

Hydraulics – Various Topics

Mark Bailey, PE
Office of Hydraulics Manager, INDOT

October 19th, 2016



INDOT Hydraulics

- **Design Manual Updates**
- **Practice Pointers**
- **ERMS submittals**



Design Manual Updates

- http://www.in.gov/indot/design_manual/design_manual_2013.htm#

The screenshot displays the Indiana Department of Transportation (INDOT) website. The browser address bar shows the URL: http://www.in.gov/indot/design_manual/design_manual_2013.htm#. The website header includes the IN.gov logo and navigation tabs for BUSINESS & AGRICULTURE, RESIDENTS, GOVERNMENT, EDUCATION, TAXES & FINANCE, VISITING & PLAYING, and FAMILY & HEALTH. The Governor Mike Pence name is visible in the top right.

The main content area features the Indiana Department of Transportation logo and the slogan "A State that Works". The page is titled "INDIANA DESIGN MANUAL HOME" and "INDIANA DESIGN MANUAL 2013- CURRENT". A welcome message states: "Welcome to the current version of the *Indiana Design Manual*. The *Design Manual* was restructured during 2011 and 2012. Those chapters that have not yet been rewritten are found in their new part and chapter location but retain their existing chapter number. View the [IDM Chapter Reorganization](#) document for details."

Key information on the page includes:

- Active on or after January 1, 2013
- The on-line version of the *Design Manual* was last updated: 09/19/2016
- Revisions to the *Design Manual* occurring after January 1, 2013 have been incorporated into this current *Indiana Design Manual 2013*. Users should consult [design memoranda](#) for revision details and policy updates. Stay current on INDOT design standards and policy changes by subscribing to [DesignConsultants Listserv](#).
- This page last updated September 19, 2016.
- Download complete [Indiana Design Manual 2013 - Current](#) (PDF 56.6 MB) (rev Sep 16)
- Part 1 - Project Design Development
- Part 2 - Hydrology and Hydraulics
- Download complete [Part 2 \(PDF 8.0 MB\)](#)
- Ch. 201 General Hydrology Information (rev. May 2013)
- Ch. 202 Hydrology (July 2012, rev. Feb. 2014)
- Ch. 203 Hydraulics and Drainage Design (rev. May 2016)
- Ch. 204 Permanent Stormwater Quality Controls (rev Oct. 12)

Additional features include "Online Services" (Traffic Conditions, Driveway Permit, Notice of Tort Claim Form, Indiana GIS Atlas, Rules IN.gov), "Top FAQs", and "I Want To..." (Need Help? Have problems? Who do I call? What Agency?, Where can I obtain current Indiana roadway or other maps?, How do I find information regarding highway road closings/construction?, I would never sell my house in a down market, how is it fair market value if you are forcing me to sell?, How is the money from Major Moves being used?, When can the project be constructed?).



Design Manual Updates

- **Bridges – none (coming soon)**
- **Culverts –**
 - Minor revisions to the In-Kind Culvert Replacement section.
 - Added a requirement to run a semi-smooth culvert option with an n of 0.015 for all replacement projects.
 - Requiring version 7.2 of HY-8



Design Manual Updates – coming soon

- **Minor revisions to the In-Kind Culvert Replacement section.**
- **Existing backwater $> 3'$, proposed $3'$ or $<$**
- **Minimum pipe size for jacking under interstate as part of a liner project is $18''$**



Design Manual Updates – coming soon

■ Bridge Backwater

<i>If the existing backwater is...</i>	<i>The allowable backwater will be...</i>
> 3 feet	3 feet or less
Between 0.14 and 3 feet	Match or improve existing
Less than 0.14 feet	Up to 0.14 feet

Design Manual Updates – coming soon

- Spans:**
- 1.) Number of spans not increased
 - 2.) Spans between piers not decreased
 - 3.) Total out-to-out span not decreased

- Slopes:**
- 1.) Change from vertical to sloping abutments allowed, but
 - 2.) Check 10% EP to make sure elevation not increased

- Road
Overflow:**
- 1.) Include impacts of changes to guardrail / barrier rail



Practice Pointers

- Bridge Rehab Project - Scour Analysis?
- Send an email to mbailey1@indot.in.gov?
- Call (317) 233-2096 and ask?
- Look it up yourself first!



Practice Pointers

The screenshot shows a web browser window with the URL <https://indot-it.bentley.com/login.aspx>. The page features the Bentley logo at the top center. Below it, the InspectTech logo (a blue square with a white magnifying glass icon) is displayed next to the text "InspectTech CONNECT Edition". To the right of the logo is a login form with the following elements:

- A text input field containing the email address "mballey1@indot.in.gov" with a "Remember Me" checkbox checked to its right.
- A text input field for the password, with a "Forgot password?" link to its right.
- A "Login" button below the password field.

At the bottom of the page, there is a disclaimer: "Unauthorized access is strictly prohibited. All actions are monitored and recorded." followed by "© Copyright 2016 Bentley Systems, Inc." and a link for "Privacy Terms of Use Contact Us".



Practice Pointers

The screenshot shows a web browser window displaying the Bentley InspectTech application. The browser's address bar shows the URL https://indot-it.bentley.com/asset_task_filter.aspx?mod_id=0. The application header includes the "InspectTech CONNECT Edition" logo and navigation links for "Main", "Collector", "Manager", and "Help". A search bar in the top right corner, containing the placeholder text "Type Asset Name Here...", is circled in red. Below the header, a "Saved Filters" dropdown menu is set to "Report Filter". The main content area is currently empty, displaying "Record Count: 0". At the bottom of the page, there is a copyright notice: "© Copyright 2016 Bentley Systems, Inc." and a user status indicator: "Viewers : Bailey, Mark - Logout".



Practice Pointers

Asset Details: (1)56-15-01300 A

Quick View: **Asset Info** | File | Scheduling

Parent Asset: Seymour
Asset Name: (1)56-15-01300 A
Asset Code: 000030
Asset Type: Bridge
NBI 007: Facility Carried by Structure: SR 1
NBI 006: Feature Intersected: BRUSHY FORK
NBI 011: Milepoint: 0007.370
NBI 016: Latitude: 39.19487
NBI 017: Longitude: -84.908134
NBI 058: Deck: 6 - Satisfactory Condition (minor deterioration)
NBI 059: Superstructure: 7 - Good Condition (some minor problems)
NBI 060: Substructure: 6 - Satisfactory Condition (minor deterioration)
NBI 062: Culverts: N - Not Applicable
NBI 041: Structure Open, Posted, or Closed to Traffic: A - Open
MAD.RP: 9
MAD.Offset: 0.21199

Open Reports
No Reports Found

Scheduling

	Inspection Type	Last Inspection Date	Frequency	Due Date:	Schedule Date	User Assigned to Inspection	Comments	Ongoing
	Routine	12/18/2015	24 Months	December 2017	12/30/2017			

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Practice Pointers

The screenshot shows the InspectTech web application interface. The browser address bar displays the URL: https://indot-it.bentley.com/bridgedetail.aspx?type=0&ias_id=17453. The page title is "Asset Details: (1)56-15-01300...". The application header includes the InspectTech logo and navigation links: Main, Collector, Manager, Help. A search bar is present with the placeholder text "Type Asset Name Here...".

The main content area is titled "Asset Details: (1)56-15-01300 A". Below this, there are tabs for "Quick View", "Asset Info", "Files", and "Scheduling". The "Completed Reports" section contains a table with the following data:

Inspection Date	Last Revision	Asset Code	Owner	Asset Type	Inspection Type	NBI 007: Facility Carried by Structure	NBI 006: Feature Intersected	Approved Date	
12/18/2015	12/29/2015	000030	Everman, Chris	Bridge	Routine	SR 1	BRUSHY FORK	12/29/2015	
12/30/2013	12/02/2015	000030	Everman, Chris	Bridge	Routine	SR 1	BRUSHY FORK		
01/05/2012	01/12/2012	000030	Wolfe, Mark	Bridge	Routine	SR 1	BRUSHY FORK		
12/21/2009	05/01/2011	000030	Wolfe, Mark	Bridge	Routine	SR 1	BRUSHY FORK		
01/09/2008	05/01/2011	000030		Bridge	Routine	SR 1	BRUSHY FORK		

Below the table is a section for "History / Notes" with the message "No history or notes found".

The "ERMS" section displays the message "ERMS data has not been loaded for this Asset" and a button labeled "Get ERMS data" which is circled in red.

At the bottom of the page, the copyright notice reads "© Copyright 2016 Bentley Systems, Inc." and the user information is "Viewers : Bailey, Mark - Logout".



Practice Pointers

The screenshot displays the Bentley InspectTech software interface. The browser address bar shows the URL: https://indot-it.bentley.com/bridgedetail.aspx?type=0&as_id=17453. The page title is "Asset Details: (1)56-15-01300 A".

The interface includes a navigation menu with "Main", "Collector", "Manager", and "Help". A search bar is labeled "Type Asset Name Here...". Action buttons include "Show More Details", "View Asset Values", "Show on Map", and "Create Report".

Under the "Completed Reports" section, there is a table with the following data:

Inspection Date	Last Revision	Asset Code	Owner	Asset Type	Inspection Type	NBI 007: Facility Carried by Structure	NBI 006: Feature Intersected	Approved Date	
12/18/2015	12/29/2015	000030	Everman, Chris	Bridge	Routine	SR 1	BRUSHY FORK	12/29/2015	✍
12/30/2013	12/02/2015	000030	Everman, Chris	Bridge	Routine	SR 1	BRUSHY FORK		✍
01/05/2012	01/12/2012	000030	Wolfe, Mark	Bridge	Routine	SR 1	BRUSHY FORK		✍
12/21/2009	05/01/2011	000030	Wolfe, Mark	Bridge	Routine	SR 1	BRUSHY FORK		✍
01/09/2008	05/01/2011	000030		Bridge	Routine	SR 1	BRUSHY FORK		✍

Below the table is a "History / Notes" section with the text: "No history or notes found".

The "ERMS" section contains a table with the following data:

ERMS Security Group	Count	
Bridge File	139	⬇
Design Document	8	⬇
INDOT Bridge Inspection Report	19	⬇
Large Plans	164	⬇

A red arrow points to the "ERMS Security Group" header in the ERMS table. An "Export All" button is located in the top right corner of the ERMS table.

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Practice Pointers

https://indot-it.bentley.com/bridgedetail.aspx?types=0&las_id=17453 Asset Details: (1)56-15-01300...

InspectTech CONNECT Edition Main Collector Manager Help Type Asset Name Here...

Asset Details: (1)56-15-01300 A Show More Details View Asset Values Show on Map Create Report

Completed Reports

Inspection Date	Last Revision	Asset Code	Owner	Asset Type	Inspection Type	NBI 007: Facility Carried by Structure	NBI 006: Feature Intersected	Approved Date
12/18/2015	12/29/2015	000030	Everman, Chris	Bridge	Routine	SR 1	BRUSHY FORK	12/29/2015
12/30/2013	12/02/2015	000030	Everman, Chris	Bridge	Routine	SR 1	BRUSHY FORK	
01/05/2012	01/12/2012	000030	Wolfe, Mark	Bridge	Routine	SR 1	BRUSHY FORK	
12/21/2009	05/01/2011	000030	Wolfe, Mark	Bridge	Routine	SR 1	BRUSHY FORK	
01/09/2008	05/01/2011	000030		Bridge	Routine	SR 1	BRUSHY FORK	

History / Notes

No history or notes found

ERMS

ERMS Security Group

Bridge File Count 139

Document Title	Document Date	Original File Name	County	Structure #	Document Type	NBI #	Route #
ScourAddt (1)56-15-01300 A - 10-26-1994.pdf	3/3/2016 5:37:00 PM	ScourAddt (1)56-15-01300 A - 10-26-1994.pdf	Dearborn	(1)56-15-01300 A	scour	30	
ScourAddt (1)56-15-01300 A - 10-26-1994 - 1.pdf	3/3/2016 5:37:00 PM	ScourAddt (1)56-15-01300 A - 10-26-1994 - 1.pdf	Dearborn	(1)56-15-01300 A	Scour Additional	30	
ScourAddt (1)56-15-01300 A - 5-22-1995.pdf	3/3/2016 5:37:00 PM	ScourAddt (1)56-15-01300 A - 5-22-1995.pdf	Dearborn	(1)56-15-01300 A	Scour Additional	30	
ScourAddt (1)56-15-01300 A.pdf	3/3/2016 5:37:00 PM	ScourAddt (1)56-15-01300 A.pdf	Dearborn	(1)56-15-01300 A	Scour Additional	30	
ScourPOA (1)56-15-01300 A.pdf	3/3/2016 5:37:00 PM	ScourPOA (1)56-15-01300 A.pdf	Dearborn	(1)56-15-01300 A	Scour POA	30	
ScourAddt (1)56-15-01300 A - 9-16-1996.pdf	3/3/2016 5:37:00 PM	ScourAddt (1)56-15-01300 A - 9-16-1996.pdf	Dearborn	(1)56-15-01300 A	Scour Additional	30	
ScourAddt (1)56-15-01300 A - 7-27-1998.pdf	3/3/2016 5:37:00 PM	ScourAddt (1)56-15-01300 A - 7-27-1998.pdf	Dearborn	(1)56-15-01300 A	Scour Additional	30	
ScourAddt (1)56-15-01300 A - 7-2-2000.pdf	3/3/2016 5:37:00 PM	ScourAddt (1)56-15-01300 A - 7-2-2000.pdf	Dearborn	(1)56-15-01300 A	Scour Additional	30	
ScourMemo 001-15-01300.pdf	3/3/2016 2:41:00 PM	ScourMemo 001-15-01300.pdf	Dearborn	1300	Scour Memo	30	
ScourMemo 001-15-01300.pdf	3/3/2016 2:03:00 PM	ScourMemo 001-15-01300.pdf	Dearborn	1300	Scour Memo	30	

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Practice Pointers

ScourMemo 001-15-01300.pdf - Adobe Acrobat Pro

File Edit View Window Help

Open Create 77.6%

Tools Fill & Sign Comment

**INDIANA DEPARTMENT OF TRANSPORTATION**

100 North Senate Avenue
Room N642
Indianapolis, Indiana 46204

PHONE: (317) 233-2086
FAX: (317) 233-4829

Michael R. Pence, Governor
Brandye Hendrickson,
Commissioner

November 24, 2015

TO: Ronald McCaslin, PE
Sr. Bridge Design Engineer

THRU: Bill P Schmidt, PE
Hydraulics Engineer

FROM: Vanessa McCauley, E.I.
Hydraulic Engineer

SUBJECT: HYDRAULICS REVIEW
Status: Final Design
Structure: 1-15-1300A
Des #: 1500347
Project: Scour Analysis
Crossing: Brushy Fork Creek



After a review of the above noted project, the following hydraulic sizing parameters are approved.

Legal Drain	= No	
CIF Permit Needed	= Yes	
Q100 Discharge	= 3230	cfs.
Drainage Area	= 5.43	sq. mi.
Elevation @ Q100	= 534.91	ft.
Velocity @ Q100	= 18.51	ft./sec.
Contraction Scour Depth	= 1.09	ft.
Total Scour Depth	= 1.09	ft.
Low Scour Elevation	= 526.91	ft.
Bottom of Footing Elevation	= 523.53	ft.
Top of Footing Elevation	= 526.28	ft.

The above data is based on a flow line elevation of 528 ft. The velocity indicated is the maximum velocity through the bridge, instead of the average velocity. The above scour depths are based on erodible material.

Based on the information above, this structure is not scour critical. However, if scour countermeasures are still desired, Class 2 riprap should be placed based on the standard specifications. Even though the velocity at Q100 is greater than the maximum for Class 2 riprap, this velocity is based solely on the watershed upstream, not on the back up from Tamers Creek. The velocity that this structure actually sees is less than what the model produces. Based on the inspection report, there is minor scour at the southeast wingwall. However, based on the pictures in the inspection report, it seems that wingwall has riprap along it and the footer is covered.

This project will need a CIF permit if scour countermeasures are placed because a house downstream from the structure would be within 2 ft of the water surface elevation during a 1% EP storm event.

If you have any questions or comments, please contact me at (317) 233-2273.

VAM

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Practice Pointers

- **What other data is in InspectTech?**
 - Bridge Inspections
 - As-built drawings
 - Plans
 - Reports
 - Correspondence
 -



InspectTech

- **Looks great, how do I get access?**
 - Consultant – ask your BIAS administrator
 - INDOT – send an email to inbridgeshelp@indot.in.gov
 - County – your consultant that submits your bridge inspection reports



ERMS submittals

The screenshot shows a web browser window displaying the Multiple File Upload Tool (MFUT) interface. The browser's address bar shows the URL: `http://ems.indot.in.gov/MFUT/default.aspx?Token=x5cID7Xqccq%2b45KQ`. The page title is "Multiple File Upload Tool (MFUT)". The header includes the Indiana Department of Transportation logo on the left and the text "Indiana Department of Transportation" and "Current User : Mark Bailey" on the right. A system status indicator shows a green checkmark. A red message reads: "Please read the manual as the application has changed. Please click on the ? icon in the upper left." Below this, a dropdown menu is labeled "Please choose the desired type of document :". The main content area features a "Select files" section with a plus icon and the instruction "Add files to the upload queue and click the start button." Below this is a table with columns for "Filename", "Status", and "Size". The table is currently empty, with the text "Drag files here." centered in the body. At the bottom of the table area are buttons for "Add Files" and "Start Upload", and a progress indicator showing "0% 0 kb". A button labeled "Enter File Information" is located below the table. The footer of the page contains the text "©Indiana Department of Transportation".

Multiple File Upload Tool (MFUT)

Indiana Department of Transportation

Current User : Mark Bailey

System Status: ✓

Please read the manual as the application has changed. Please click on the ? icon in the upper left.

Please choose the desired type of document :

Select files
Add files to the upload queue and click the start button.

Filename	Status	Size
Drag files here.		

Add Files Start Upload 0% 0 kb

Enter File Information

©Indiana Department of Transportation



ERMS submittals

- **Let your coordinator know!**
 - Send an email to indotcoordinatorX@indot.IN.gov
 - X=
 - 1 for Crawfordsville
 - 2 for Fort Wayne
 - 3 for Greenfield
 - 4 for LaPorte
 - 5 for Seymour
 - 6 for Vincennes



ERMS submittals

- Internal file shuffling



ERMS submittals

- **What should I say in my submittal email to my district coordinator and who else should I copy?**
 - Project name
 - INDOT District or LPA
 - County if LPA
 - Des #
 - Structure #
 - Type of submittal



ERMS submittals

■ Project name

- US 31 over Grassy Creek
- CR 300 N over Buck Creek
- Guilford Rd Reconstruction
- Fairfield Causeway Road over Brookville Lake
- SR 18 from SR 43 to Wood St
- ~~■ I-74 0.9 mi W of SR 32~~
- CV 026-12-56.15



ERMS submittals

- **Type of submittal**
 - Scour Analysis
 - Bridge Replacement
 - Bridge Rehab
 - Small Structure Replacement
 - Small Structure Liner
 - Detention
 - Storm Sewer



ERMS submittals

- **Who should I copy from INDOT?**
 - The project manager



ERMS submittals

- What if I still do cover letters?



ERMS submittals

■ Other tips

- 1 submittal per Des #
- contact person with contact info if your reviewer has any questions



ERMS submittals

■ Examples – The Good

From: Aaron Isch [<mailto:aaron@eri.consulting>]
Sent: Wednesday, September 28, 2016 12:43 PM
To: INDOT Coordinator 2 <indotcoordinator2@indot.IN.gov>
Cc: Langmaid, John <JLANGMAID@indot.IN.gov>
Subject: 1383457 - Hydraulics Upload

**** This is an EXTERNAL email. Exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email. ****

Coordinator 2,

We have uploaded Hydraulics documents for a culvert replacement that is part of the bridge replacement on Hillegas Rd over US 30, Des 1383457. Please see the attached transmittal letter for more information.

Thanks,

Aaron Isch, P.E.
Engineering Resources, Inc.
11020 Diebold Road Fort Wayne, IN 46845
Direct (260) 451-9702 | Office (260) 490-1025 Ext. 280
aaron@eri.consulting

From: MfutUploads@indot.in.gov [<mailto:MfutUploads@indot.in.gov>]
Sent: Wednesday, September 28, 2016 12:41 PM
To: Aaron Isch <aaron@eri.consulting>
Subject: Multiple File Upload Tool (MFUT) Confirmation

Please do not respond to this email. It is automatically generated.

The following files were added successfully into the ERMS system for user AISCH01:

HYD DgnComps 1383457 for Bridge Services.pdf as document type of Design Documents.	
UCM Title:	HYD DgnComps 1383457 For Bridge Services



ERMS submittals

■ The Good

From: Kokosinski, Elizabeth [<mailto:EKokosinski@structurepoint.com>]

Sent: Tuesday, September 27, 2016 4:58 PM

To: INDOT Coordinator 1 <indotcoordinator1@indot.IN.gov>

Cc: Logeman, Adam <alogeman@structurepoint.com>; Day, Dave <Dday@structurepoint.com>; Ahmed, Arshad <ArAhmed@indot.IN.gov>;

Subject: HYD Upload for DES 1500302

**** This is an EXTERNAL email. Exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email. ****

Coordinator 1,

15 files have been revised and electronically uploaded onto the ERMS system for review, including the letter of transmittal.

DES NO.: 1500302

Proj. NO.: 1500302

Project: SR 234 over Jones and Armstrong Ditch (Replacement)

Submittal: Hydraulics

Attached to this email is a copy of the transmittal letter for the submittal and a receipt of the uploaded documents; the transmittal letter has been included in the posted documents.

If you have any questions, please contact me at the information below.

Thank you,

Elizabeth M. Kokosinski, EI
Design Engineer, Bridge Group



AMERICAN
STRUCTUREPOINT
INC.



ERMS submittals

■ The Bad

Sent: Thursday, October 13, 2016 3:18 PM
To: INDOT Coordinator 2 <indotcoordinator2@indot.IN.gov>
Subject: FW: Multiple File Upload Tool (MFUT) Confirmation

**** This is an EXTERNAL email. Exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email. ****

Coordinator,

The 4 files listed below have been successfully uploaded to ERMS.

From: MfutUploads@indot.in.gov [<mailto:MfutUploads@indot.in.gov>]
Sent: Tuesday, October 04, 2016 2:11 PM
To: Mike Siffer <m.siffer@gaiconsultants.com>
Subject: Multiple File Upload Tool (MFUT) Confirmation

Please do not respond to this email. It is automatically generated.

The following files were added successfully into the ERMS system for user MSIFFER01:

HYD DgnComps 0301145 for Bridge Services.pdf as document type of Design Documents.	
UCM Title:	HYD DgnComps 0301145 For Bridge Services
Content ID:	DOT_4088344



ERMS submittals

■ The Bad

From: INDOT Coordinator 2

Sent: Friday, October 14, 2016 10:27 AM

To: INDOT Coordinator 8 <indotcoordinator8@indot.IN.gov>

Cc: Langmaid, John <JLANGMAID@indot.IN.gov>; Smith, Gregory <GSmith2@indot.IN.gov>; Lytton, Keith <KL>

Subject: FW: Multiple File Upload Tool (MFUT) Confirmation, Des # 0301145

CO8,

4 Hydraulic files have been transitioned to Co COORD8 for review.

Please forward to Mark Bailey.

John & Greg,

4 Hydraulic files have been received and copied to the project folder.

Keith,

Pipeliner for Valentine Ditch, 3.2 mi N of Adams/Allen Co line, small structure # CV 027-002-103.75

<L:\CONSULTANT SERVICES\STATE PROJECTS FILES\0301145\Hydraulics\10-14-16>

Mandy O'Connor

Administrative Assistant - Capital Program Management

5333 Hatfield Road

Fort Wayne, IN 46808

Office: (260) 969-8319

Email: aoconnor@indot.in.gov



ERMS submittals

- **The Ugly**



The End

- **Thank you for your attention and help with ERMS submittals.**
- **Any questions?**

