



Advanced Hydraulic Modeling through FHWA's EDC-5 Initiative

Erik J. Carlson, PE
MDOT Hydraulic Unit




What the heck is
EDC???

Every Day Counts

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[CAI Home](#) [Every Day Counts](#) [STIC Network](#) [AID Demonstration](#) [Resources](#)



On-Ramp to Innovation
every day counts

“The EDC-5 innovations support FHWA’s goals of enhancing safety, improving infrastructure, deploying innovation and serving America efficiently and effectively. We look forward to building on the success of past EDC cycles to expand adoption of proven innovations that save lives, money and time.”


- Acting Federal Highway Administrator
Brandye Hendrickson



[Learn more about Every Day Counts >>](#)

EDC Innovation of the Month:
**Collaborative Hydraulics:
Advancing to the Next Generation of Engineering (CHANGE)**
Next-generation hydraulic tools improve understanding of complex interactions between river or coastal environments and transportation assets.
[Learn more >>](#)

Better design and more efficient project delivery.



EDC Rounds

- [EDC-5 \(2019-2020\)](#)
- [EDC-4 \(2017-2018\)](#)
- [EDC-3 \(2015-2016\)](#)
- [EDC-2 \(2013-2014\)](#)
- [EDC-1 \(2011-2012\)](#)

EDC-4

Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE) – 2017 to 2018

- NHI 135095 (Two-dimensional Hydraulic Modeling of Rivers at Highway Encroachments) face to face training April 2017
- NHI 135095 A & B online training in Summer 2018
- Looking for test site locations

EDC-4

Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE) – 2017 to 2018

- SRH-2D is FHWA's preferred software, running through SMS.
- SMS is a proprietary software developed by AquaVeo.
- FHWA license – FHWA provides 'pro' version SMS licenses for all DOT's
- Reviewers license – Regulatory agencies can request a free 'full' version of SMS from Aquaveo. Reviewers must complete form from following link:

<http://www.aquaveo.com/regulatory-review>

EDC-4

Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE) – 2017 to 2018

Why not HEC-RAS 2D?
Currently has no capability to
model structures in 2D.



EDC-5

Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE) – 2019 to 2020

- Continuation of EDC-4
- Modeling specific locations
 - US-2 over the Big Cedar River
 - M-13/M-84 over the Saginaw River
 - US-2 over the Manistique River
 - US-127 over the Pine River
 - US-127 over the Chippewa River
 - M-35 over the Carp River

EDC-5

When should I use 2D modeling?



U.S. Department
of Transportation

Federal Highway
Administration



U.S. Department of Transportation
Federal Highway Administration

Publication No. FHWA-HIF-12-018
April 2012

Hydraulic Design Series Number 7

Hydraulic Design of Safe Bridges

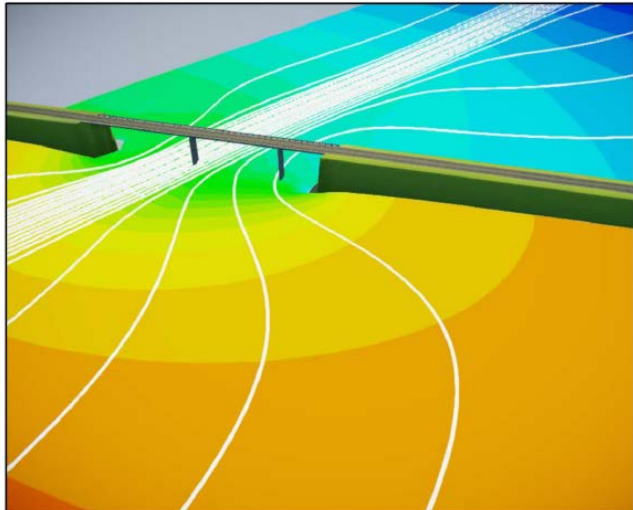


Table 4.1. Bridge Hydraulic Modeling Selection.

Bridge Hydraulic Condition	Hydraulic Analysis Method	
	One-Dimensional	Two-Dimensional
Small streams	●	▶
In-channel flows	●	▶
Narrow to moderate-width floodplains	●	▶
Wide floodplains	▶	●
Minor floodplain constriction	●	▶
Highly variable floodplain roughness	▶	●
Highly sinuous channels	▶	●
Multiple embankment openings	▶/○	●
Unmatched multiple openings in series	▶/○	●
Low skew roadway alignment (<20°)	●	▶
Moderately skewed roadway alignment (>20° and <30°)	▶	●
Highly skewed roadway alignment (>30°)	○	●
Detailed analysis of bends, confluences and angle of attack	○	●
Multiple channels	▶	●
Small tidal streams and rivers	●	▶
Large tidal waterways and wind-influenced conditions	○	●
Detailed flow distribution at bridges	▶	●
Significant roadway overtopping	▶	●
Upstream controls	○	●
Countermeasure design	▶	●
● well suited or primary use		
▶ possible application or secondary use		
○ unsuitable or rarely used		
▶/○ possibly unsuitable depending on application		

Advanced Survey

- Some of our Consultants have the capability of delivering single and multibeam bathymetry
- MDOT currently has a research project looking at purchasing our own bathymetric equipment.
- Ability to essentially map the stream bottom in high definition.

Advanced Survey



Advanced Survey

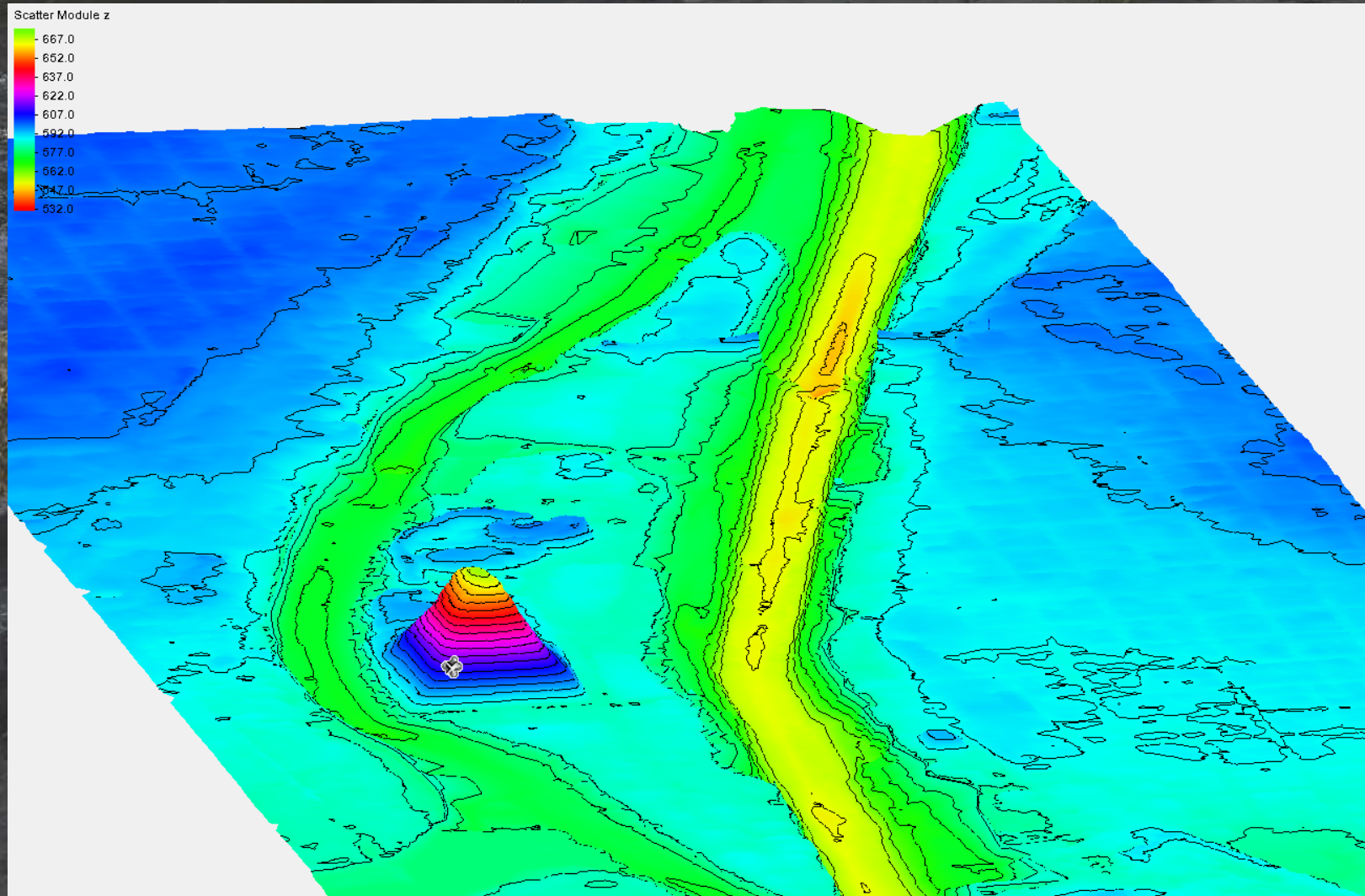


Advanced Survey

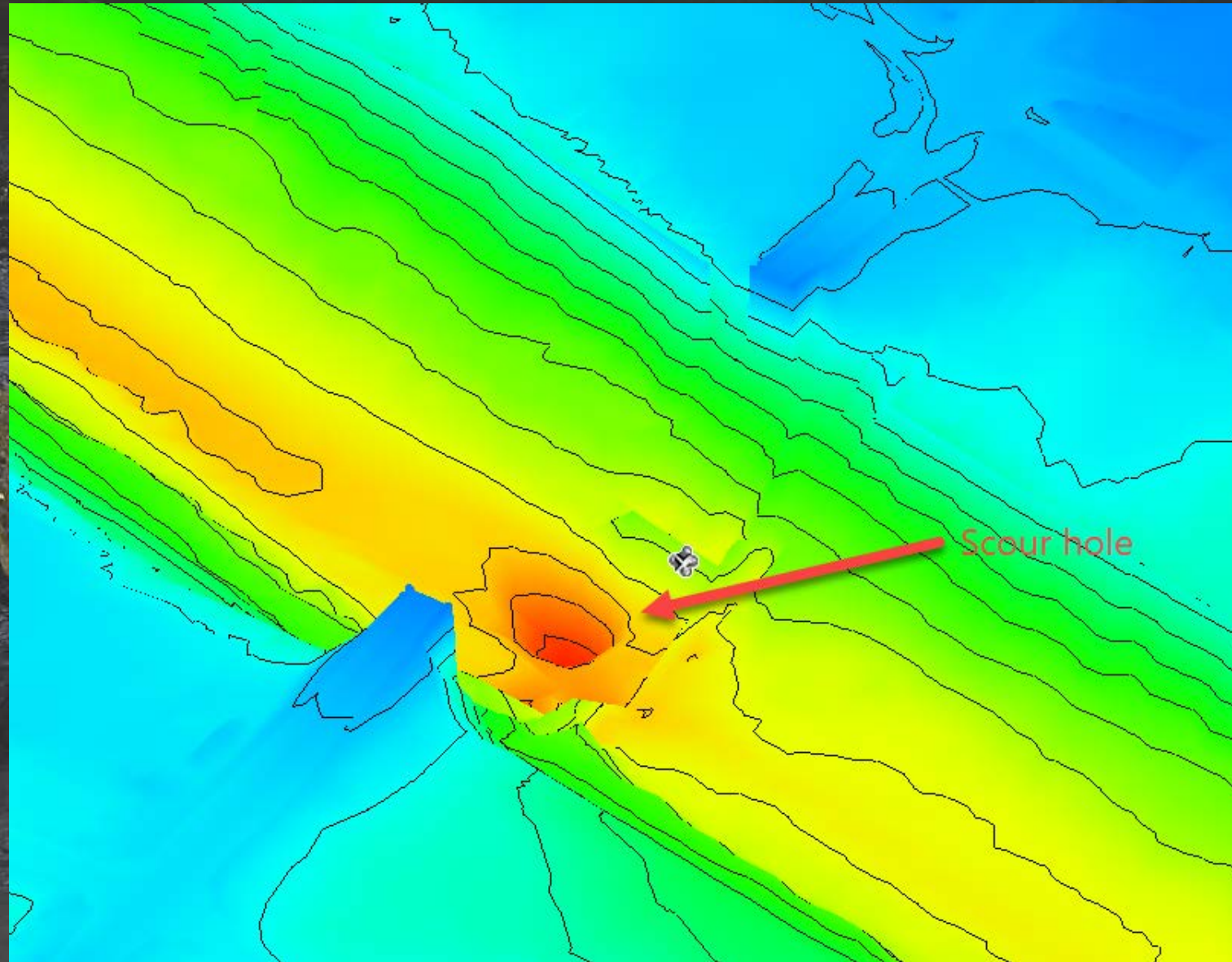
- LIDAR available in some locations of the state.
- Need to investigate further, as we have noticed discrepancies between hard survey and LIDAR.

<https://viewer.nationalmap.gov/basic/>

SMS Models



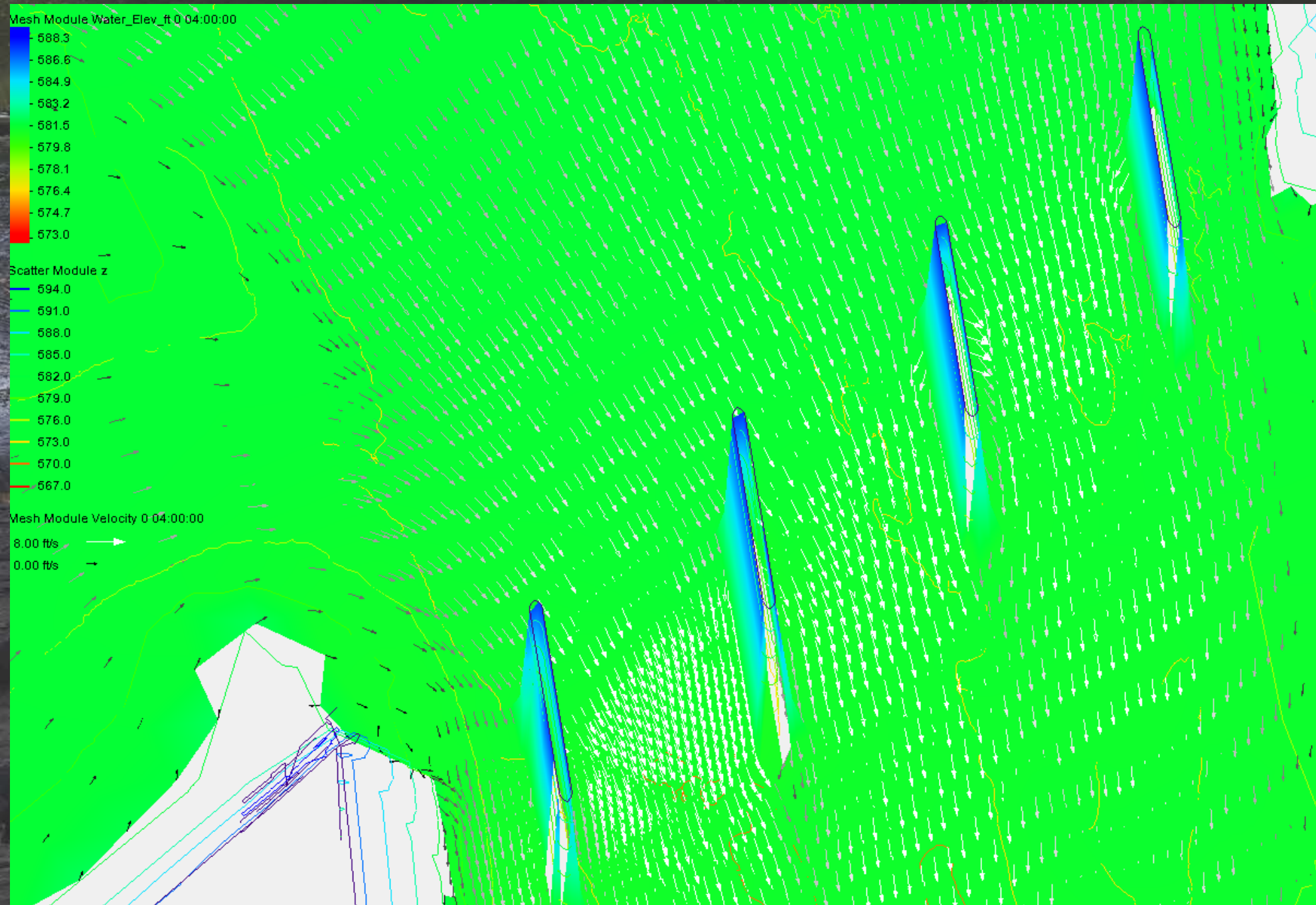
SMS Models



SMS Models

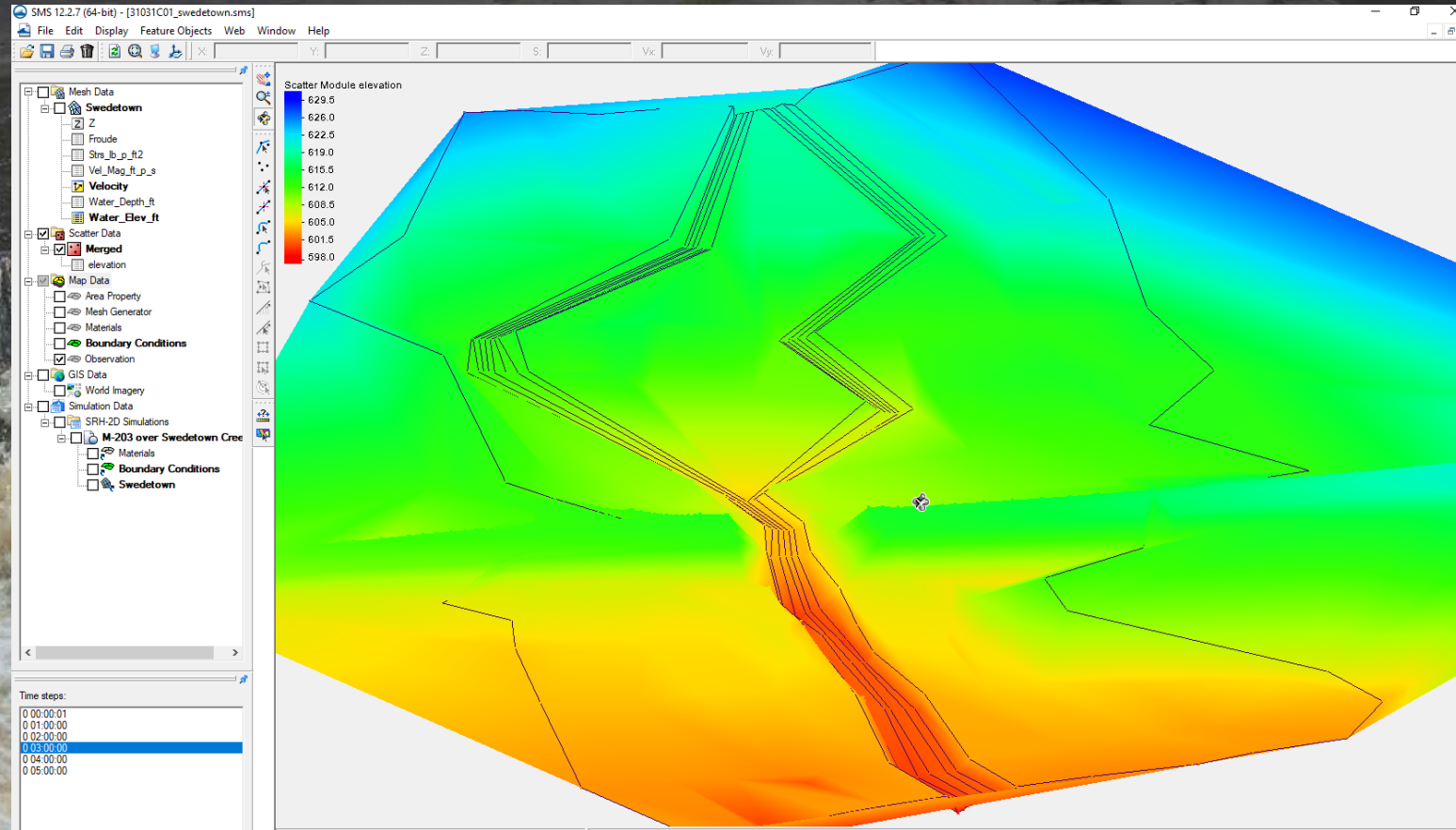






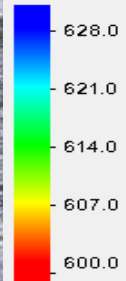
SMS Models

- Can be developed from traditional survey
- Additional breaklines needed

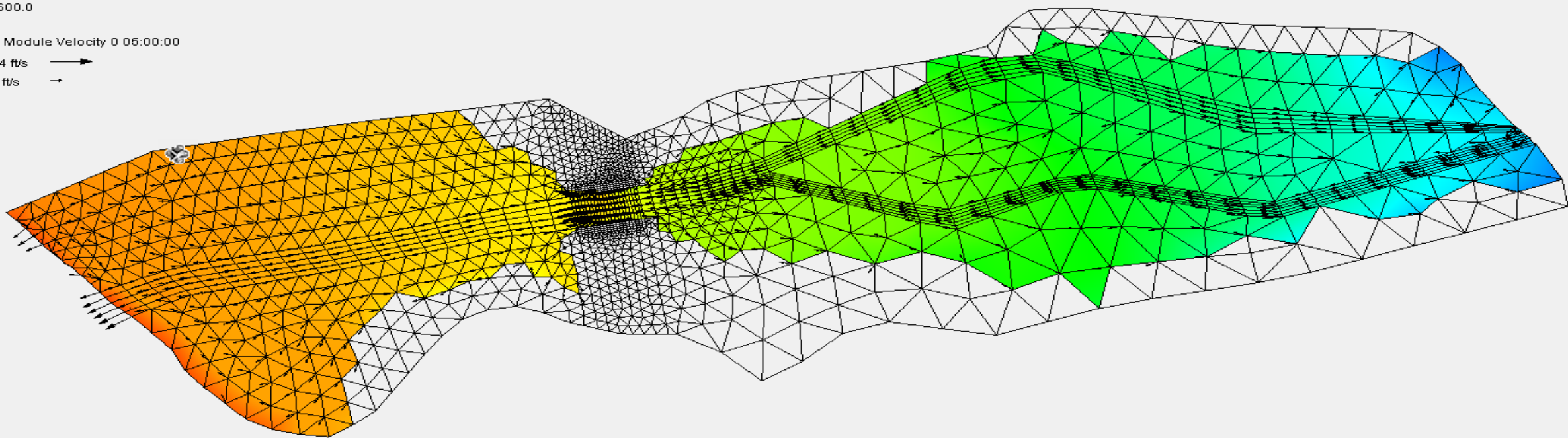
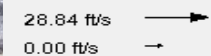


SMS Models

Mesh Module Water_Elev_ft 0 05:00:00



Mesh Module Velocity 0 05:00:00



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SMS Resources

- FHWA's Resource Center hosts a bi-monthly webinar on 2D modeling topics
- Past webinars can be viewed here:

<https://connectdot.connectsolutions.com/modelingusersforum/>

EDC-5

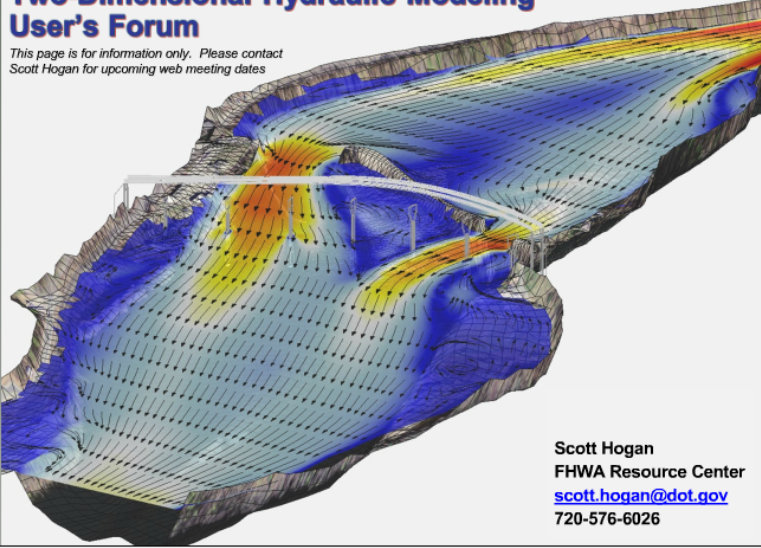
Recordings for all the past web meetings are available above on the right and the corresponding presentation slides can be downloaded from the file share on the lower right.

This Adobe room is no longer used for the live web forum meetings. It is only maintained as a resource for recordings and other information.

2D Modeling Forum Title Page .pptx

Two-Dimensional Hydraulic Modeling User's Forum

This page is for information only. Please contact Scott Hogan for upcoming web meeting dates



Scott Hogan
FHWA Resource Center
scott.hogan@dot.gov
720-576-6026

Additional resources

Name	Size
Guide_on_Unsteady_Flow_Modeling_with_SRH-2D.pdf	457 KB
Exporting SMS Scatter Data sets into Microstation Geopak 031918.docx	492 KB
Exporting SMS Scatter Data sets into Microstation OpenRoads 031918.docx	746 KB
HoganPaletteSMS122.pal	1 KB
Importing breakline and TIN data from Microstation Geopak and Inroads into SMS Scatter Data sets 091117_1192830377.docx	561 KB
In-Stream_Structure_Modeling.pdf	2 MB
Manual-SRH2D-v2.pdf	2 MB

Download File(s)

Web Links 2

- NHI Course 135095
- FHWA Hydraulics Page
- SRH-2D / SMS Tutorials
- SRH-2D Information
- SMS Free Reviewers License
- 3/24/15 Kickoff Meeting Recording
- 4/22/15 Meeting Recording - Pressure Flow
- 5/27/15 Meeting Recording - HY-8 Culverts
- 7/15/15 Meeting Recording - SRH-2D Model Development
- 8/26/15 Meeting Recording - Managing data and reviewing results
- 2/17/16 Meeting Recording - New SRH-2D/SMS Features
- 4/27/16 Meeting Recording - Mesh Development
- 6/15/16 Meeting Recording - Using Lidar and Data Filtering
- 10/6/16 Meeting Recording - Mesh Development for Bridges
- 2/2/17 Meeting Recording - 2D Modeling and Bridge Scour Analysis
- 4/19/17 Meeting Recording - 2D Modeling Boundary Conditions
- 6/21/17 Meeting Recording - Developing Terrain Data

Browse To

Meeting presentation slides

Name	Size
2016-02-17 2D Modeling Users Forum Meeting.pdf	4 MB
2017-10-18 2D Modeling Users Forum Meeting.pdf	4 MB
2018-01-25-18 Meeting - CDOT Modeling Experience.pdf	14 MB
2018-05-31 2D Modeling Users Forum Meeting - Bridge and Culvert Best Practices.pdf	3 MB
2015-05-27 2D Modeling Users Forum Meeting.pdf	754 KB
2015-04-22 2D Modeling Users Forum Meeting.pdf	954 KB
2017-04-19 2D Modeling Users Forum Meeting.pdf	7 MB
2016-10-06 2D Modeling Users Forum Meeting.pdf	14 MB
2018-03-01 2D Modeling Users Forum Meeting - UAV Mapping.pdf	41 MB
2017-08-31 2D Modeling Users Forum Meeting.pdf	5 MB
2015-07-15 2D Modeling Users Forum Meeting.pdf	774 KB
2016-04-27 2D Modeling Users Forum Meeting.pdf	7 MB
2016-06-15 2D Modeling Users Forum Meeting.pdf	6 MB

Download File(s)

Attendee List (1)

Active Speakers

Hosts (0)

Presenters (0)

Participants (1)

Guest

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SMS Resources

- FHWA's Everyday Counts:

<https://www.fhwa.dot.gov/innovation/everydaycounts/2d-hydraulic-forum.cfm>

- Youtube videos:

https://www.youtube.com/playlist?list=PLzyvhl2SQscw-_eRs2x9-yVhgvE8CKfcP

- User Manuals:

[https://www.xmswiki.com/wiki/SMS:Workflows Overview](https://www.xmswiki.com/wiki/SMS:Workflows_Overview)

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Questions?



Erik J. Carlson, PE

carlsone2@Michigan.gov

517-335-1919