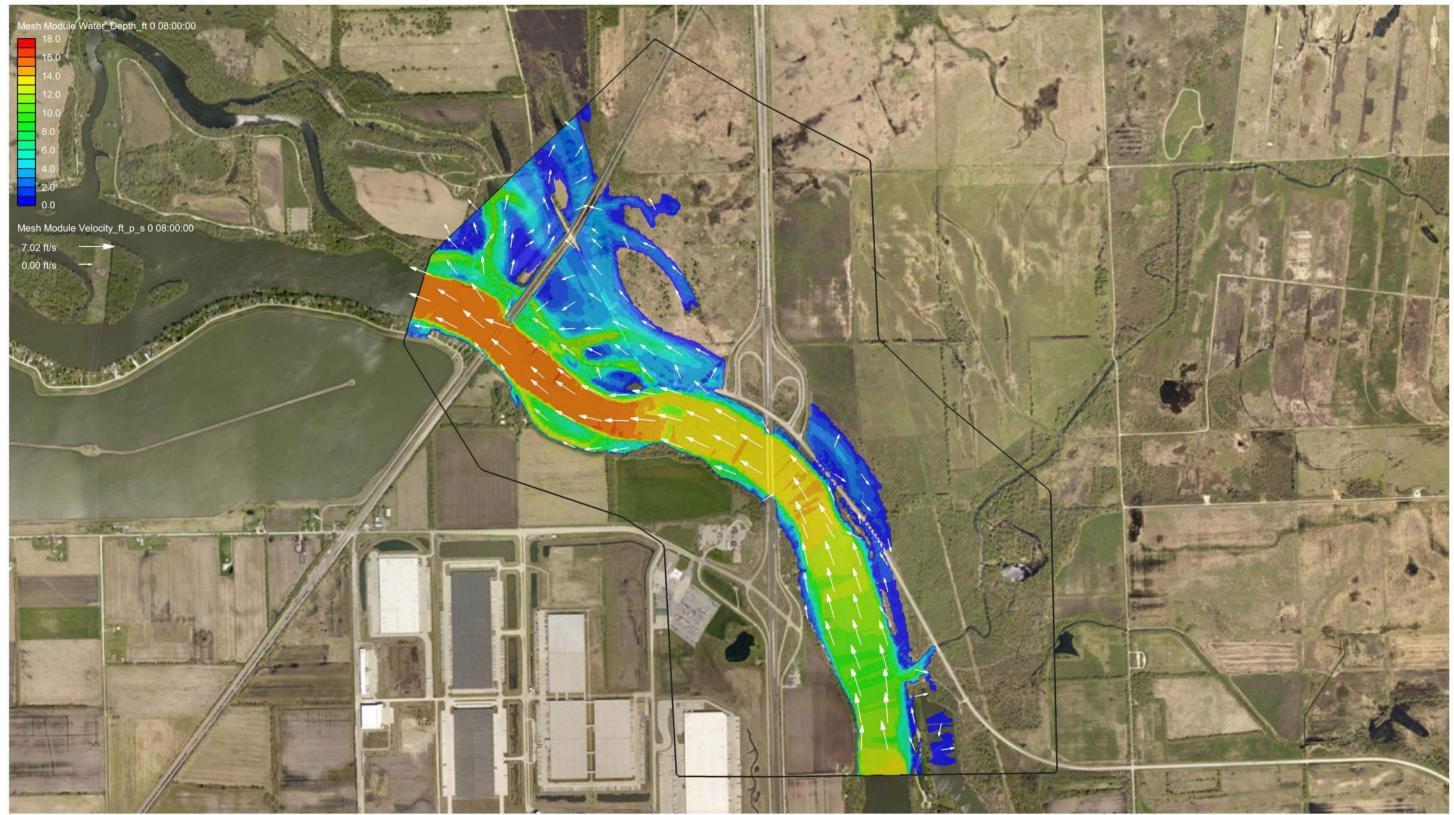
No overtopping occurs. A small area within the mesh boundary overlaps with the Des Plaines River floodplain. The model is showing higher stages than FIS due to n value assumptions and lack of channel bathymetry.

Revised: June 21, 2021

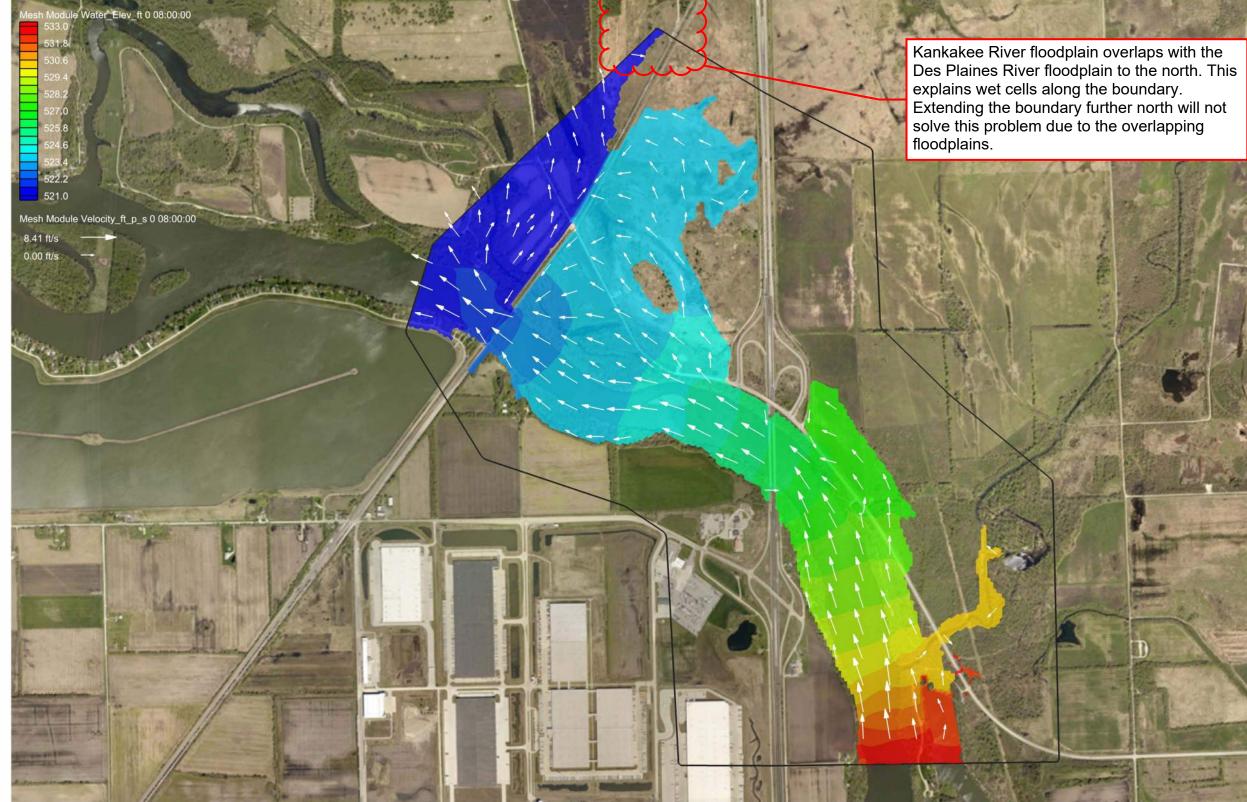
I-55 Over The Kankakee River SMS Quick Check Model 10-Year Storm - Velocity/Elevation Results



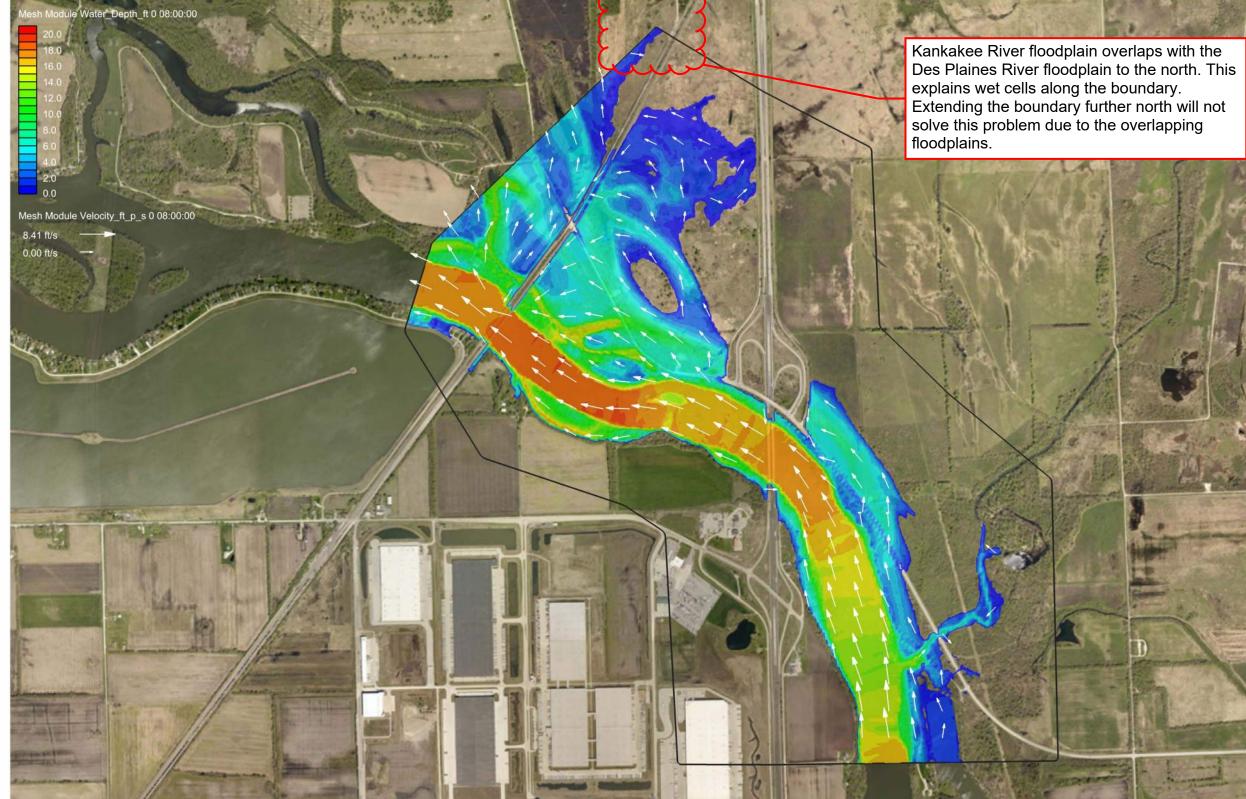
I-55 Over The Kankakee River SMS Quick Check Model 10-Year Storm - Velocity/Depth Results



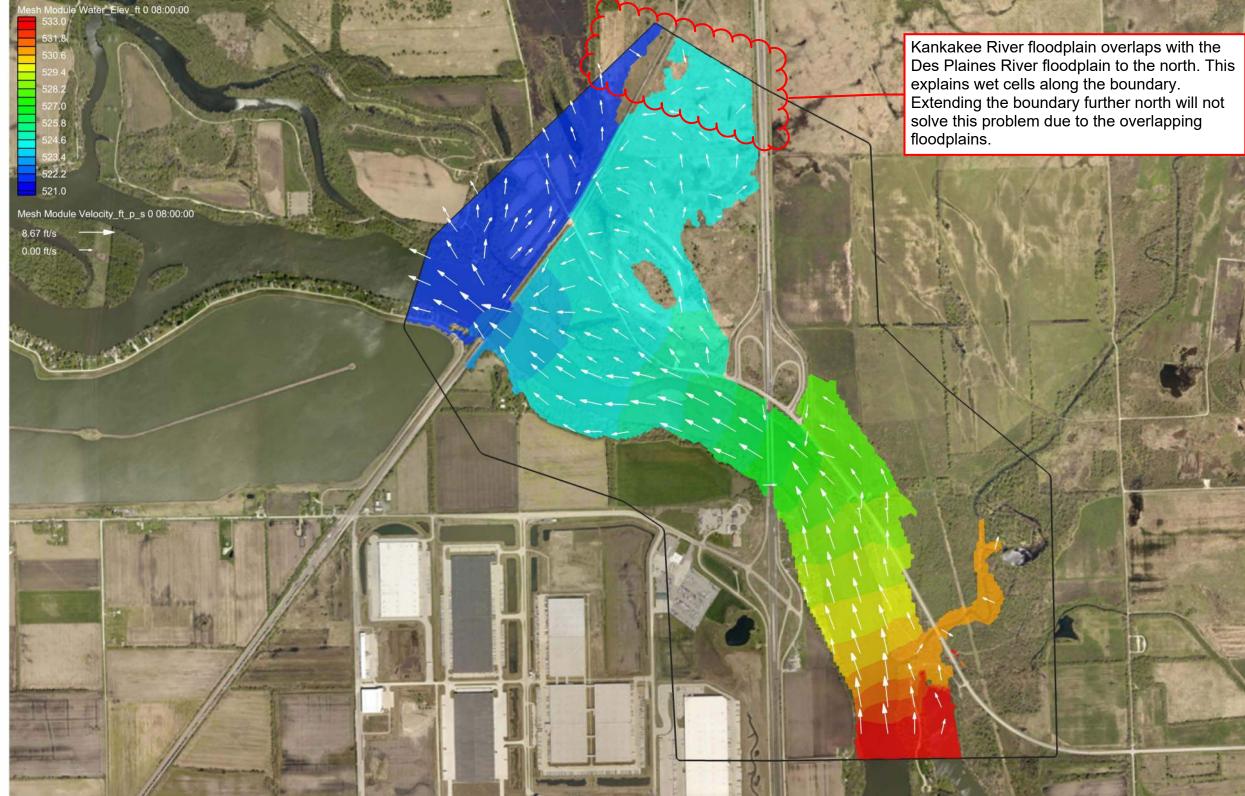
I-55 Over The Kankakee River SMS Quick Check Model **50-Year Storm - Velocity/Elevation Results**



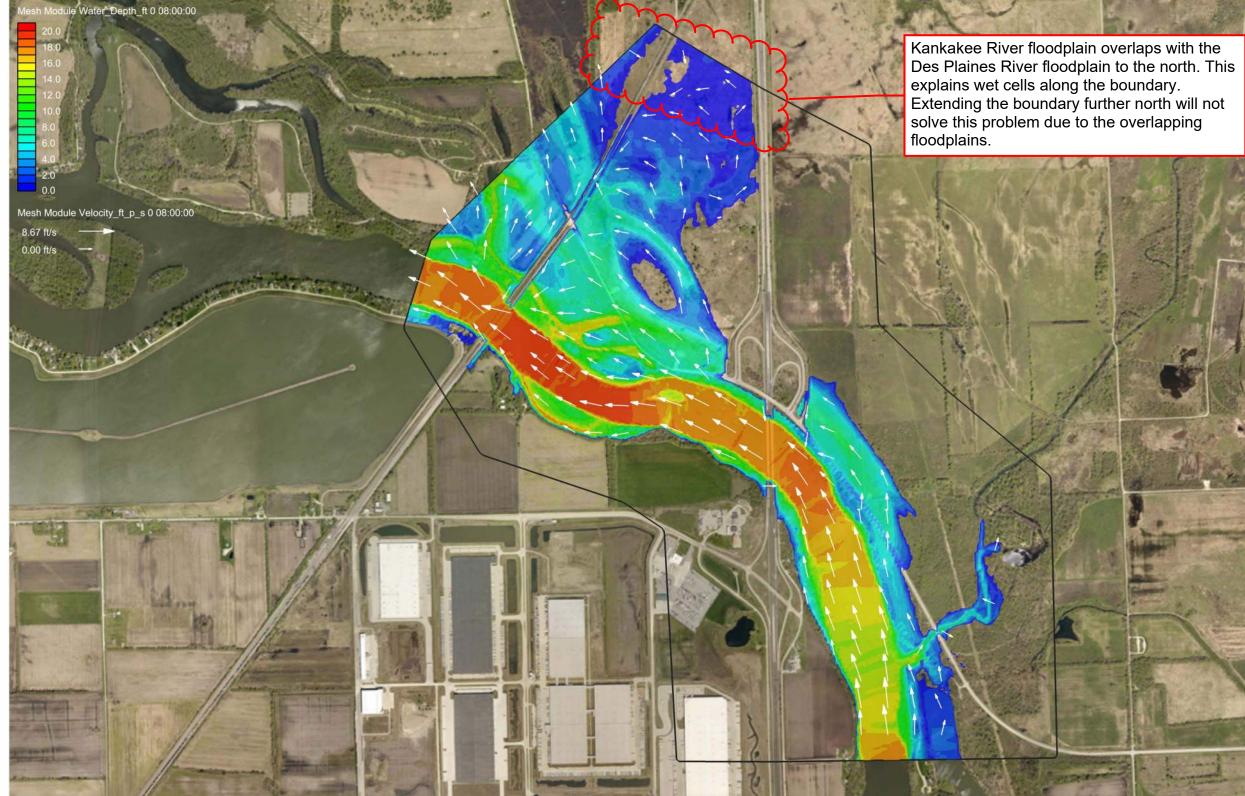
I-55 Over The Kankakee River SMS Quick Check Model 50-Year Storm - Velocity/Depth Results



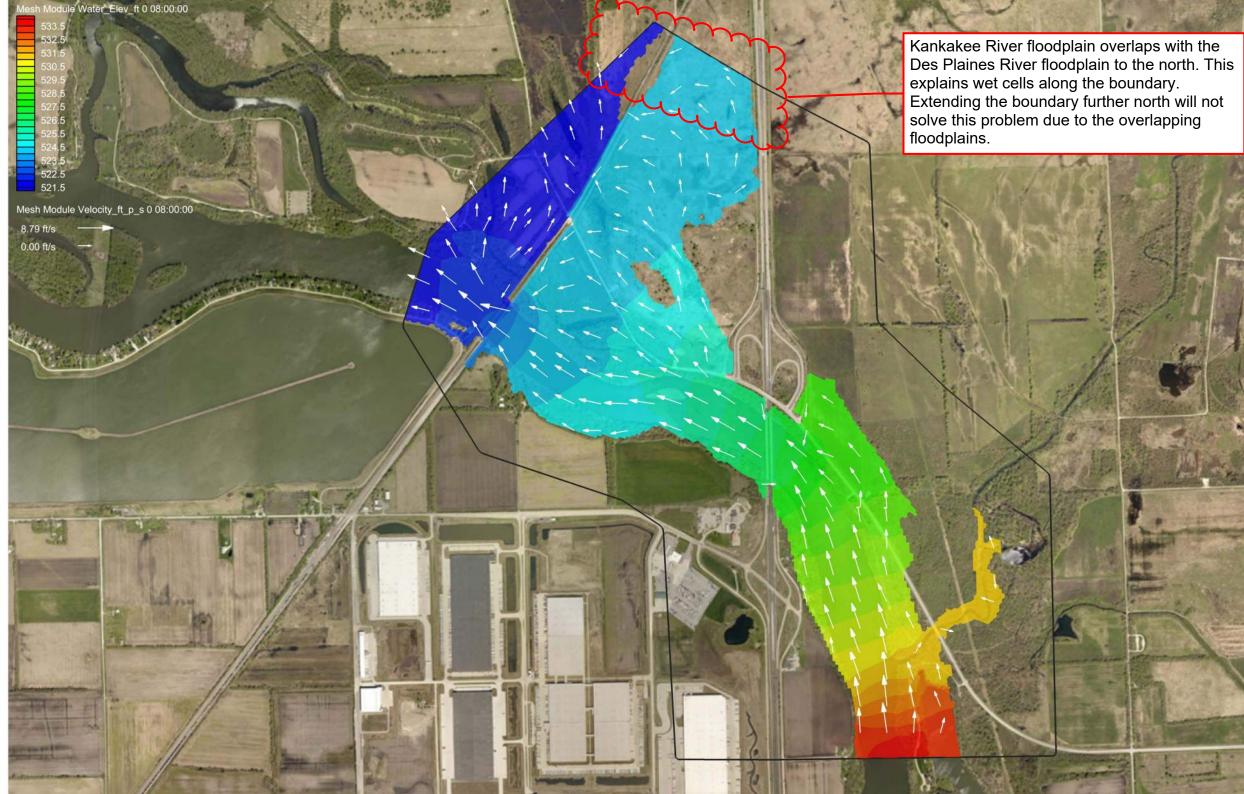
I-55 Over The Kankakee River SMS Quick Check Model **100-Year Storm - Velocity/Elevation Results**



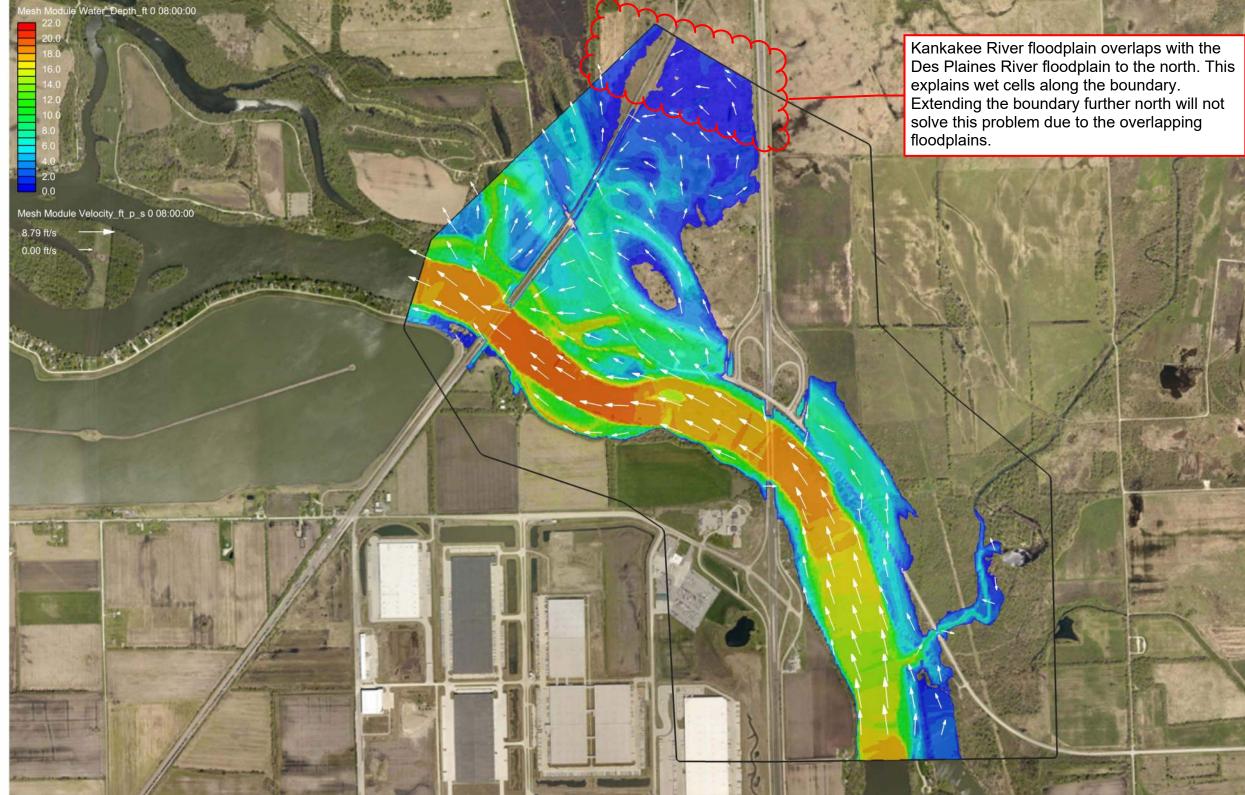
I-55 Over The Kankakee River SMS Quick Check Model **100-Year Storm - Velocity/Depth Results**



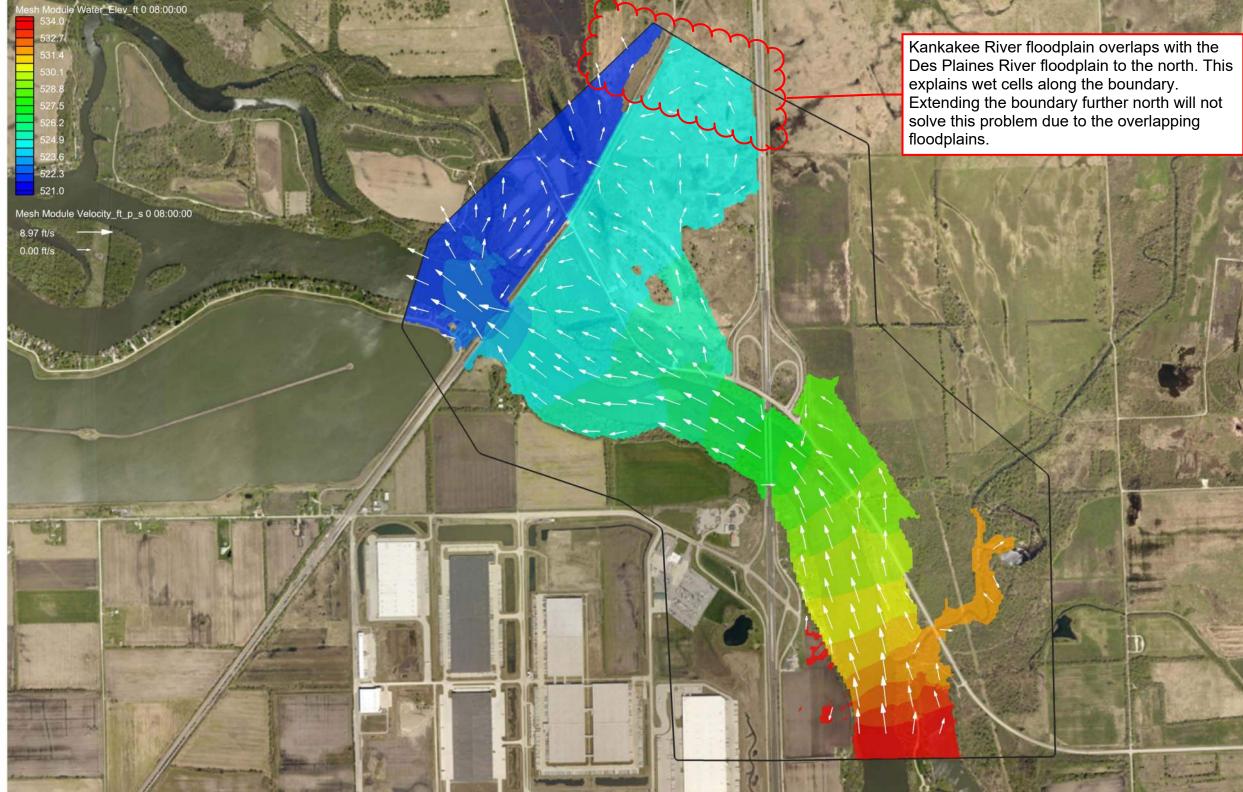
I-55 Over The Kankakee River SMS Quick Check Model 200-Year Storm - Velocity/Elevation Results



I-55 Over The Kankakee River SMS Quick Check Model 200-Year Storm - Velocity/Depth Results



I-55 Over The Kankakee River SMS Quick Check Model **500-Year Storm - Velocity/Elevation Results**



I-55 Over The Kankakee River SMS Quick Check Model 500-Year Storm - Velocity/Depth Results

