



U.S. Department  
of Transportation

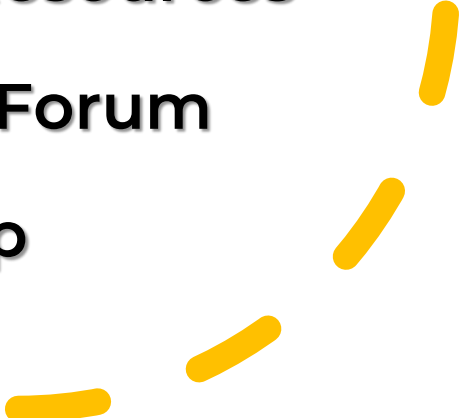
**Federal Highway  
Administration**

**2D Hydraulic Modeling User's Forum**

# **SMS/SRH-2D Hydraulic Modeling Resources**

**Updated 4/2024**

## **Overview of FHWA 2D Hydraulic Modeling Resources**

- **Software download and licensing**
  - **NHI Training Courses**
  - **2D Hydraulic Modeling Reference Document**
  - **SMS Wiki Page**
  - **2D Modeling Tutorials**
  - **YouTube 2D Hydraulic Modeling Videos**
  - **SRH-2D Sediment Transport Resources**
  - **2D Hydraulic Modeling User's Forum**
  - **FHWA Bridge Scour Workshop**
- 

# Software Download and Licensing

## SMS Downloads

### SMS Current Release

Software Title	Build Date	File Size
<a href="#">SMS 13.3.10 (64-bit)</a>   <a href="#">Release Notes</a>	22Mar24	781MB
<a href="#">SMS Tutorials</a>	3Aug23	5.5GB

## Request Software License

In order to acquire a license to one of our software titles, please choose from one of the following options. If you need further assistance, please contact us.

Sales and Licensing Support  
Phone: +1 (801) 691-5528  
Email: [licensing@aquaveo.com](mailto:licensing@aquaveo.com)

Purchase

- Purchase a commercial license

Evaluate

- Evaluate a complete version of our software

Govt. License

(FHWA or USACE)

- Request a sponsored license (for specific government agencies)

Request

Community

Beginning with SMS 13.0, the software runs in Community mode by default and does not require a license code. Simply download and install SMS 13.0 or higher to utilize the Community Edition.

- Review [website](#) for current release and notes
- Community license (free to all)
  - No license code needed
  - **Includes all features needed to perform SRH-2D simulations (new features added)**
- Pro-version
  - Request/Renew from SMS Menu: *Help* → *Register* → *Request License*
  - Includes technical support
  - DOT/FHWA staff contact [scott.hogan@dot.gov](mailto:scott.hogan@dot.gov) or [laura.Girard@dot.gov](mailto:laura.Girard@dot.gov)
  - All others contact [support@Aquaveo.com](mailto:support@Aquaveo.com)
- **Reviewers License – Pro-Version**
  - Complete [form](#) and Contact Aquaveo

# 2D Hydraulic Modeling Reference Document

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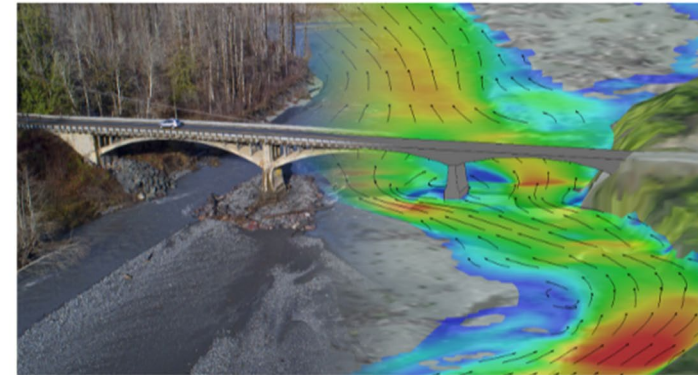
- [2D Hydraulic Modeling for Highways in the River Environment](#)
- Modeling fundamentals
- Data requirements
- Model development
- Model review and calibration
- SMS/SRH-2D User Interface
- Sample report outline
- Survey request form

Publication No. FHWA-HIF-19-061  
October 2019

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## Two-Dimensional Hydraulic Modeling for Highways in the River Environment

Reference Document



U.S. Department of Transportation  
**Federal Highway Administration**

# NHI Training Courses

- In-person training (NHI [Course 135095](#))
- Virtual training available (NHI [Course 135095V](#))
- Virtual Training (NHI [Course 135095A](#))  
SRH-2D Model Data files, Diagnostics & Verifying 2D Model Results
- Virtual Training (NHI [Course 135095B](#))  
Model Terrain Development with Various Data Sources

The screenshot displays the NHI Training Courses website interface. The top navigation bar includes the NHI logo, 'Login', 'My Training', 'My Profile', 'Checkout', 'Home', 'Contact', and 'Help'. The main content area is titled 'Course Search' and features a search bar with options for 'SEARCH FOR COURSES', 'SEARCH FOR SCHEDULED SESSIONS', 'QUICK SEARCH', and 'DOWNLOAD CATALOG'. Below the search bar, there are buttons for 'Return To Search Results' and 'Show Search Criteria'. The course details for 'Two-Dimensional Hydraulic Modeling of Rivers at Highway Encroachments' are shown, including the program area (Hydraulics), course number (FHWA-NHI-135095), and training level (Intermediate). A table lists the course details for the year 2023, showing a length of 3 days, 2.1 CEU units, and a host price of \$850 per participant. The course description includes a note about virtual alternatives and a detailed overview of the course content.

**Course Search**

Search for courses based on delivery type, program area, or topic below, or find upcoming trainings in your state or territory. For more information on trainings from the National Highway Institute, contact us.

**SEARCH FOR COURSES** | **SEARCH FOR SCHEDULED SESSIONS** | **QUICK SEARCH** | **DOWNLOAD CATALOG**

**Return To Search Results** | **Show Search Criteria**

**JUMP TO:** Course Information | Outcomes | Target Audience | Session Information

**Course Description**

*Two-Dimensional Hydraulic Modeling of Rivers at Highway Encroachments*

**PROGRAM AREA:** Hydraulics  
**COURSE NUMBER:** FHWA-NHI-135095  
**Instructor-led Training (ILT)**

Calendar Year	Length	CEU	Host Price
2023	3 Days	2.1 Units	\$850 Per Participant

**TRAINING LEVEL:** Intermediate  
**CLASS SIZE:** Minimum: 20 Maximum: 30  
**COURSE DESCRIPTION:**

Please Note: NHI offers a virtual alternative to the ILT Course 135095. To register for the virtual option, search the Course Number "135095V".

Two-Dimensional Hydraulic Modeling of Rivers at Highway Encroachments (135095) provides participants with instruction to understand and appropriately apply 2D hydraulic models of rivers in highway encroachment situations.

The course focuses on the use and application of the SRH-2D model, developed by the US Bureau of Reclamation (USBR) and sponsored by the USBR and FHWA. Modeling principles and techniques will be presented using the latest version of the Surface Water Modeling System (SMS), a graphical pre-and post-processor for several 2D modeling engines, including SRH-2D. Specific lesson topics include model terrain

# Online SMS Wiki Page and Other Resources

- [SMS Workflows Overview](#)
- [Table of SRH-2D Errors and Solutions](#)
- [SMS Blog](#)

General Workflows	SRH-2D Workflows
<a href="#">3D Bridge</a>	<a href="#">SRH-2D Project</a>
<a href="#">Annotations</a>	<a href="#">SRH-2D BD Data</a>
<a href="#">Animation</a>	<a href="#">SRH-2D Boundary Conditions</a>
<a href="#">Breaklines</a>	<a href="#">SRH-2D Culvert</a>
<a href="#">Bridge Scour</a>	<a href="#">SRH-2D Gate</a>
<a href="#">CAD Data</a>	<a href="#">SRH-2D Monitor Points</a>
<a href="#">Cartesian Grid Creation</a>	<a href="#">SRH-2D Obstructions</a>
<a href="#">Compute Volumes</a>	<a href="#">SRH-2D Pressure Flow Bridge</a>
<a href="#">Cross Sections</a>	<a href="#">SRH-2D Pressure Flow with 3D Bridges</a>
<a href="#">Data Visualization</a>	<a href="#">SRH-2D Post-Processing</a>
<a href="#">Digitize</a>	<a href="#">SRH-2D Sediment Transport</a>
<a href="#">Display Options</a>	<a href="#">SRH-2D Simulation</a>
<a href="#">Display Themes</a>	<a href="#">SRH-2D Summary Reports</a>
<a href="#">Element Patch Workflow</a>	<a href="#">Summary Table</a>
<a href="#">Export Data</a>	<a href="#">SRH-2D Weir</a>
<a href="#">Extract Features</a>	<a href="#">SRH-2D Advanced Simulation Tools</a>
<a href="#">Fast Floodplain</a>	
<a href="#">Feature Stamping</a>	
<a href="#">Floodway Delineation</a>	
<a href="#">GIS Data</a>	
<a href="#">Images</a>	
<a href="#">Import Data</a>	
<a href="#">Import Online Data</a>	
<a href="#">Import Spectra</a>	
<a href="#">Lidar</a>	
<a href="#">Mesh Creation</a>	
<a href="#">Mesh Editing</a>	
<a href="#">Multiple Elevation Sources</a>	
<a href="#">Observations</a>	

# 2D Modeling Tutorials

- [Tutorial Link](#)
- Over 75 SMS/SRH-2D Tutorials, including:
  - Data importing, processing, and conversions
  - Raster data features and tools
  - Display and Visualizations
  - Mesh development tools
  - Culverts and other 1D hydraulic structures
  - Bridge and culvert pressure flow
  - Floodway tools
  - Sediment transport
  - Calibration and advanced simulations

General SMS Tutorials	
Title	SMS 13.2
Overview	<a href="#">PDF</a> <a href="#">Data</a>
2D Summary Table	<a href="#">PDF</a> <a href="#">Data</a>
3D Bridge	<a href="#">PDF</a> <a href="#">Data</a>
Annotated Cross Sections	<a href="#">PDF</a> <a href="#">Data</a>
Bridge Meshing	<a href="#">PDF</a> <a href="#">Data</a>
Bridge Scour	<a href="#">PDF</a> <a href="#">Data</a>
Bridge Scour Scenarios	<a href="#">PDF</a> <a href="#">Data</a>
Cell-Centered Grid	<a href="#">PDF</a> <a href="#">Data</a>
Cross Section	<a href="#">PDF</a> <a href="#">Data</a>
Cross Section to Surface	<a href="#">PDF</a> <a href="#">Data</a>
Data Visualization	<a href="#">PDF</a> <a href="#">Data</a>
Dataset Toolbox	<a href="#">PDF</a> <a href="#">Data</a>
Datasets to Rasters	<a href="#">PDF</a> <a href="#">Data</a>
Display Themes	<a href="#">PDF</a> <a href="#">Data</a>
Display Themes – Additional	<a href="#">PDF</a> <a href="#">Data</a>
Display Themes – Vector	<a href="#">PDF</a> <a href="#">Data</a>
Extract Features	<a href="#">PDF</a> <a href="#">Data</a>
Extract Features for Mesh Generation	<a href="#">PDF</a> <a href="#">Data</a>
Fast Floodplain	<a href="#">PDF</a> <a href="#">Data</a>
Feature Stamping	<a href="#">PDF</a> <a href="#">Data</a>
Floodway Methods	<a href="#">PDF</a> <a href="#">Data</a>
Floodway Delineation – Equal Conveyance	<a href="#">PDF</a> <a href="#">Data</a>
Floodway Delineation – Unit Q	<a href="#">PDF</a> <a href="#">Data</a>
GIS	<a href="#">PDF</a> <a href="#">Data</a>
Google Earth	<a href="#">PDF</a> <a href="#">Data</a>
Grid Generation	<a href="#">PDF</a> <a href="#">Data</a>
Import From Web	<a href="#">PDF</a> <a href="#">Data</a>
Importing Spectral Data	<a href="#">PDF</a> <a href="#">Data</a>

	SRH-2D	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Boundary Conditions	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Bridge Pressure Flow	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Culvert Structures	
	SRH-2D Culvert Structures with HY-8	* <a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Gates	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Obstructions	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Post-Processing	* <a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Pressure Flow with 3D Bridges	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Reports	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Simulations	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Adv. Simulations – Calibration	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Adv. Simulations – Calibration Mannings	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Adv. Simulations – Scenarios	<a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Weir Flow	* <a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Sediment Transport	* <a href="#">PDF</a> <a href="#">Data</a>
	SRH-2D Cohesive Sediment Transport	* <a href="#">PDF</a> <a href="#">Data</a>

SRH-2D

# Short YouTube Training Videos – 2D Hydraulic Modeling

- 2017 [Videos](#) (11)
- 2020/2023 [Videos](#) (12) **NEW!**
- Other [SMS Learning Videos](#)
- NHI 2D Hydraulic Modeling Course [Demonstration Videos](#) (13) **NEW!**

**Two-Dimensional (2D) Hydraulic Modeling Videos**  
Federal Highway Administration USDOTFHWA  
6 videos • 1,159 views • Last updated on Nov 23, 2020

Play all Shuffle

This series of videos is intended to provide training opportunities for those who are new to 2D hydraulic modeling and to promote best practices for the development of accurate and efficient models. Some of the examples demonstrate the use of the US Bureau of Reclamation SRH-2D model, but the concepts and methods are generally applicable to all models. The specific topics covered in these videos primarily focus on concepts that are important in transportation related hydraulic analyses.

<https://www.fhwa.dot.gov/engineering/hydraulics/>

- 1 **Approximate Channel Data**  
Federal Highway Administration USDOTFHWA • 730 views • 2 years ago • 4:52
- 2 **Bridge Features**  
Federal Highway Administration USDOTFHWA • 1.1K views • 2 years ago • 5:53
- 3 **Domain Limits**  
Federal Highway Administration USDOTFHWA • 258 views • 2 years ago • 5:54
- 4 **Hydraulic Controls**  
Federal Highway Administration USDOTFHWA • 769 views • 2 years ago • 4:57
- 5 **Material Roughness Values**  
Federal Highway Administration USDOTFHWA • 335 views • 2 years ago • 6:11
- 6 **Merging Terrain**  
Federal Highway Administration USDOTFHWA • 541 views • 2 years ago • 6:32



# Short YouTube Training Videos – 2D Sediment Transport Modeling

- [SRH-2D User's Manual: Sediment Transport and Mobile-Bed Modeling](#)
- Overview of SMS/SRH-2D Sediment Transport Modeling [YouTube Videos](#) (6)

**2D Sediment Transport Modeling with SRH-2D**  
Federal Highway Administration USDOTFHWA  
6 videos 456 views Last updated on Sep 29, 2022

Play all Shuffle

This video series is designed to provide guidance in the process of setting up and running a 2D sediment transport model with SRH-2D, developed by the US Bureau of Reclamation. The videos provide an overview of sediment transport modeling but also address the details of preparing, running, reviewing, and troubleshooting a model. Throughout the video demonstrations, the SMS user interface for SRH-2D is used to develop, execute, and review results for the 2D sediment transport analyses.

**Video 1 – Overview of Sediment Transport Modeling**  
Federal Highway Administration USDOTFHWA • 331 views • 4 months ago

**Video 2 – Converting a Hydraulic Model to a Sediment Model**  
Federal Highway Administration USDOTFHWA • 189 views • 4 months ago

**Video 3 – Sediment Parameters**  
Federal Highway Administration USDOTFHWA • 100 views • 4 months ago

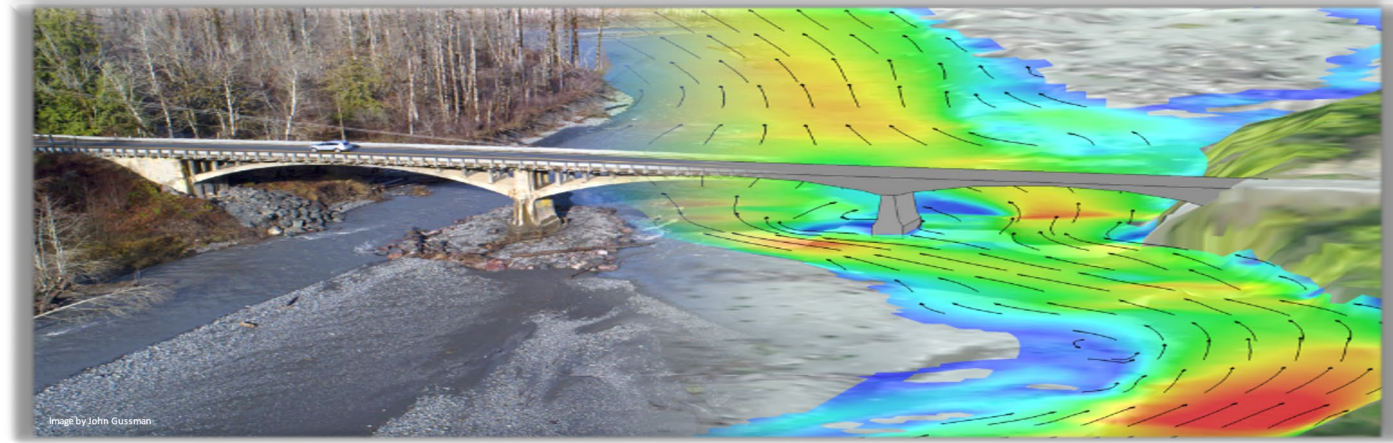
**Video 4 – Executing a Sediment Model and Reviewing Results**  
Federal Highway Administration USDOTFHWA • 93 views • 4 months ago

**Video 5 – Sensitivity Analysis and Troubleshooting**  
Federal Highway Administration USDOTFHWA • 164 views • 4 months ago

**Video 6 – Cohesive Sediment Modeling**  
Federal Highway Administration USDOTFHWA • 131 views • 4 months ago

# FHWA 2D Hydraulic Modeling User's Forum

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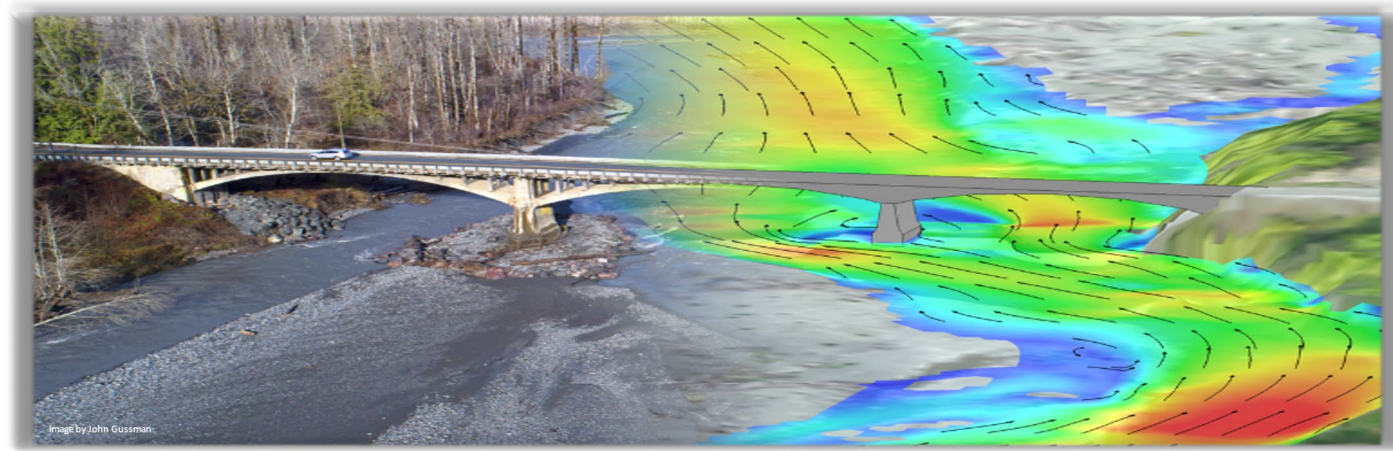


- [Subscribe](#) to receive web meeting invites
- Web meetings held roughly every 2-3 months
- Updates on the latest SRH-2D and SMS developments
- 2D modeling best practices
- Tips and tricks in SMS
- Access to past eight years of web meeting recordings
- Contact Scott Hogan for more information

**Scott Hogan**  
FHWA Resource Center  
[Scott.hogan@dot.gov](mailto:Scott.hogan@dot.gov)  
(720) 576-6026

# FHWA 2D Hydraulic Modeling User's Forum

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- Web Links to web meeting recording links after March 2022 (Zoom)
  - April 7, 2022 – Colorado DOT 2D Modeling Success Stories ([Recording](#) / [Handout](#))
  - November 16, 2022 - Automated Bridge and Culvert Meshing Tools ([Recording](#) / [Handout](#) / [Demo](#))
  - January 19, 2023 – How to Generate An Accurate and Efficient Mesh ([Recording](#) / [Handout](#))
  - February 23, 2023 - Troubleshooting SMS Projects ([Recording](#) / [Handout](#))
  - April 20, 2023 – Overview of Raster Data and Tools in SMS ([Recording](#) / [Handout](#))
  - June 22, 2023 - Incorporating Channel Cross Section Data Into A Terrain Surface ([Recording](#) / [Handout](#))
  - September 28, 2023 – Modeling 1D and 2D Culverts in SRH-2D SMS ([Recording](#) / [Handout](#) / [Demo](#))

# FHWA 2D Hydraulic Modeling User's Forum

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Meeting recording links prior to March 2022 (Through Adobe Connect)

- July 15, 2015 - SRH-2D Model Development (*archived*)
- August 26, 2015 - Managing information in SMS and reviewing results for adequacy (*archived*)
- April 27, 2016 - Mesh Development and Review (*archived*)
- February 2, 2017 - Evaluating bridge scour with 2D model results (*archived*)
- April 19, 2017 - [SRH-2D Boundary Conditions](#)
- June 21, 2017 - [Developing Terrain Data](#)
- August 31, 2017 - [Back to the Basics for mesh development](#)
- October 18, 2017 - [Potential mesh stability issues and solutions](#)
- January 25, 2018 - [CDOTs 2D modeling experience](#)
- March 1, 2018 - [Nevada DOT terrain mapping with UAVs](#)
- May 31, 2018 - [Bridge and Culvert Best Modeling Practices](#)
- August 20, 2018 - [Minnesota Data Collection and Model Calibration](#)
- November 14, 2018 - [2D Hydraulic Model Review](#)
- January 17, 2019 - [New features in the SMS SRH2D interface](#)
- March 14, 2019 - [SRH-2D Model Development Overview](#)
- June 18, 2019 - [Importing and Compiling Terrain Data](#)
- August 8, 2019 - [Presenting and Exporting Results](#)
- November 14, 2019 - [2D Hydraulic Modeling Reference Document Overview](#)
- February 20, 2020 - [2D Hydraulic Model Review - Terrain Data](#)
- April 4, 2020 - [2D Hydraulic Model Review - 2D Mesh](#)
- May 13, 2020 - [2D Hydraulic Model Review - 2D Boundary Conditions and Materials](#)
- July 16, 2020 - [2D Hydraulic Model Review - Hydraulic Structures](#)
- December 1, 2020 - [What's new in SMS 13.1 and SRH-2D 3.3](#)
- March 2, 2021 - [2D Hydraulic Model Review - Model Controls and Results \(3D Bridges\)](#)
- June 17, 2021 - [Understanding the Importance of Hydraulic Controls/Mesh Resolution](#)
- January 13, 2022 - [FEMA Flood Mapping Using 2D Modeling](#)

# Additional FHWA 2D Hydraulic Modeling Resources

- FHWA Bridge Hydraulics [Page](#)

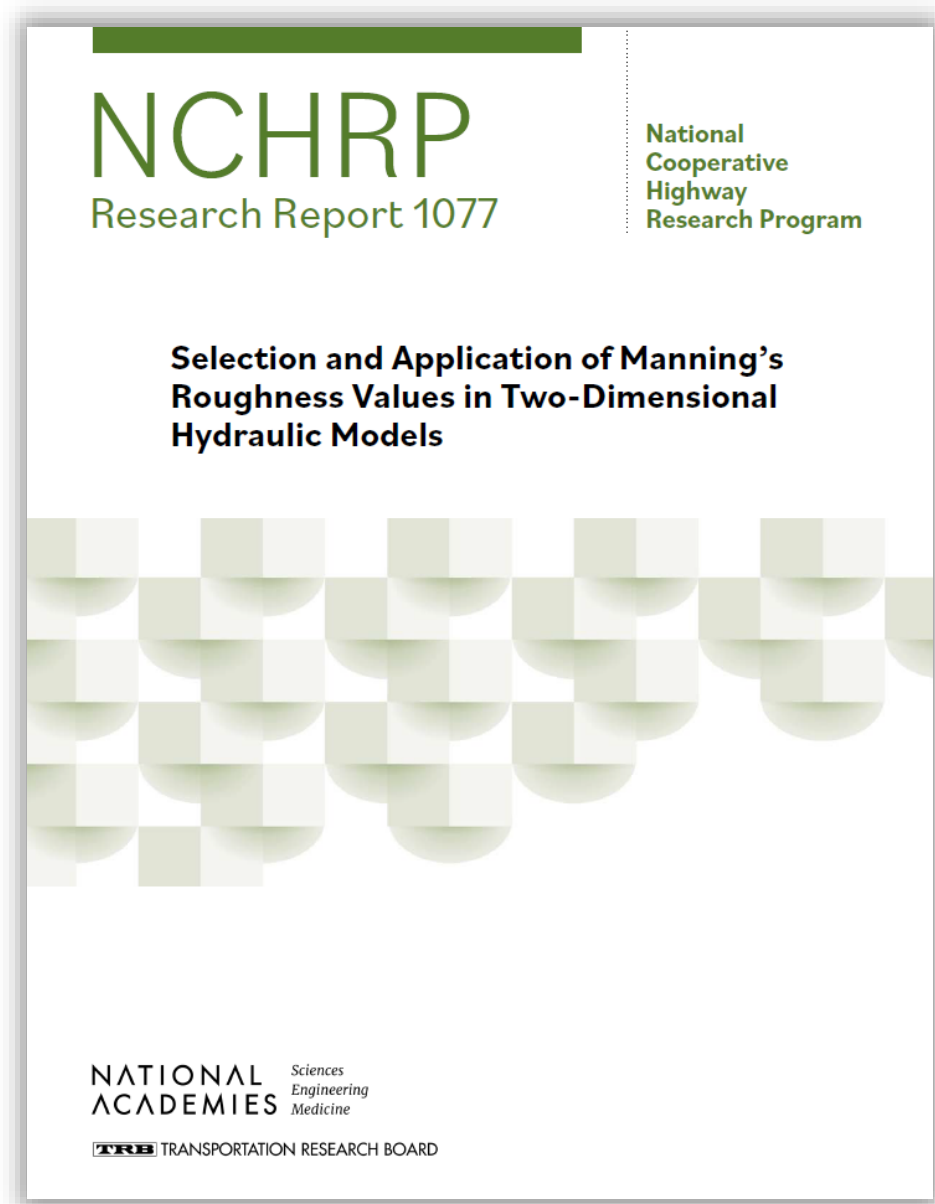
- 2D Hydraulic Modeling Sample Scope of Work
- 2D Hydraulic Modeling Video Summary Pages
- Benchmarking of SRH-2D Report
- A Primer on Modeling in the Coastal Environment

The screenshot shows the FHWA Bridges & Structures website. The header includes the U.S. Department of Transportation Federal Highway Administration logo and navigation links for About, Programs, Resources, Briefing Room, Contact, and Search FHWA. The main navigation bar lists Structures, Geotech, Hydraulics, Safety Inspection, and Management/Preservation. Below this, a sub-navigation bar includes Hydrology, Highway Drainage, Culvert Hydraulics, Bridge Hydraulics, Scour, and Coastal Highways. The page title is "Hydraulic Engineering". The main content area contains a paragraph explaining the purpose of hydraulic engineering and the role of the National Hydraulic Team (NHT). Below the text is a row of six image thumbnails: Hydrology, Drainage, Culverts, Bridge Hydraulics, Scour, and Coastal Highways. At the bottom, there are two sections: "Quick Links" with links to Policy & Guidance, Publications, Research, Software, Staff Listing, Training, Conferences, and Videos & Webinars; and "Features" with links to NHT Hydraulic Newsletter and Hydraulics Email Notifications. The footer includes the text "First photo: credit NOAA" and "Updated: 08/25/2020".

# Additional Hydraulic Modeling Resources

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Recommendations for selecting Manning's  $n$  values for 2D hydraulic models. [NCHRP Research Report 1077 \(2024\)](#).



# FHWA Bridge Scour Workshop

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- [Recordings and Handouts](#)
- Bridge Scour Overview
- Long Term Degradation
- Contraction Scour
- Pier Scour
- Abutment Scour
- 2D Bridge Scour Tools Demo

