WisDOT PROCEDURE FOR APPRAISAL OF SCOUR AT IN-SERVICE STRUCTURES

July 2026 UPDATE

This document includes an updated scour appraisal procedure that is intended for use by WisDOT, local government engineering staff and engineering consultants in the evaluation of potential scour related risk to in-service structures (bridges, box culverts and 3 sided structures). This procedure supersedes the WisDOT scour evaluation policy developed in 1994 and 1995. These updates to WisDOT's scour evaluation procedures reflect the Federal Highway Administration's (FHWA) evolving scour assessment and calculations guidance, and address plan of corrective actions resulting from a FHWA Metric 18 review completed in 2022.

This revision provides guidance to WisDOT, local agencies and consultants for determination of scour vulnerability for in-service structures over water.

Technical aspects of this procedure are supported by FHWA publications Hydraulic Engineering Circular No. 16 "Highways in the River Environment", Hydraulic Engineering Circular No. 18 "Evaluating Scour at Bridges", Hydraulic Engineering Circular No. 20 "Stream Stability at Highway Structures" and the Wisconsin Department of Transportation Bridge Manual. Procedural aspects and questions will be supported by the WisDOT Bureau of Structures.

Scour is a dynamic sediment transport process. Research on scour is ongoing, and revisions to the methods of scour and stream stability analyses may occur. It is important that an interdisciplinary team consisting of hydraulic, geotechnical, and structural engineers be involved in all levels of analysis and the evaluation process.

Procedure for Scour Appraisal of In-Service Bridges

This procedure is intended to be a guideline for evaluating scour vulnerability of in-service structures over water. It outlines a process to determine proper scour coding for Specifications for National Bridge Inventory (SNBI) item B.AP.03 – Scour Vulnerability. This procedure is intended to guide a user through the required steps to establish scour vulnerability and proper SNBI item B.AP.03 coding for a given structure. If field conditions identified during a structure inspection indicate changes to the waterway or physical/functional condition of a bridge – the structure should be reevaluated using this procedure.

Definitions

Scour Susceptible

Structures most likely to be susceptible to scour and for which sufficient foundation information is available on which an evaluation can be based.

Low Risk

Structures that are reasonably risk free or low risk due to foundation type, subsurface conditions, stream geomorphology and structure inspection history.

Technical Resources:

FHWA Publication No. FHWA-HIF-23-004 (HEC 16) “Highways in the River Environment”

FHWA Publication No. FHWA-HIF-12-003 (HEC 18) "Evaluation of Scour at Bridges" Fifth Edition

FHWA Publication No. FHWA-HIF-12-004 (HEC 20) "Stream Stability at Highway Structures"

FHWA Publication No. FHWA-NHI-09-111 (HEC 23) "Bridge Scour and Stream Instability Countermeasures"

FHWA Publication No. FHWA-HIF-23-048 (Tech Brief) “Hydraulic Considerations for Abutments on Deep Foundations and Bridge Embankment Protection”

Wisconsin Department of Transportation Bridge Manual

SNBI Item B.AP.03 – Scour Vulnerability Codes

Specification
Report the scour vulnerability of the bridge using one of the following codes.

Code	Description
0	Scour appraisal has not been completed.
A	Scour appraisal completed. Bridge determined to be stable for scour.
B	Scour appraisal completed. Bridge determined to be stable for scour, dependent upon designed, and functioning countermeasures.
C	Scour appraisal completed. Bridge could become unstable for scour. Temporary (not designed) countermeasure installed to mitigate scour. Bridge is scour critical.
D	Scour appraisal completed. Bridge is, or may become, unstable for scour. Bridge is scour critical.
E	Scour appraisal has not been completed. Temporary (not designed) countermeasure installed to mitigate scour.
U	Scour appraisal has not been completed due to unknown foundations.

Procedure

The procedure will have a maximum of four steps based on structure type, readily available information, field reconnaissance needs and potential monitoring or countermeasure recommendations. The procedure has been established to start from the most basic information and proceed only through the minimal number of steps to achieve adequate scour assessment and coding of SNBI item B.AP.03. The steps in this procedure are:

1. Level 1a Assessment – Worksheet
2. Level 1b Assessment – Flowchart
3. Level 2 Evaluation – Engineering Analysis
4. Recommendations and/or Plan of Action (POA)

After completion of this procedure, a WisDOT Scour Appraisal Summary Form must be completed and included in the bridge file (HSI). If a Level 2 evaluation is performed, the results should be documented using the WisDOT Level 2 Report Form and included in the bridge file.

Level 1a Assessment - Worksheet

The Level 1a assessment procedure is a desktop exercise completed using the following pieces of information:

- As built plans
- Geotechnical boring results
- Pile driving records
- Historic aerial imagery
- LiDAR or terrain data
- Inspection reports
- Underwater profiles (UWP)
- Maintenance records

The purpose of evaluating in-service bridges and three-sided structures is to identify and place them into one of four categories:

- Low Risk
- Unknown foundation
- Scour susceptible
- Scour critical

The Level 1a assessment procedure should be used to assist with prioritization of scour susceptible structures for further evaluation (Levels 1b and 2, described below). The assessment process will direct attention and effort away from structures that are of low risk or unknown foundation and focus further efforts to scour susceptible and scour critical structures.

The Level 1a assessment is a qualitative analysis in worksheet format that can be found as an attachment to this policy document. The worksheet guides a user through several questions related to structure and foundation geometry, inspection observations, site conditions and stream stability. Each question's response is assigned a point value; the total sum of all points is the overall stability total for that structure. Depending on the stability total, a structure can either be considered low risk, scour critical, or scour susceptible and in need of a Level 1b assessment.

Structures that may be considered low risk include:

- Closed conduits (box culverts and pipe culverts)
- Structures supported by spread footings on scour resistant bedrock
- Structures over standing water, i.e. lakes, ponds, or wetlands
- Bridges perched above the floodplain such that foundations (including piles) are well above flood water elevations. This case would be coded as A for SNBI item B.AP.03.
- Structures with a stability total ≤ 35 points when assessed using the Level 1a WisDOT Scour Assessment Worksheet

Structures evaluated and determined to be at low risk of scour related failure will be coded as A for SNBI item B.AP.03 (bridge determined to be stable for scour).

Structures with unknown foundations will not be evaluated in this process due to the incomplete information required for a scour evaluation. An accurate assessment of scour susceptibility would be difficult. Therefore, structures with unknown foundations will be assigned a scour code of U for SNBI item B.AP.03. A scour plan of action (POA) must be developed for structures with unknown foundations consistent with the WisDOT Structure Inspection Manual 1.3.16.

A scour critical designation should be applied to structures with a history of observed scour problems or scour calculations that indicate a potential scour problem. Scour critical structures should be appropriately coded as C or D for SNBI item B.AP.03. If a scour critical structure (previously not coded as scour critical) is identified during the Level 1a assessment, it should then advance to the recommendation/plan of action phase.

Single span structures with a stability total > 45 and multi-span structures with a stability total > 55 are considered high priority for further evaluation. A high priority bridge with standard riprap slope protection (not designed) can be temporarily coded as E for SNBI item B.AP.03 and should proceed to a Level 2 evaluation. All other structures should be temporarily coded as 0 for SNBI item B.AP.03 and proceed to a Level 2 evaluation.

Structures that do not meet the criteria of low risk, unknown foundation or scour critical are considered scour susceptible and should advance to a Level 1b assessment.

Level 1b Assessment - Flowchart

The purpose of a Level 1b assessment is to refine the degree of scour susceptibility for a given structure and potentially reduce the number of structures requiring a detailed hydraulic and scour analysis. A Level 1b assessment should be performed for all in-service structures that are not identified as low risk, unknown foundation or scour critical by the Level 1a procedure. It is expected that this assessment will be conducted by one or more professional engineers familiar with the structure and/or experts in the subject of bridge scour.

The Level 1b assessment is also a desktop exercise using data and information gathered for Level 1a. In addition, the following information should be collected for a 1b assessment:

- Hydraulic studies
- USGS gage data
- Flood history/observations
- Flood Insurance Study (FIS) reports
- Other readily available information to aid in the assessment of potential scour susceptibility

The procedure consists of a flowchart (attached to this memo) with a series of yes/no questions related to structure and foundation geometry, inspection observations, flood history, site conditions and stream stability. The flowchart will direct a user to either classify a structure as low risk, scour critical, or scour susceptible and in need of a Level 2 evaluation.

If a Level 2 evaluation is unwarranted for a given structure based on criteria listed in the flowchart, it is acceptable to set up a monitoring program in lieu of a full hydraulic and scour analysis. In this case, the structure should be coded as D for SNBI item B.AP.03. A scour plan of action (POA) must be developed consistent with the WisDOT Structure Inspection Manual 1.3.16.

Level 2 Evaluation – Engineering Analysis

If a bridge's scour susceptibility and proper coding cannot be determined based on the Level 1a and 1b assessment processes, then a Level 2 evaluation must be performed. A Level 2 evaluation is a site-specific study to determine a structure's vulnerability to scour. It is expected that this evaluation will be conducted by a multidisciplinary team of professional engineers (hydraulic, structural, geotechnical) familiar with the structure and/or experts in the subject of bridge scour. The team should be thoroughly familiar with FHWA publications HEC-18, HEC-20 and HEC 23.

A Level 2 evaluation consists of the following tasks, listed in the order of execution, including:

- Office data collection
- Field study/survey – channel material properties, channel bathymetry (if needed)
- Perform hydrology and hydraulic calculations
- Perform scour calculations
- Evaluate foundation stability for calculated scour depths
- Prepare detailed scour assessment report

Refer to WisDOT Bridge Manual for guidance on acceptable hydrology, hydraulics and scour calculation methodologies and approaches. The calculations and summary of the results must be documented in a report format consistent with requirements in WisDOT Bridge Manual. The summary should include total calculated scour elevation as well as remaining pile embedment (if applicable) and unbraced length in the total scoured condition. A Level 2 Report Form has been developed for inclusion with the scour report. This document must be dated and stamped by a professional engineer.

Calculated scour depths should be reviewed by personnel with structural and geotechnical expertise to determine structural stability in the scoured condition. Report RP-01-2025 "Guidance for Allowable Exposed Pile Height due to Scour" was developed to assist in assessment of stability and is included as an attachment to this policy. If a multi-disciplinary team of hydraulic, structural and geotechnical engineers determine that the calculated scour will not compromise stability, then the structure can be coded as A for SNBI item B.AP.03.

If the calculated scour determines that the structure may become unstable for scour, then the structure should be coded as scour critical. For scour critical bridges the next appropriate step is to determine a course of action. Options include countermeasures designed to resist calculated scour and/or the development of a POA.

Recommendations and Plan of Action (POA)

Refer to WisDOT Structures Inspection Manual section 1.3.18 for guidance on development and implementation of a Scour Plan of Action (POA).

If designed countermeasures are to be installed to correct an existing or potential scour problem, the structure should retain a scour critical coding until corrective countermeasures has been installed. A designed countermeasure is one that has been drafted according to the design guidelines published in HEC 23. After installation of a designed countermeasure, the scour code can be revised to B for SNBI item B.AP.03.

SCOUR APPRAISAL SUMMARY FORM
Wisconsin Department of Transportation
9/2024

BUREAU OF STRUCTURES

Structure Information:

Structure ID:
Year Built:
Highway:
Waterbody Crossing:
Bridge Type:
Span #:
Length [ft]:
Abut. Foundation(s):
Pier Foundation(s):
Completed by:
Date:

Data Collection/Review (check all that apply):

- [ ] Structure Plan
- [ ] Inspection Reports
- [ ] Underwater Profiles
- [ ] Historical Aerial Imagery
- [ ] Subsurface Report
- [ ] Pile Driving Records
- [ ] Previous Scour Assessment/Documentation
- [ ] Other:

Scour Appraisal (check all that apply):

- [ ] **LEVEL 1a ASSESSMENT**
  - [ ] Stability Total
- [ ] **LEVEL 1b ASSESSMENT**

  If Level 1b resulted in low risk designation, select reasoning:
  - [ ] bridge spans ditch with flat slope
  - [ ] bridge over still water
  - [ ] single span bridge, on piles, stable streambed after design level event
  - [ ] bridge over concrete lined channel
  - [ ] multi span bridge, on piles >20', aligned with flow, stable streambed after design level event
  - [ ] bridge with piles embedded into non-erodible material/rock
  - [ ] bridge with spread footings on non-erodible material/rock
- [x] **LEVEL 2 ASSESSMENT**

  In table below include total calculated scour depths and bottom of foundation elevations. If needed, attach a table for larger bridges. In summary narrative, briefly describe any geotechnical (soil strata) or structural elements (foundation type, etc.) that informed scour risk designation. If reviewing an existing structure, include any documented scour history.

Total Calculated Scour Evaluation

	L ABUTMENT		PIER 1		PIER 2		PIER 3		PIER 4		R ABUTMENT	
Bot. of Foundation Elev. (piles, footings)												
Total Scour - Design Event Elev.												
Unbraced Length | Remaining Embed. [ft]												
Total Scour - Check Event Elev.												
Unbraced Length | Remaining Embed. [ft]												
Incipient OT (if less than design event) Elev.												
Unbraced Length | Remaining Embed. [ft]												

Scour Risk Designation: Based on examination of the above information select a category below for the structure.

- [ ] Low Risk
- [ ] Unknown Foundation
- [ ] Scour Critical

Recommended SNBI Scour Vulnerability Code (Item B.AP.03)

- [ ] A
- [ ] B
- [ ] C
- [ ] D
- [ ] E
- [ ] U

Justification for Coding:

Summary Narrative:

Recommended Action(s):

- [ ] Develop POA
- [ ] Increase Monitoring Frequency
- [ ] Install Countermeasures
- [ ] None (Low Risk)

Checked By:

Date: 4/27/2026

PE License # (for Level 1b/2):

Wisconsin Department of Transportation
Bridge Scour Evaluation Worksheet - Level 1a

Date	
Evaluated by	
Bridge ID	
Waterway	
Feature On	
County	
Township	
Location	
Main Span Materials & Design (Item 43)	
ADT	

Stability Total

0

Bridges and bottomless culverts with significant observed stability threatening scour problems should be considered scour critical and SI&A it #113 should be coded 0, 1, 2, or 3. The bridge should also be coded D under new NBI item B.AP.03. If scour has not been observed or is not a immediate threat to structure stability then this form is intended to evaluate whether a strucure can be determined to be scour critical, stable, risk, or whether more review is necessary. If a bridge has an unknown foundation, it should immediately proceed to a Level 2 evaluation.

For each numbered question enter the number of points into the adjacent **Yellow Cell**. If more than one answer applies, use the answer with the highest nu of points. **Each question should be answered.**

Bridges and bottomless culverts with a stability total of 35 points or less could be considered stable/low risk and code SI&A Item 113 as 5. They should alsc coded as A under new NBI item B.AP.03. Structures with a total greater than 45 for a single span or 55 for a multi-span should be considered scour critical an SI&A Item 113 as 2 or 3 (NBI item B.AP.03 code D). Structures coded as scour critical require development of a Plan of Action (POA) and should be considere corrective counter measures and/or monitored closely.

Structures with a stability total in the 36 to 45 range for single span and 36 to 55 range for multi-span require further investigation and should proceed with a 1b evaluation. Refer to 2023 BOS Scour Policy Update for more details related to Level 1b and 2 scour evaluation procedures.

Number		Points
1	**Category**	
	A. Single span - pile foundations or spread footing	4
	B. Multi-span - piers on piling, and continuous and non-continuous superstructure	4
	C. Multi-span - piers on spread footings, and continuous and non-continuous superstructure	8
	D. Structure is an overflow bridge	8

Number		Points
2	**Number of piers in the main channel**	
	A. No piers in main channel	0
	B. One pier	1
	C. Two to four piers	2
	D. Five or more piers	4

Number		Points
3	**Pier Foundation (pick one from A, B or C)**	
	A. No piers or all piers above flood flows.	0
	B. Spread foundations:	
	1) Spread on erosion resistant bedrock	0
	2) Spread on erodible rock (weathered sandstone)	2
	3) Unknown foundation type	**
	4) Spread on soil or gravel	6
	C. Pile bents, footing/piling or caisson, depth below existing stream bed:	
	1) Pile depth greater than 40'	0
	2) Pile depth 20' to 40'	2
	3) Unknown pile depth	**
	4) Pile depth less than 20'	5

** - unknown foundation - send to Level 2 Evaluation

Number		Points
4	**Abutment Foundation (pick one from A, B or C)**	
	A. Abutments located above flood flows.	0
	B. Spread Foundations:	
	1) Spread on erosion resistant bedrock	0
	2) Spread on erodible rock (weathered sandstone)	2
	3) Unknown foundation type/depth	**
	4) Spread on soil or gravel	6
	C. Pile Bents, footing/piling or caisson, depth below existing stream bed:	
	1) Pile depth greater than 40'	0
	2) Pile depth 20' to 40'	1
	3) Unknown pile depth	**
	4) Pile depth less than 20'	2
	D. High Timber Abutment.	6

** - unknown foundation - send to Level 2 Evaluation

5	**Road low point elevation vs low member submergence**	
	A. Submergence of low member or overtopping of road low point is improbable.	0
	B. Low member elevation is above road low point, submergence possible.	1
	C. Low member elevation is below road low point, submergence possible.	4

Structure subtotal 0

Comments:
1)
2)
3)
4)
5)

*is road lower than the low chord adjacent to the bridge? May need to consult topo map and determine if there is low road point within the floodplain limits

Number		Points
6	**Observed scour at piers (pick one from A, B, C or D)**	
	A. No piers or all piers above flood flows.	0
	B. Spread foundations:	
	1) No scour hole	0
	2) Scour hole above top of footing	2
	3) Scour hole within limits of footing	8
	4) No measurement taken at piers	7
	C. Footing/piling foundations:	
	1) No scour hole	0
	2) Scour hole above top of footing	2
	3) Scour hole within limits of footing	4
	4) Piling exposed	6
	5) No measurement taken at piers	5
	D. Pile bent foundations:	
	1) No scour hole	0
	2) Less than 5' scour	2
	3) More than 5' scour	4
	4) No measurement taken at piers	3

7	**Abutment type and condition (pick one from A, B or C)**	
	A. Stub/Integral abutments on erodible soils, effective berm slope:	
	1) 2:1 or flatter	0
	2) Steeper than 2:1 but flatter than 1.5:1	3
	3) 1.5:1 or steeper	6
	B. High abutments on erodible soils, depth of footings or backwall planking below stream bed:	
	1) More than 5 feet	0
	2) 0 to 5 feet	4
	3) Footing is above stream bed	8
	C. Abutment on erosion resistant bedrock – no deficiencies.	0

8	**Abutment Protection**		
	A. No protection necessary.	0	Stable banks - determine via inspection photos and streambed profiles
	B. Wing dams or revetment protection in good condition.	0	
	C. Other protection in good condition.	1	intact riprap on berm slope
	D. Protection condition poor or not provided but needed.	3	

9	**Location of abutments relative to top of bank**	
	A. More than 25 feet away.	0
	B. 5' to 25'.	2
	C. Less than 5'.	6
	D. Abutment within stream banks.	8

10	**Observed scour at abutments**	
	A. No problems.	0
	B. Minor scour problems.	4
	C. Major scour problems observed in past inspections.	8

11	**Observed debris (or ice) lodged against bridge**		
	A. Debris or ice has not been observed at bridge, single span	0	Must have 4 or more years of inspections
	B. Debris or ice has not been observed, multi span bridge forested watershed	1	with no debris issues
	C. Slight Amount of Occasional – every 3 years or more.	3	
	D. Frequent – more than once every 3 years.	6	
	E. No available information.	4	
	F. Moderate to heavy debris or continually present.	8	

Observations Subtotal 0

Comments:
6
7
8
9
10
11

Number		Points
12	**Average degradation of streambed since construction, not including local scour**	
	A. Less than 4' or stream aggrading.	0
	B. 4' to 6'.	2
	C. Greater than 6'.	6
	D. No Comparative cross-sections.	4

Degradation is long-term lowering of the channel bed. Channel bed fluctuation (temporary lowering and filling) from transient sediment or a single flood event is not considered long term degradation.
Nearby bridges may have streambed profiles that can help determine if degradation is occuring through a stream reach

13	**Observed lateral movement of stream**	
	A. Stable.	0
	B. Movement, no threats to bridge.	2
	C. Unstable, threatens bridge.	8
	D. No information available.	4

Aerial photo sources:
https://maps.sco.wisc.edu/WHAIFinder/#7/44.868/-89.747
Google Earth, County GIS maps, WDNR Surface Water Data Viewer are all good sources for aerial photos

14	**Channel bed material**	
	A. Bedrock.	0
	B. Boulders and cobbles (individual particles > 3" diameter)	2
	C. Gravel, Sand, Silt, and Clay (individual particles < 3" diameter)	4

15	**SI&A Item #61 Channel and Channel Protection**	
	A. Rated a 6 or more.	0
	B. Rated a 5 or less.	4

Comments:
12
13
14
15

Stream Geomorphics Subtotal 0

Number		Points	
16	**Bridge location (pick one from A or B)**		
	A. No stream junction within 1,000 feet of structure	0	*ditch doesn't count
	B. Bridge over mainstream, tributary or spillway nearby:		
	1) Tributary downstream within 100 ft	1	
	2) Tributary or spillway upstream within 1,000 ft	4	
	C. Bridge over tributary, mainstream nearby:		
	1) Mainstream within 1,000 feet	2	
	2) Mainstream within 500 feet	4	
17	**Stream bend within 150 feet of bridge (deflection)**		
	A. 0 to 15 degree bend.	1	
	B. 15 to 45 degree bend.	3	
	C. 45 to 90 degree bend.	6	
18	**Alignment of piers to flood flow**		
	A. No piers or all piers above flood flows.	0	If design flood elevation is unavailable, assume all piers are in flood flow
	B. 0 to 5 degrees skew.	1	
	C. 5 to 15 degrees skew.	3	
	D. 15 to 90 degrees skew.	6	
	Site Geomorphics subtotal	0	

Stability total 0

Bridges and bottomless culverts with a stability total of 35 points or less could be considered stable/low risk and code SI&A Item 113 as 5. They should also be coded as A under new NBI item B.AP.03. Structures with a total greater than 45 for a single span or 55 for a multi-span should be considered scour critical and code SI&A Item 113 as 2 or 3 (NBI item B.AP.03 code D). Structures coded as scour critical need to be considered for corrective counter measures and/or monitored closely.

Structures with a stability total in the 36 to 45 range for single span and 36 to 55 range for multi-span require further investigation and should proceed with a Level 1b evaluation. Refer to 2023 BOS Scour Policy Update for more details related to Level 1b and Level 2 scour evaluation procedures.

Comments:
16
17
18
General Comments

WisDOT Level 1b Scour Assessment

Start

Level 1a Scour Assessment total ≤35

Yes → Code SI&A Item 113 as 8/ SNBI item B.AP.03 as A

No

Level 2 Scour evaluation complete or countermeasures installed?

Yes → Verify proper code for SI&A Item 113 / SNBI item B.AP.03 and/or monitor as needed

No

- Relief bridge for main channel
-First bridge downstream of a dam and within 1 mile of a large reservoir
- 1/2 mile of a low-head dam

Yes → Level 2 evaluation required. Code SI&A Item 113 as 3/B.AP.03 as 0 and develop a POA until analysis is completed.

No

Type or depth of foundation unknown?

Yes → Code SI&A Item 113 as 3/ SNBI item B.AP.03 as U and develop a POA

No

- Bridge is over straightened ditch, slope < 5 ft/mi, bridge spans channel (all must apply)
- Bridge is over still water i.e. wetland, pond, lake, etc.
- Single span bridge, spans channel, intact riprap at abutment, documented history of stable streambed* (vertical and lateral), on piles (all must apply)
-Bridge over concrete lined channel

Yes → Code SI&A Item 113 as 8/ SNBI item B.AP.03 as A

No

*Structure must be at least 30 years old and have experienced a design level flow event to qualify for stable streambed

- Multi-span bridge aligned with flow, pile tip elevations >20 feet below thalweg elevation, documented history of stable streambed* (vertical and lateral)
-Bridge with spread footings (abutments and piers) on non-erodible bedrock

Yes → Code SI&A Item 113 as 8/ SNBI item B.AP.03 as A

No

Monitoring may be a logical economical choice instead of continued scour evaluation studies in the following situations:
- Bridge or road has been previously overtopped and no evidence of scour problems exist at the site. Bridge or road overtopped only due to backwater from a downstream control does not meet this criteria.
- Bridge scheduled for replacement or installation of countermeasures within 5 years.
- Bridge on a local road or street with ADT <100.

Yes → Code SI&A Item 113 as 3/ SNBI item B.AP.03 as D and develop a POA

No

Level 2 evaluation required. Code SI&A Item 113 as 3/ SNBI item B.AP.03 as D and develop a POA until evaluation is completed.

LEVEL 2 EVALUATION REPORT FORM
Wisconsin Department of Transportation
6/2024

BUREAU OF STRUCTURES

Structure Information:

Structure ID:
Year Built:
Highway:
Waterbody Crossing:
Bridge Type:
Span #:
Length [ft]:
Abut. Foundation(s):
Pier Foundation(s):
Completed by:
Date:

Hydraulics:

Method (HEC RAS, SMS, etc):
Geometric Contraction Ratio:
Thalweg Elevation (at bridge): ft
Water Surface Elevation (at bridge): ft

Hydrology:

Scour Design Flood (flow, RI): cfs Q:
Scour Check Flood (flow, RI): cfs Q:
Incipient Overtopping Flood: cfs Q:

Geotechnical (values in mm):

Left Overbank: D_{50}: D_{84}:
Main Channel: D_{50}: D_{84}:
Right Overbank: D_{50}: D_{84}:

Contraction Scour:

(if computing overbank, print additional sheet(s) as needed)

Scour type: Live Bed
Vertical
Clear Water
Cohesive Soil

Long Term Aggradation/Degradation:

Estimated LTA/LTD: ft
Comments:

Vertical Contraction (if applicable):

T (Deck Thickness): ft
h_0 (vertical opening size): ft
h_u (flow depth u/s of bridge): ft
Low Chord elevation: ft

Approach Section Hydraulics:

Distance U/S of Constriction: ft
V_c (critical velocity for D_{50}): ft/s
V_1 (average velocity): ft/s
W_1 (width of flow): ft
Y_1 (avg channel depth): ft
Q_1 (flow carrying sediment): cfs
S (EGL slope @ approach): ft

Constricted Section Hydraulics (main channel):

V_2 (avg velocity): ft/s
W_2 (width of flow): ft
Q_2 (channel flow): cfs
y_0 (depth before scour): ft
y_2 (depth after scour): ft
y_s (contr. scour depth): ft

Pier Scour:

(if thalweg can migrate, use max main channel hydraulic values)

Method (HEC 18, Complex, FL):
K_1 (pier shape):
K_2 (angle of attack): °
Bed Condition (plane, dunes, etc):
K_3 (bed condition):
a (Pier width): ft
L (Pier Length in direction of flow): ft
V_1 (velocity directly U/S of pier): ft/s
Y_1 (depth directly U/S of pier): ft
y_s (Pier 1 scour depth): ft
y_s (Pier 2 scour depth): ft
y_s (Pier 3 scour depth): ft
y_s (Pier 4 scour depth): ft
y_s (Pier 5 scour depth): ft

If additional piers, fill out another form

Abutment Scour:

Scour Condition (live, clear water):
Scour Condition Location (a or b):
Abut Type (spill through, vertical):
q_1 (unit discharge approach): cfs
q_2 (unit discharge constricted): cfs
y_1 (avg depth approach): ft
y_0 (avg depth constricted): ft
y_s (abutment scour depth): ft
y_{max} (flow depth incl. abut. scour): ft

Contraction Scour – Cohesive Soil:

Soil Erodibility Class:
n (manning's roughness):
Y (avg channel depth, U/S): ft
V_2 (avg velocity): ft/s
τ_c (critical shear stress): lb/ft^2
y_0 (depth before scour): ft
t (duration of flow): ft
y_s (cohesive scour depth): ft

Total Calculated Scour Elevation:

	L ABUTMENT	PIER 1	PIER 2	PIER 3	PIER 4	PIER 5	R ABUTMENT
Scour Design Event							
Scour Check Event							
Incipient OT (if less than design event)							

Recommended SNBI Scour Vulnerability Code (B.AP.03):

Comments:

Checked By:
Date: 7/15/2026
PE License #