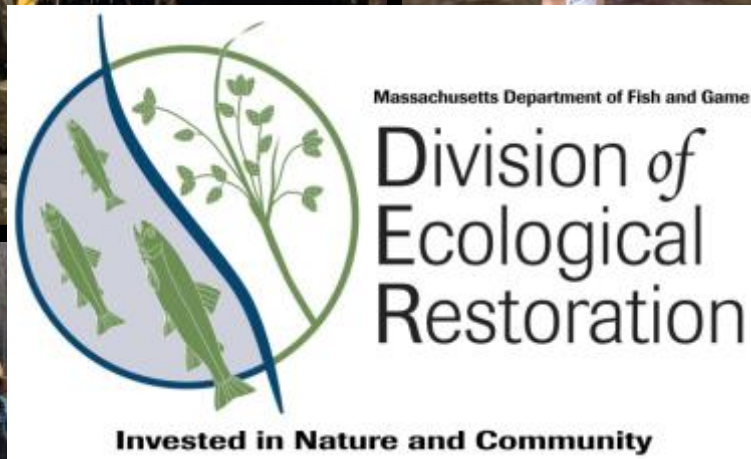




Aquatic Connectivity Assessments of Road- Stream Crossings



Restoring and protecting the Commonwealth's rivers, wetlands and watersheds for the benefit of people and the environment

US. Fish and Wildlife Service Funding Sources



- National Fish Passage Program
- National Fish Habitat Action Plan



US Fish and Wildlife Resources

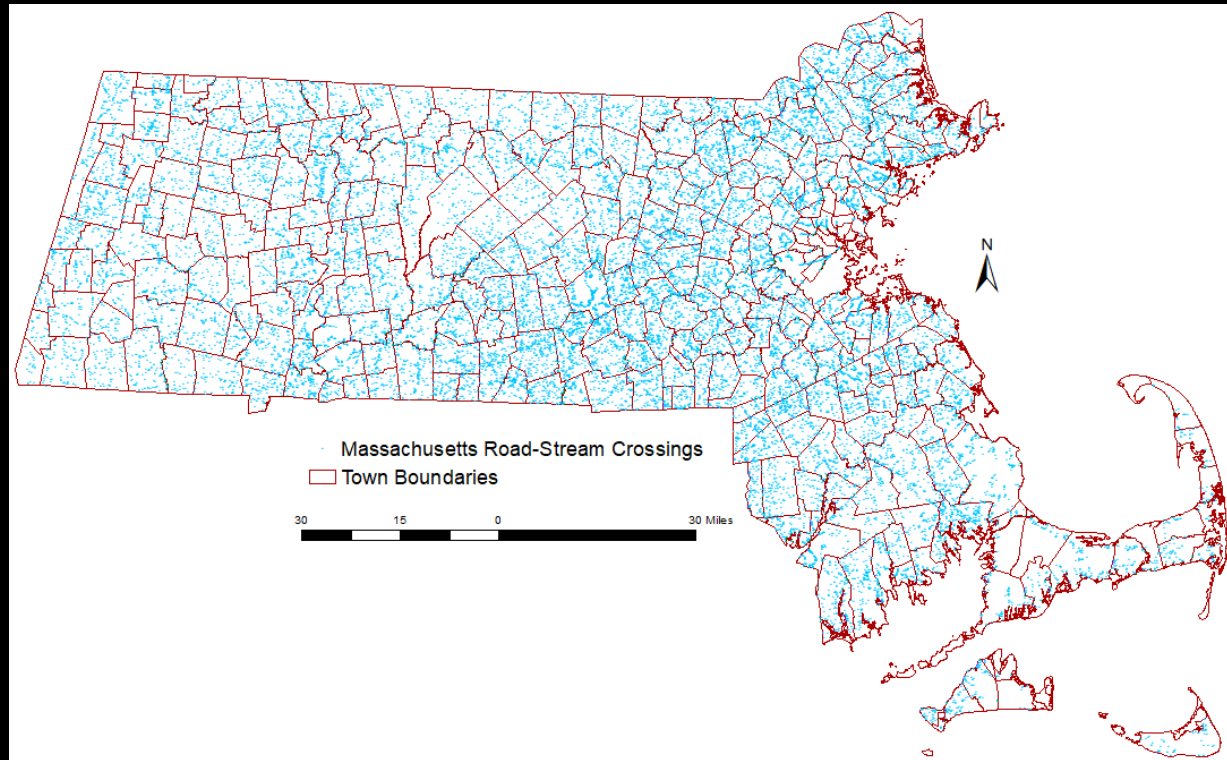
Engineering Support
Construction Assistance
Biological Monitoring

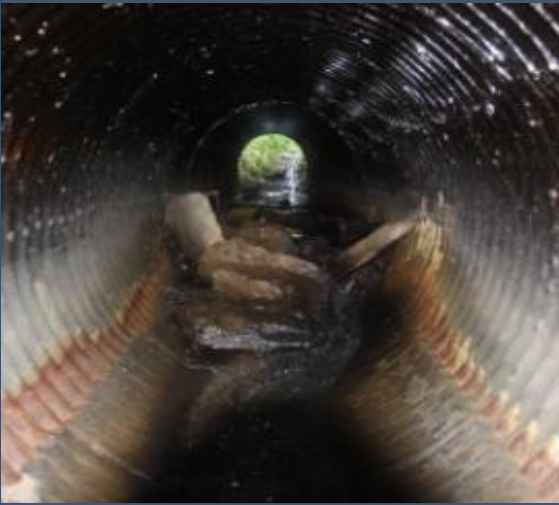
Road-Stream Crossings

In Massachusetts, there is on average a road-stream crossing every 1.2 road miles and every 0.5 stream miles.

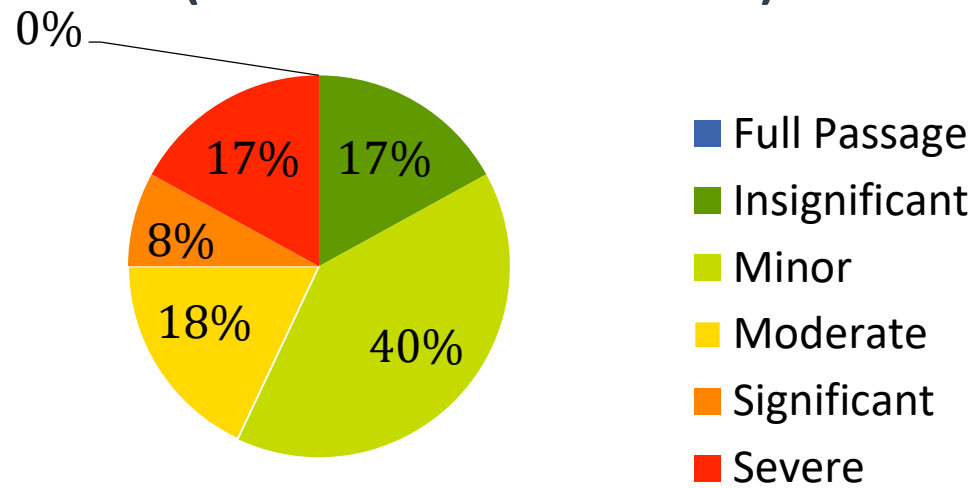
Est. 29,000 culverts and small bridges

~ 6,400 assessed in MA





Existing Barriers to Fish Passage (Closed Bottom Culverts)



No Closed-Bottom Culverts Provide Full Passage.

Failing & Undersized Culverts

- Blocks movement of fish & wildlife
i.e. thermal refuge, spawning habitat, road mortality
- Prone to clogging with sediment and woody debris
- Higher maintenance and repairs cost
- Increased structure vulnerability
- Flow constrictions scour stream beds and erode transportation structures and banks
- At risk of flooding, road closures, and failure



Mass DOT



Aging and Degrading Infrastructure

North Atlantic Aquatic Connectivity Collaborative (NAACC)



Developed a unified protocol for assessing aquatic passability at road-stream crossings

Coarse level, rapid-assessment of crossings performed by certified Lead Observers to prioritize culvert replacements



Non-tidal Aquatic Connectivity Assessment Certification:

Online Training Protocol (through UMASS OWL)

Field Training (today)

Shadow 20 sites w/ certified observer

L3 (Level 3) Coordinators – central

L2 (Level 2) Coordinators – state/watershed

L1 (Level 1) Coordinators – local

Lead Observers – lead survey teams, collect & enter data

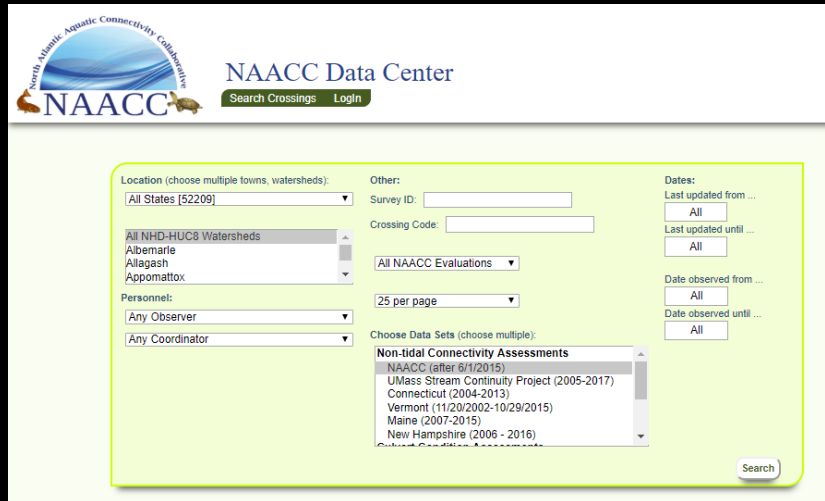


<https://streamcontinuity.org/naacc>

<https://naacc.org/>

NAACC Websites Sites

<https://owl.umass.edu/owl-c/user/loginpage.cgi?UserType=Student&Server=owl-umasscafe>



The NAACC Data Center search interface features a header with the NAACC logo and navigation links for 'Search Crossings' and 'Login'. The main search area is divided into several sections: 'Location (choose multiple towns, watersheds)' with a dropdown for 'All States [52209]'; 'Other' with a 'Survey ID' field and a 'Crossing Code' field; 'Dates' with 'Last updated from' and 'Last updated until' dropdowns; 'Personnel' with 'Any Observer' and 'Any Coordinator' dropdowns; and 'Choose Data Sets (choose multiple)' with a list of 'Non-tidal Connectivity Assessments' including 'NAACC (after 5/1/2015)', 'UMass Stream Continuity Project (2005-2017)', 'Connecticut (2004-2013)', 'Vermont (11/20/2002-10/29/2015)', 'Maine (2007-2015)', and 'New Hampshire (2006 - 2016)'. A '25 per page' dropdown and a 'Search' button are also present.

<https://naacc.org>

<https://streamcontinuity.org/naacc>



The OWL User Login page features the OWL logo and the text 'OWL User Login'. Below this, there is a box containing 'OWL Login', 'Login Page', and 'Login Help'. To the right, the OWL logo is displayed again, followed by the text 'Online Web Learning' and 'Training UMass Center for Agriculture, Food, and the Environment (CAFE / NAACC)'.



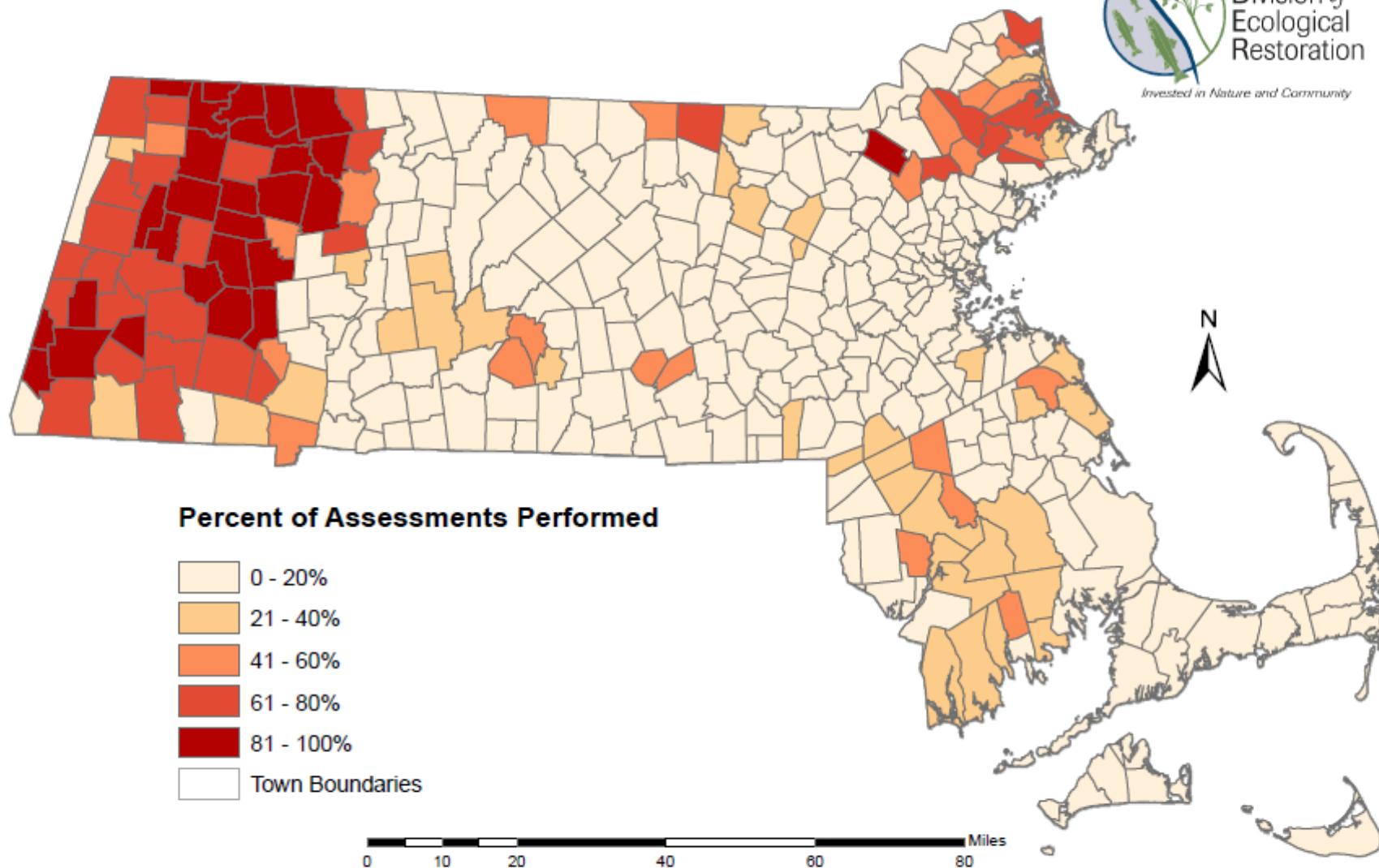
The NAACC website homepage features the NAACC logo and the text 'North Atlantic Aquatic Connectivity Collaborative'. Below this is a navigation bar with links for 'About', 'What's at Stake', 'Assessments', 'Data Center', 'Resources', 'States', 'Projects', 'News & Events', 'FAQ', and 'Donate'. The main content area shows a large image of a stream flowing through a forest, with a large, curved, metallic structure (likely a culvert or bridge) visible. Below the image is a footer with links for 'NAACC Data Center', 'Toolkit', 'Participating States', and 'Get Involved!'. A paragraph of text describes the NAACC as a network of individuals from universities, conservation organizations, and state and federal natural resource and transportation departments focused on improving aquatic connectivity across a thirteen-state region, from Maine to West Virginia.

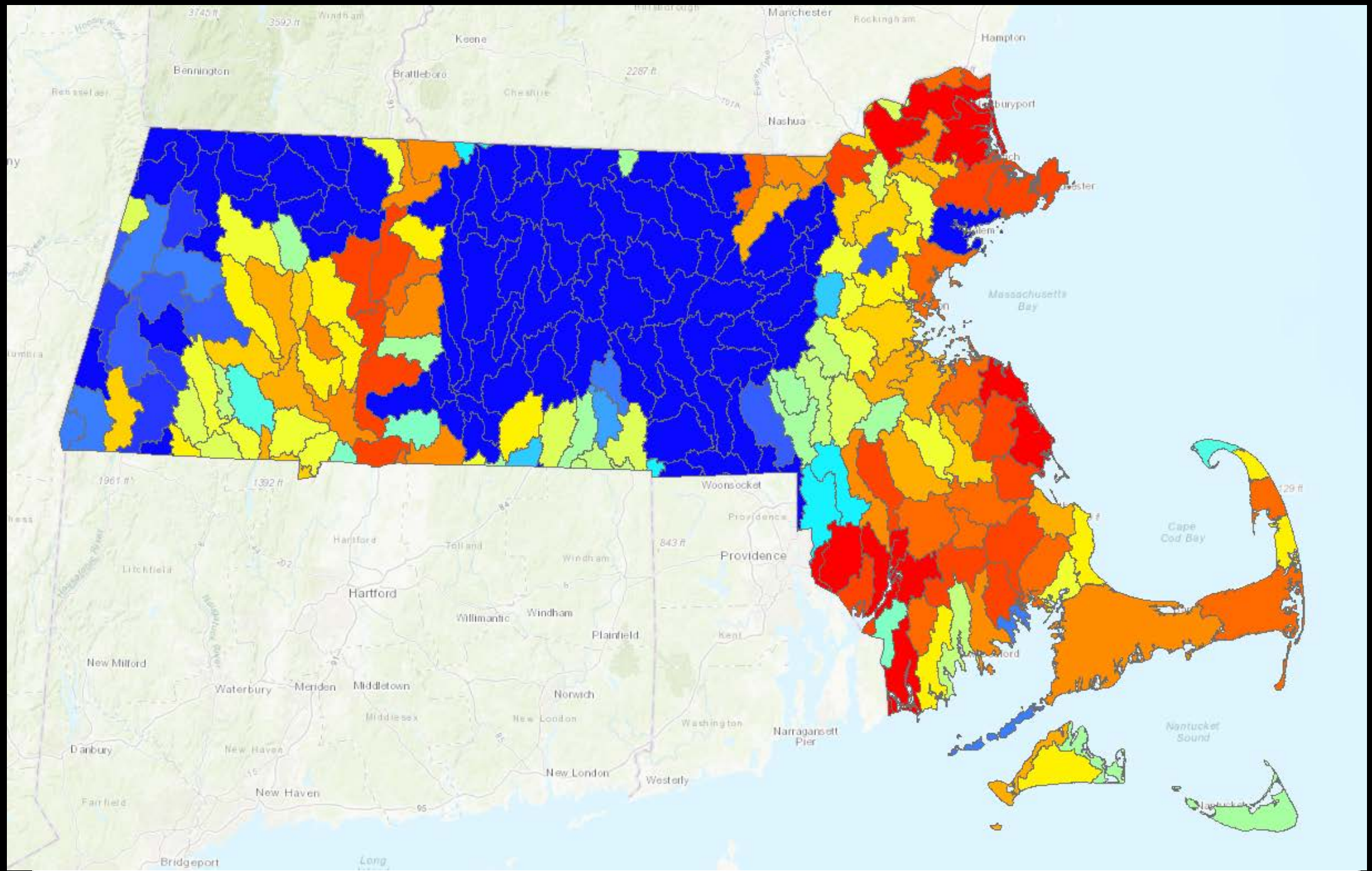
NAACC Assessment Protocols

- **Aquatic Connectivity - Non-tidal**
(online protocols training, field training, and shadow 20 sites with Lead Observer)
- **Aquatic Connectivity - Tidal**
(online Tidal protocols training, field training ...)
- **Structure Condition**
(TBD)
- **Terrestrial Connectivity**
(TBD)

**Proposed Method for Assessing the Vulnerability of Road-Stream Crossings to
Climate Change: Deerfield River Watershed Pilot**

Density of NAACC Stream Crossing Assessments in Massachusetts







2008 Survey



2015 Survey





Culvert Failure



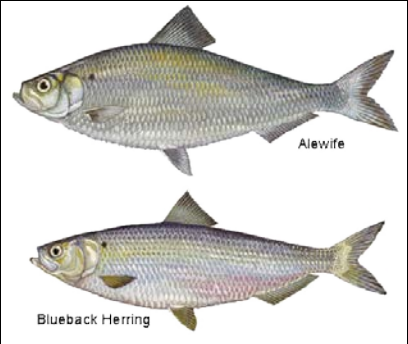
Importance of Small Streams

- Habitat - coldwater
- Biodiversity
- Food Web
- Clean Water
- Flood Control



Ethan Nedeau photo

Micrographia



Alan Richmond



© 1999 Joyce Gross



Barry Wicklow



Robert Jenkins & Noel Burkhead









Project Infrastructure

- Crossing codes
- Protocols & field data forms
- Electronic data collection
- Online Database
 - Data storage & retrieval
 - Scoring
 - Mapping interface
- Prioritizing crossings for assessment
- Data Collection by Certified Lead Observers
- Record Review
- Prioritizing crossings for mitigation
 - TNC Northeast Connectivity Project
 - UMass Critical Linkages Project

Data Set: **NAACC (after 6/1/2015)**

Survey Id: **29524** Crossing Code: **xy4249702673009526**
AOP Coarse Screen: **No AOP** NAACC Aquatic Passability Score: **0.03**
Data checked and accurate by Carrie Banks on 02-25-2016



[xy4249702673009526/downstream/08-10-2015.jpg](#)



[xy4249702673009526/inlet/08-10-2015.jpg](#)



[xy4249702673009526/outlet/08-10-2015.jpg](#)



[xy4249702673009526/upstream/08-10-2015.jpg](#)

Non-tidal Aquatic Connectivity Crossing Data

Database Entry By: No data

Coordinator: Carrie Banks

GPS to Crossing Distance (meters): 18.6

Crossing Code: xy4249702673009526

Date Observed: 08-10-2015

Town/County: Windsor, MA

Road: Route 9

GPS: Lat: 42.49715, Long: -73.00967

Location Description: Where high tension power lines cross Route 9

Crossing Type: Culvert

Flow Condition: Typical low-flow

Tidal Site: No

Road Fill Height (feet) : 22

Bankfull Width Confidence: Low/Estimated

Tailwater Scour Pool: None

Crossing Comments: Circa 1958; USGS Regression Bankfull = 16.9 ft; Apron 30' wide downstream, metal. Cage w/ 4' spacing. 10" wide girder (beams) frame over upstream side collecting woody debris that blocks flow

Entry Date: 02-25-2016

Last Updated: 02-25-2016

NHD-HUC8 Watershed: Westfield

Local ID: No data

Lead Observer: Eric Comeau

Stream/River: Shaw Brook

Type: Paved

Number of Culverts/Bridge Cells: 1

Crossing Condition: OK

Alignment: Skewed (>45°)

Bankfull Width (feet): 20

Constriction: Severe

Evaluation of this stream crossing is estimated as: **SEVERE BARRIER**

Non-tidal Aquatic Connectivity Structure Data

Total Number of Culverts: 1

This is culvert number 1 for this crossing:

Outlet Openness Ratio: 0.296

Outlet Shape: Box Culvert

Outlet Grade: Cascade

Outlet drop to water surface (feet): 2.0

Structure Length: L = 265.0 Feet

Structure Material: Concrete

Outlet Armoring: Extensive

Outlet dimensions (feet): A = 8.0; B = 10.0; C = 7.0; D = 0.20 ; E= No data

Outlet drop to stream bottom (feet): 4.0

Inlet Openness Ratio: 0.299

Inlet Type: Mitered to Slope

Inlet dimensions (feet): A = 8.0; B = 10.0; C = 6.5; D = 0.10

Inlet Shape: Box Culvert

Inlet Grade: Inlet Drop

Slope Percent: No data

Internal Structures: None

Structure Substrate Matches Stream: None

Structure Substrate Coverage: None

Severity: Minor

Water velocity matches that of the stream? Yes

Height above dry passage: No data

Structure Comments: No data

Slope Confidence: No data

Internal Structures Comment: No data

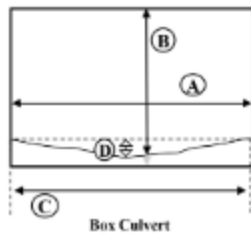
Structure Substrate Type: None

Physical Barriers: Debris/Sediment/Rock

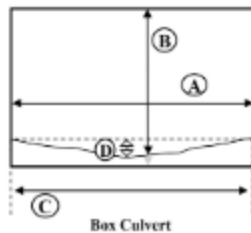
Water depth matches that of the stream? Yes

Dry passage through structure? No

Inlet Shape:



Outlet Shape:



Data Set: NAACC (after 6/1/2015)

Survey Id: 76254 Crossing Code: xy4226776572744046

AOP Coarse Screen: No AOP NAACC Aquatic Passability Score: 0.48

Data checked and accurate by Jake Lehan on 03-12-2020

Table 1 below identifies characteristics and conditions that allow crossings to be classified as providing "Full AOP," "Reduced AOP," or "No AOP."

Table 1. NAACC Coarse Screen

Metric	Flow Condition	Crossing Classification		
		Full AOP	Reduced AOP	No AOP
		<i>If all are true</i>	<i>If any are true</i>	<i>If any are true</i>
Inlet Grade		At Stream Grade	Inlet Drop or Perched	
Outlet Grade		At Stream Grade		Cascade, Free Fall onto Cascade
Outlet Drop to Water Surface		= 0		≥ 1 ft
Outlet Drop to Water Surface/ Outlet Drop to Stream Bottom				> 0.5
Inlet or Outlet Water Depth	Typical-Low	> 0.3 ft		< 0.3 ft w/Outlet Drop to Water Surface > 0
	Moderate	> 0.4 ft		< 0.4 ft w/Outlet Drop to Water Surface > 0
Structure Substrate Matches Stream		Comparable or Contrasting		
Structure Substrate Coverage		100%	< 100%	
Physical Barrier Severity		None	Minor or Moderate	Severe

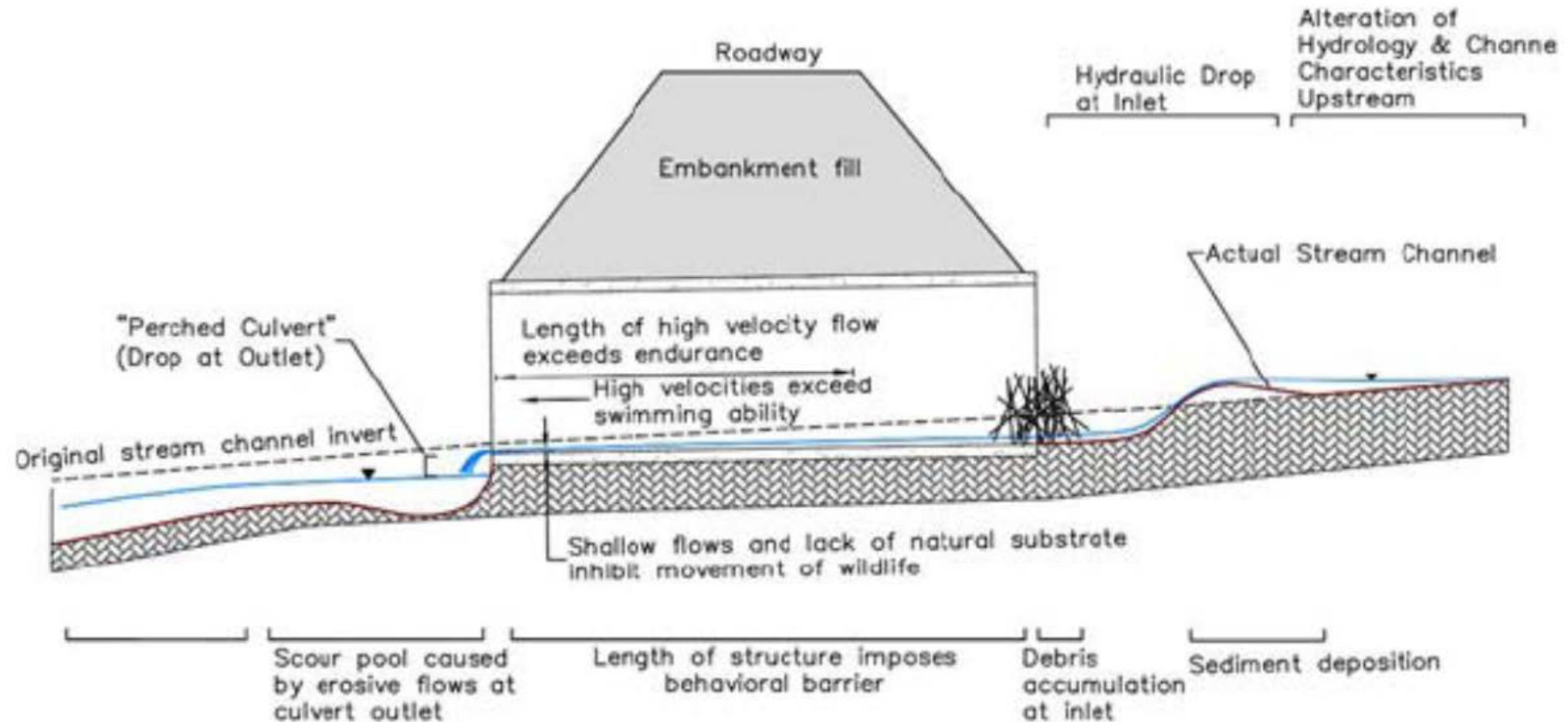
Table 3. Weights associated with each parameter in the scoring algorithm.

parameter	weight
Outlet drop	0.161
Physical barriers	0.135
Constriction	0.090
Inlet grade	0.088
Water depth	0.082
Water velocity	0.080
Scour pool	0.071
Substrate matches stream	0.070
Substrate coverage	0.057
Openness	0.052
Height	0.045
Outlet armoring	0.037
Internal structures	0.032

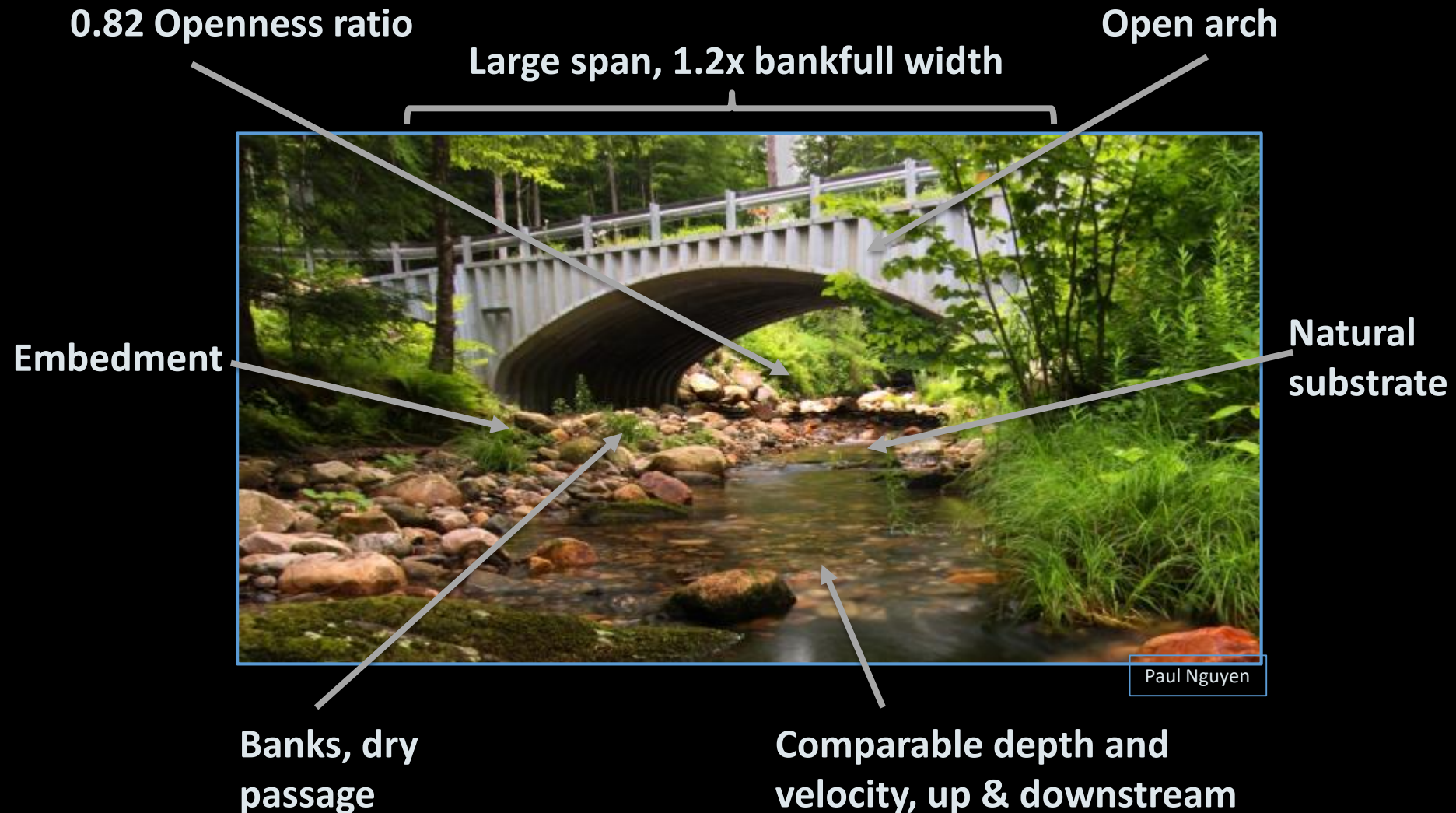
Descriptor	Aquatic Passability Score(s)
No barrier	1.0
Insignificant barrier	0.80 – 0.99
Minor barrier	0.60 – 0.79
Moderate barrier	0.40 – 0.59
Significant barrier	0.20 – 0.39
Severe barrier	0.00 – 0.19


Conditions affecting wildlife passage at culverts

(Source: MassDOT Highway Division Stream Crossing Handbook)



Massachusetts Stream Crossing Standards (SCS)



The background image shows a stream flowing through a rocky landscape. A large, corrugated metal culvert is visible, with water cascading over its edge. A person is standing in the stream, holding a long measuring tape vertically to gauge the water depth. The surrounding area is filled with rocks and some green vegetation.

Estimated 1.5 hr per crossing

= 30min assessment + 30min travel + 30min data upload
- 30min if using Offline Data Manager (ODM)

Deerfield River Watershed (2014) – Partnered with UMass & Trout Unlimited, NFWF New England Forest and River funds

Westfield River Watershed (2015) – Wild & Scenic Rivers

Palmer, MA (2020) – Matching state culvert replacements with NAACC assessments

Ipswich River Watershed Association (2014 & 2018) – Mass. Environmental Trust to develop NAACC Tidal Crossing Protocol and aquatic connectivity assessments w/ funding from MET and NFWF Hurricane Sandy

Housatonic Valley Association (HVA) 2016-2018 – create Road-Stream Crossings Management Plans for communities with NFWF New England Forest and River funds



Behave Safely!

Park your vehicle responsibly as to not block traffic

Walk behind guardrails whenever possible

Look Both Ways When Crossing the Street!

Do not survey during high flow conditions!

Coordinates do not have to be taken from the middle of the road

Watch your footing!

L1 Coordinator may set restrictions on what types of structures Lead

Observers assess, i.e. no interstate hwy, bridges larger than 40 ft, railroads etc

Survey in teams of 2-3 people

Wear High Visibility Colors

Use Traffic Cones

Be **SAFE** out there!

Equipment Checklist

NAACC Data Forms
Instruction Guide
Tablets (if using ODM)
GPS Units
Digital Cameras
Flashlight
Batteries
Pen/Pencil
Waders

Tape Reel
Pocket Rods
Stadia Rod
(All in Decimal Feet)

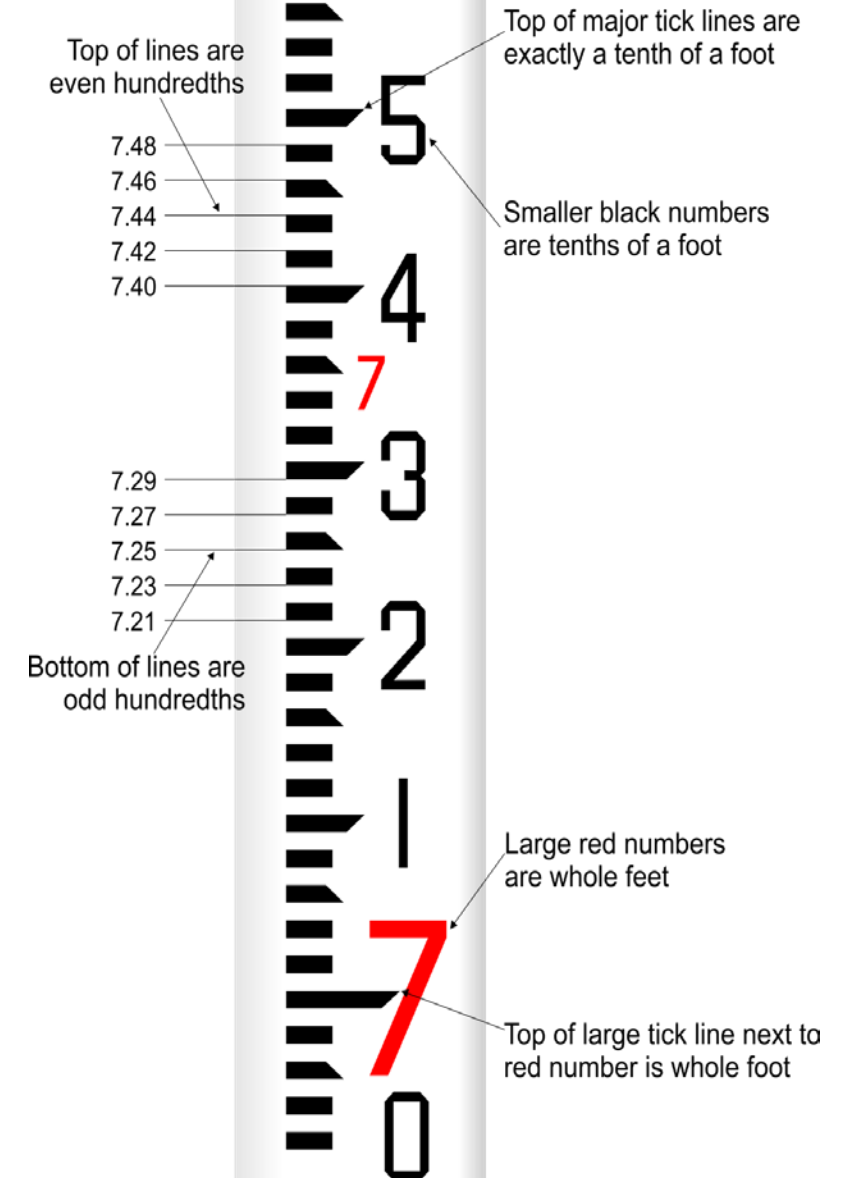
Optional:
Rangefinder
Measuring wheel



Help stop the spread of invasives!



Safety Cones
Team Members



NAACC Stream Crossing Survey

NAACC Stream Crossing Survey Data Form Instruction Guide



Developed by the

North Atlantic Aquatic Connectivity Collaborative

Including: University of Massachusetts Amherst
The Nature Conservancy
U.S. Fish and Wildlife Service

Version 1.2 – May 2016

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(207) 781-8364; alexoabbott@hotmail.com

For more information, go to: www.streamcontinuity.org

NAACC		AQUATIC CONNECTIVITY Stream Crossing Survey DATA FORM		DATE/USER ENTER BY: _____ REVIEW DATE: _____ DATA ENTRY REVIEWED BY: _____ REVIEW DATE: _____		
CROSSING DATA	Crossing Code _____		Local ID (Optional) _____			
	Date Observed (dd/mm/yyyy) _____		Lead Observer _____			
	Town/County _____		Stream _____			
	Road _____		Type <input type="checkbox"/> MULTILANE <input type="checkbox"/> DIVED <input type="checkbox"/> UNPAVED <input type="checkbox"/> DRIVEWAY <input type="checkbox"/> RAIL <input type="checkbox"/> RAIL ROAD			
	GPS Coordinates (Decimal degree) _____		_____			
	Location Description					
	Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING		Number of Culverts/ Bridge Cells _____			
	<input type="checkbox"/> BUILT-D STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UP-STREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE					
	Photo IDs <input type="checkbox"/> LEFT <input type="checkbox"/> OUTLET <input type="checkbox"/> UPSTREAM <input type="checkbox"/> DOWNSTREAM <input type="checkbox"/> OTHER _____					
	Flow Condition <input type="checkbox"/> NO FLOW <input type="checkbox"/> TYPICAL LOW <input type="checkbox"/> MODERATE <input type="checkbox"/> HIGH		Crossing Condition <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> NEW <input type="checkbox"/> UNKNOWN			
Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (deg) _____		Road Fill Height (Specify event to road surface/bridge = ft) _____		
Bankfull Width (optional) _____		Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS FULL CHANNEL & BANKS		
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		<input type="checkbox"/> SPANS ONLY BANKFULL/ACTIVE CHANNEL				
Crossing Comments _____						
OUTLET	STRUCTURE 1					
	Structure Material <input type="checkbox"/> METAL <input type="checkbox"/> CONCRETE <input type="checkbox"/> PLASTIC <input type="checkbox"/> WOOD <input type="checkbox"/> ROCK/STONE <input type="checkbox"/> FIBERGLASS <input type="checkbox"/> COMBINATION					
	Outlet Shape <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> FORD <input type="checkbox"/> UNKNOWN <input type="checkbox"/> REMOVED					
	Outlet Grade (check one) <input type="checkbox"/> AT STREAM GRADE <input type="checkbox"/> FREE FALL <input type="checkbox"/> CASCADE <input type="checkbox"/> FREE FALL ONTO CASCADE <input type="checkbox"/> CLOGGED/COLLAPSED/SUBMERGED <input type="checkbox"/> UNKNOWN					
	Outlet Dimensions A. Width _____		B. Height _____		C. Substrate/Water Width _____	
INLET	Outlet Drop to Water Surface _____		Outlet Drop to Stream Bottom _____		E. Abutment Height (Specify # bridges on rd) _____	
	L. Structure Length (Overall length from inlet to outlet) _____					
	Inlet Shape <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> FORD <input type="checkbox"/> UNKNOWN <input type="checkbox"/> REMOVED					
	Inlet Type <input type="checkbox"/> PROJECTING <input type="checkbox"/> HEADWALL <input type="checkbox"/> WINGWALLS <input type="checkbox"/> HEADWALL & WINGWALLS <input type="checkbox"/> MITERED TO SLOPE <input type="checkbox"/> OTHER <input type="checkbox"/> NONE					
	Inlet Grade (check one) <input type="checkbox"/> AT STREAM GRADE <input type="checkbox"/> INLET GRADE <input type="checkbox"/> PERCHED <input type="checkbox"/> CLOGGED/COLLAPSED/SUBMERGED <input type="checkbox"/> UNKNOWN					
ADDITIONAL CONDITIONS	Inlet Dimensions A. Width _____		B. Height _____		C. Substrate/Water Width _____	
	Slope % (check one) _____		Slope Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW		Internal Structures <input type="checkbox"/> NONE <input type="checkbox"/> RAFTERS/AWERS <input type="checkbox"/> SUPPORTS <input type="checkbox"/> OTHER _____	
	Structure Substrate Matches Stream <input type="checkbox"/> NONE <input type="checkbox"/> COMPARABLE <input type="checkbox"/> CONTRASTING <input type="checkbox"/> NOT APPROPRIATE <input type="checkbox"/> UNKNOWN					
	Structure Substrate Type (check one) <input type="checkbox"/> NONE <input type="checkbox"/> SILT <input type="checkbox"/> SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> COBBLE <input type="checkbox"/> BOULDER <input type="checkbox"/> BEDROCK <input type="checkbox"/> UNKNOWN					
	Structure Substrate Coverage <input type="checkbox"/> NONE <input type="checkbox"/> 25% <input type="checkbox"/> 50% <input type="checkbox"/> 75% <input type="checkbox"/> 100% <input type="checkbox"/> UNKNOWN					
	Physical Barriers (check all that apply) <input type="checkbox"/> NONE <input type="checkbox"/> DEBRIS/SEDIMENT/ROCK <input type="checkbox"/> DEFORMATION <input type="checkbox"/> FREE FALL <input type="checkbox"/> FENCING <input type="checkbox"/> DRY <input type="checkbox"/> OTHER _____					
	Severity (Choose carelessly based on barrier type(s) across) <input type="checkbox"/> NONE <input type="checkbox"/> MINOR <input type="checkbox"/> MODERATE <input type="checkbox"/> SEVERE					
Water Depth Matches Stream <input type="checkbox"/> YES <input type="checkbox"/> NO SHALLOWER <input type="checkbox"/> NO DEEPER <input type="checkbox"/> UNKNOWN <input type="checkbox"/> DRY						
Water Velocity Matches Stream <input type="checkbox"/> YES <input type="checkbox"/> NO FASTER <input type="checkbox"/> NO SLOWER <input type="checkbox"/> UNKNOWN <input type="checkbox"/> DRY						
Dry Passage through Structure? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN						
Height above Dry Passage _____						
Comments _____						

Page 1

&

~ 80% of surveys

1

Field Form

Pages 2, 3, 4

Additional
Structure Data

~ 98% of crossings
have 3 or fewer
structures

STRUCTURE 2		Structure Material								METAL			CONCRETE			PLASTIC			WOOD			ROCK/STONE			FIBERGLASS			COMBINATION																	
OUTLET	Outlet Shape	1	2	3	4	5	6	7	FORD	UNKNOWN	REMOVED	Outlet Armoring												NONE	NOT EXTENSIVE	EXTENSIVE																			
	Outlet Grade (Pick one)	AT STREAM GRADE																		FREE FALL	CASCADE	FREE FALL ONTO CASCADE						CLOGGED/COLLAPSED/SUBMERGED						UNKNOWN											
	Outlet Dimensions	A. Width				B. Height				C. Substrate/Water Width				D. Water Depth																															
	Outlet Drop to Water Surface																		Outlet Drop to Stream Bottom						E. Abutment Height (Type 7 bridges only)																				
L. Structure Length (Overall length from inlet to outlet)																																													
INLET	Inlet Shape	1	2	3	4	5	6	7	FORD	UNKNOWN	REMOVED																																		
	Inlet Type	PROJECTING			HEADWALL			WINGWALLS			HEADWALL & WINGWALLS			MITERED TO SLOPE			OTHER			NONE																									
	Inlet Grade (Pick one)	AT STREAM GRADE																		INLET GRADE	PERCHED	CLOGGED/COLLAPSED/SUBMERGED						UNKNOWN																	
	Inlet Dimensions	A. Width				B. Height				C. Substrate/Water Width				D. Water Depth																															
ADDITIONAL CONDITIONS	Slope % (Optional)		Slope Confidence		HIGH		LOW		Internal Structures																NONE	BAFFLES/AWEIRS	SUPPORTS	OTHER																	
	Structure Substrate Matches Stream																							NONE	COMPARABLE	CONTRASTING	NOT APPROPRIATE	UNKNOWN																	
	Structure Substrate Type (Pick one)																							NONE	SILT	SAND	GRAVEL	COBBLE	BOULDER	BEDROCK	UNKNOWN														
	Structure Substrate Coverage																							NONE	25%	50%	75%	100%	UNKNOWN																
	Physical Barriers (Pick all that apply)																							NONE	DEBRIS/SEDIMENT/ROCK	DEFORMATION	FREE FALL	FENCING	DRY	OTHER															
	Severity (Choose carefully based on barrier type(s) above)																							NONE	MINOR	MODERATE	SEVERE																		
	Water Depth Matches Stream																							YES	NO-SHALLOWER	NO-DEEPER	UNKNOWN	DRY																	
	Water Velocity Matches Stream																							YES	NO-FASTER	NO-SLOWER	UNKNOWN	DRY																	
	Dry Passage through Structure?																							YES	NO	UNKNOWN	Height above Dry Passage																		
	Comments																																												
STRUCTURE 3		Structure Material								METAL			CONCRETE			PLASTIC			WOOD			ROCK/STONE			FIBERGLASS			COMBINATION																	
OUTLET	Outlet Shape	1	2	3	4	5	6	7	FORD	UNKNOWN	REMOVED	Outlet Armoring												NONE	NOT EXTENSIVE	EXTENSIVE																			
	Outlet Grade (Pick one)	AT STREAM GRADE																		FREE FALL	CASCADE	FREE FALL ONTO CASCADE						CLOGGED/COLLAPSED/SUBMERGED						UNKNOWN											
	Outlet Dimensions	A. Width				B. Height				C. Substrate/Water Width				D. Water Depth																															
	Outlet Drop to Water Surface																		Outlet Drop to Stream Bottom						E. Abutment Height (Type 7 bridges only)																				
L. Structure Length (Overall length from inlet to outlet)																																													
INLET	Inlet Shape	1	2	3	4	5	6	7	FORD	UNKNOWN	REMOVED																																		
	Inlet Type	PROJECTING			HEADWALL			WINGWALLS			HEADWALL & WINGWALLS			MITERED TO SLOPE			OTHER			NONE																									
	Inlet Grade (Pick one)	AT STREAM GRADE																		INLET GRADE	PERCHED	CLOGGED/COLLAPSED/SUBMERGED						UNKNOWN																	
	Inlet Dimensions	A. Width				B. Height				C. Substrate/Water Width				D. Water Depth																															
ADDITIONAL CONDITIONS	Slope % (Optional)		Slope Confidence		HIGH		LOW		Internal Structures																NONE	BAFFLES/AWEIRS	SUPPORTS	OTHER																	
	Structure Substrate Matches Stream																							NONE	COMPARABLE	CONTRASTING	NOT APPROPRIATE	UNKNOWN																	
	Structure Substrate Type (Pick one)																							NONE	SILT	SAND	GRAVEL	COBBLE	BOULDER	BEDROCK	UNKNOWN														
	Structure Substrate Coverage																							NONE	25%	50%	75%	100%	UNKNOWN																
	Physical Barriers (Pick all that apply)																							NONE	DEBRIS/SEDIMENT/ROCK	DEFORMATION	FREE FALL	FENCING	DRY	OTHER															
	Severity (Choose carefully based on barrier type(s) above)																							NONE	MINOR	MODERATE	SEVERE																		
	Water Depth Matches Stream																							YES	NO-SHALLOWER	NO-DEEPER	UNKNOWN	DRY																	
	Water Velocity Matches Stream																							YES	NO-FASTER	NO-SLOWER	UNKNOWN	DRY																	
	Dry Passage through Structure?																							YES	NO	UNKNOWN	Height above Dry Passage																		
	Comments																																												

Field Form

Page 5

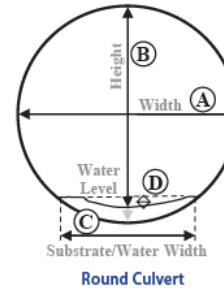
Shape & Dimension Reference

Structure Shape & Dimensions

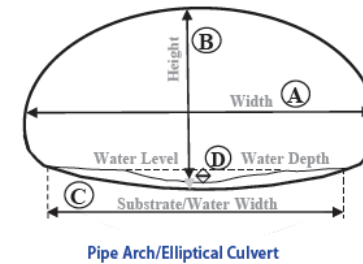
- 1) Select the Structure Shape number from the diagrams below and record it on the form for Inlet and Outlet Shape.
- 2) Record on the form in the appropriate blanks dimensions **A**, **B**, **C** and **D** as shown in the diagrams;
C captures the width of water or substrate, whichever is wider; for dry culverts without substrate, $C = 0$.
D is the depth of water – be sure to measure inside the structure; for dry culverts, $D = 0$.
- 3) Record Structure Length (**L**). (Record abutment height (**E**) only for Type 7 Structures.)
- 4) For multiple culverts, also record the Inlet and Outlet shape and dimensions for each additional culvert.

NOTE: Culverts 1, 2 & 4 may or may not have substrate in them, so height measurements (**B**) are taken from the level of the "stream bed", whether that bed is composed of substrate or just the inside bottom surface of a culvert (grey arrows below show measuring to bottom, black arrows show measuring to substrate).

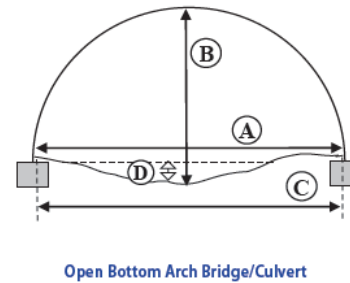
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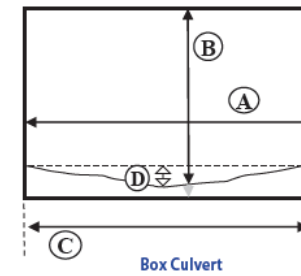
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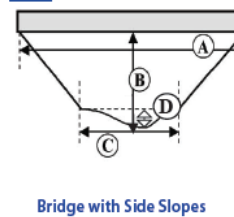
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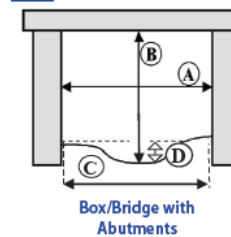
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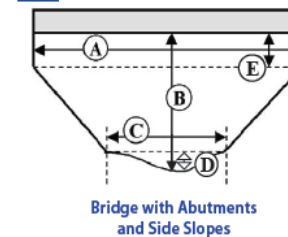
5



6



7



CROSSING DATA

Crossing Code		Local ID (Optional)	
Date Observed (00/00/0000)		Lead Observer	
Town/County		Stream	
Road	Type	<input type="checkbox"/> MULTILANE <input type="checkbox"/> PAVED <input type="checkbox"/> UNPAVED <input type="checkbox"/> DRIVEWAY <input type="checkbox"/> TRAIL <input type="checkbox"/> RAILROAD	
GPS Coordinates (Decimal degrees)		°N Latitude — °W Longitude	
Location Description			

xy44261527037520

44.26152°(N), -70.37520°(W)

50 ft east of Main St, Cold Brook Ave intersection

Crossing Type <input checked="" type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE		Number of Culverts/ Bridge Cells _____
Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____		
Flow Condition <input type="checkbox"/> NO FLOW <input type="checkbox"/> TYPICAL-LOW <input type="checkbox"/> MODERATE <input type="checkbox"/> HIGH		Crossing Condition <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> NEW <input type="checkbox"/> UNKNOWN
Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN	Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (>45°)	Road Fill Height (Top of culvert to road surface; bridge = 0) _____
Bankfull Width (Optional) _____ Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ ACTIVE CHANNEL <input type="checkbox"/> SPANS FULL CHANNEL & BANKS
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		
Crossing Comments _____		



Crossing Type <input type="checkbox"/> BRIDGE <input checked="" type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING		Number of Culverts/ Bridge Cells _____
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Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		
Crossing Comments _____		



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Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE						
Crossing Comments _____ _____ _____						



Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE						Number of Culverts/ Bridge Cells _____
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Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE				<input type="checkbox"/> SPANS FULL CHANNEL & BANKS		
Crossing Comments _____						

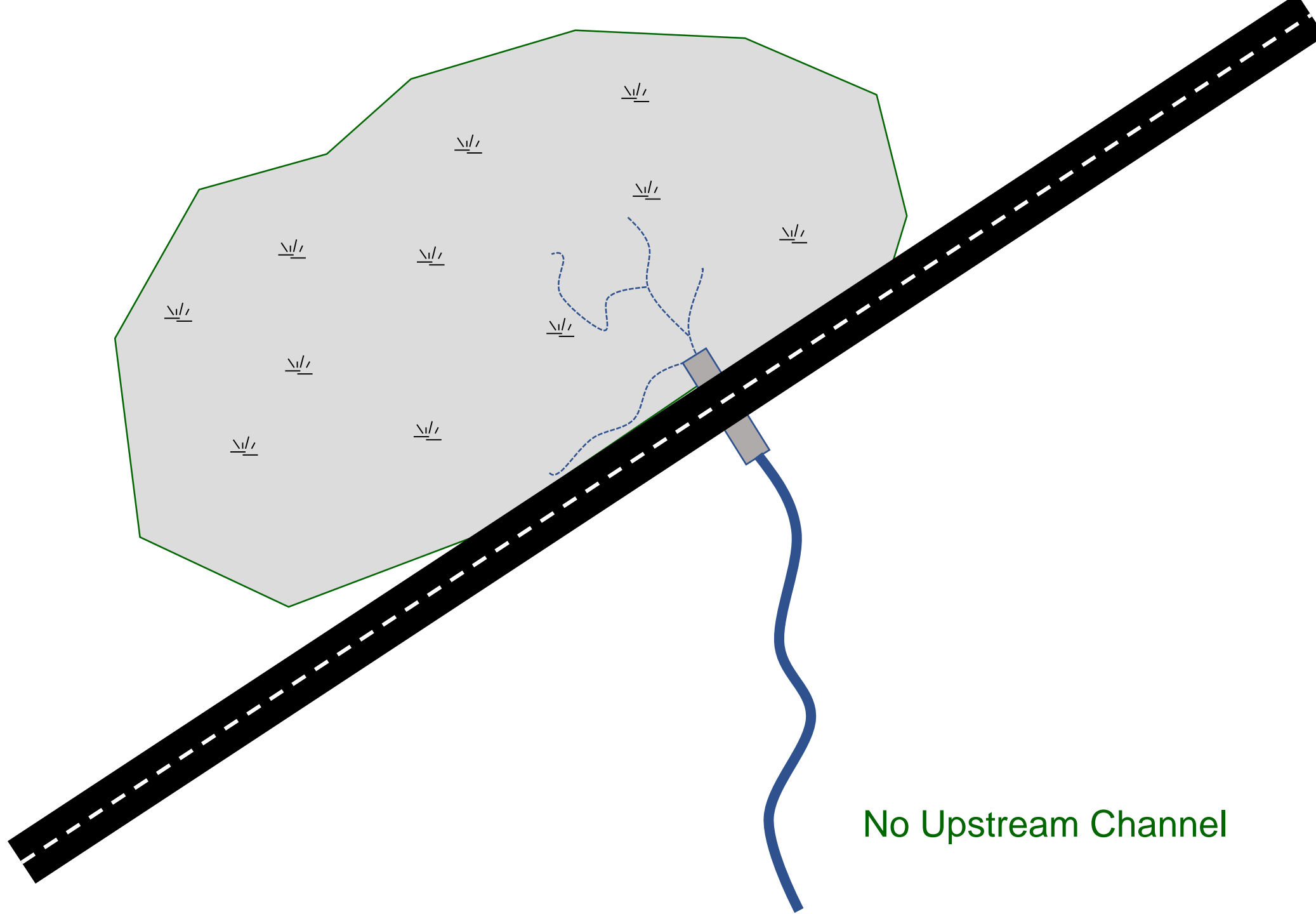
- For when you can access a crossing but can't access the inlet or outlet well enough to collect data
- Observers will be allowed to enter data but validation rules on required fields will be relaxed
- “Inaccessible” reserved for crossings that cannot be assessed at all

No score will be given

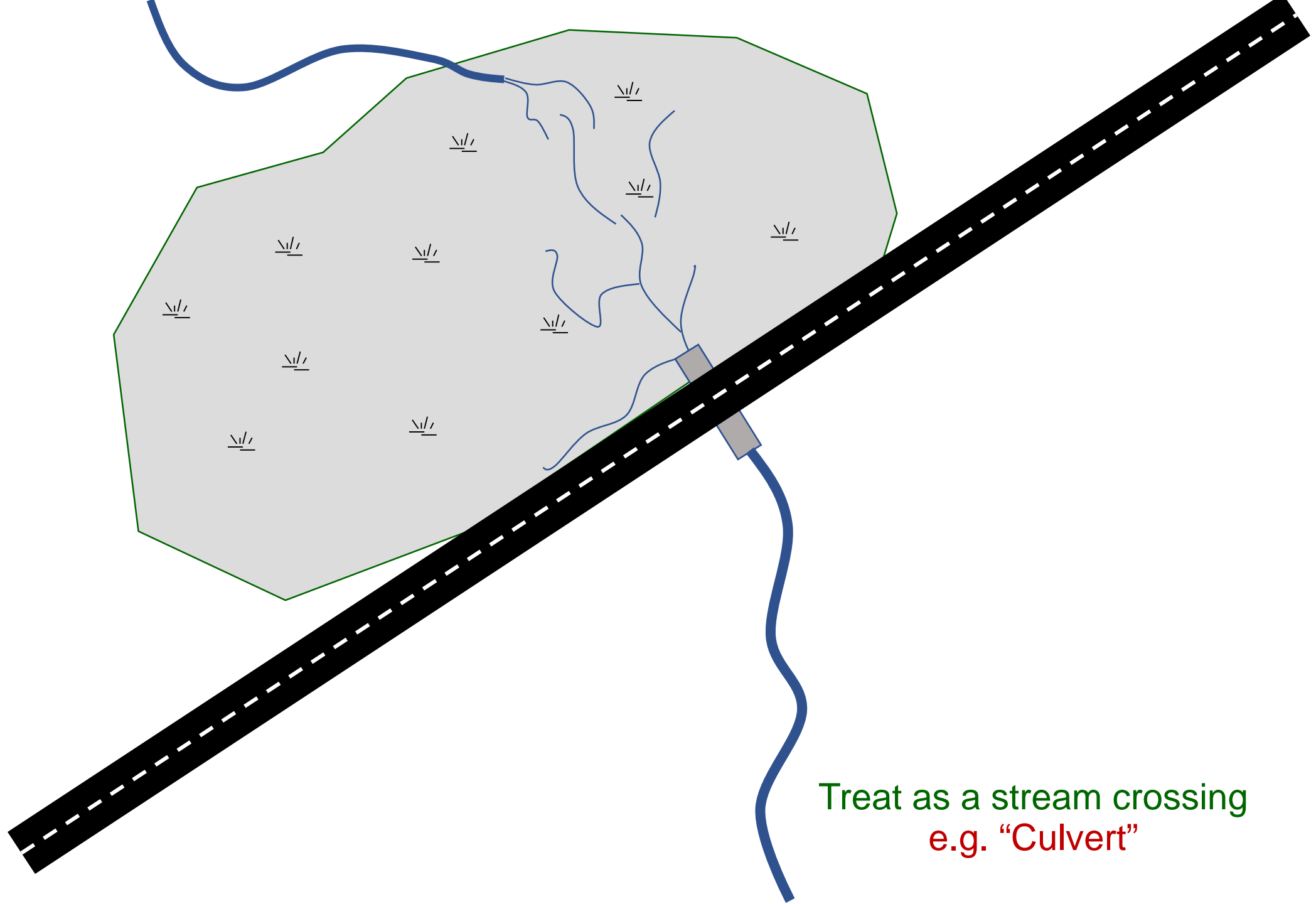
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Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (>45°)		Road Fill Height (Top of culvert to road surface; bridge = 0) _____		
Bankfull Width (Optional) _____		Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ACTIVE CHANNEL <input type="checkbox"/> SPANS FULL CHANNEL & BANKS		
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE						
Crossing Comments						

- Culverts at stream headwater (origin)
- Wetland crossings
- Observers will be allowed to enter data but validation rules on required fields will be relaxed

No score will be given



No Upstream Channel



Treat as a stream crossing
e.g. "Culvert"

Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE						Number of Culverts/ Bridge Cells _____
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Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (>45°)		Road Fill Height (Top of culvert to road surface; bridge = 0) _____		
Bankfull Width (Optional) _____		Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ ACTIVE CHANNEL		
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE				<input type="checkbox"/> <u>SPANS FULL CHANNEL & BANKS</u>		
Crossing Comments _____						

- For major bridges with no doubt about their passability
- OK to bypass these crossings without data collection
- Observers will be allowed to enter data but validation rules on required fields will be relaxed

No Barrier to Fish Passage

* Dry Passage

Bridge Adequate



Not Bridge Adequate



Crossing Type		<input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING									
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Photo IDs		INLET_____		OUTLET_____		UPSTREAM_____		DOWNSTREAM_____		OTHER_____	
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Bankfull Width (Optional)_____		Confidence		<input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction		<input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ ACTIVE CHANNEL			
Tailwater Scour Pool		<input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE									
Crossing Comments											



Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING		Number of Culverts/ Bridge Cells _____
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Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		
Crossing Comments _____		

Flow Level is determined by the stream's water levels relative to bankfull height.

No Flow: typical of drought conditions for perennial streams or seasonal conditions for intermittent or ephemeral streams.

Typical-Low: most common, for summer low flows. Water level in the stream will typically be below the level of non-aquatic vegetation, exposing portions of stream banks and bottom.

Moderate: This value is selected when recent rains have raised water levels at or above the level of herbaceous (non-woody) stream bank vegetation.

High: This value is only selected rarely when flows are very high relative to stream banks making crossing surveys very difficult or impossible, normally due to very recent, or ongoing major rain events.

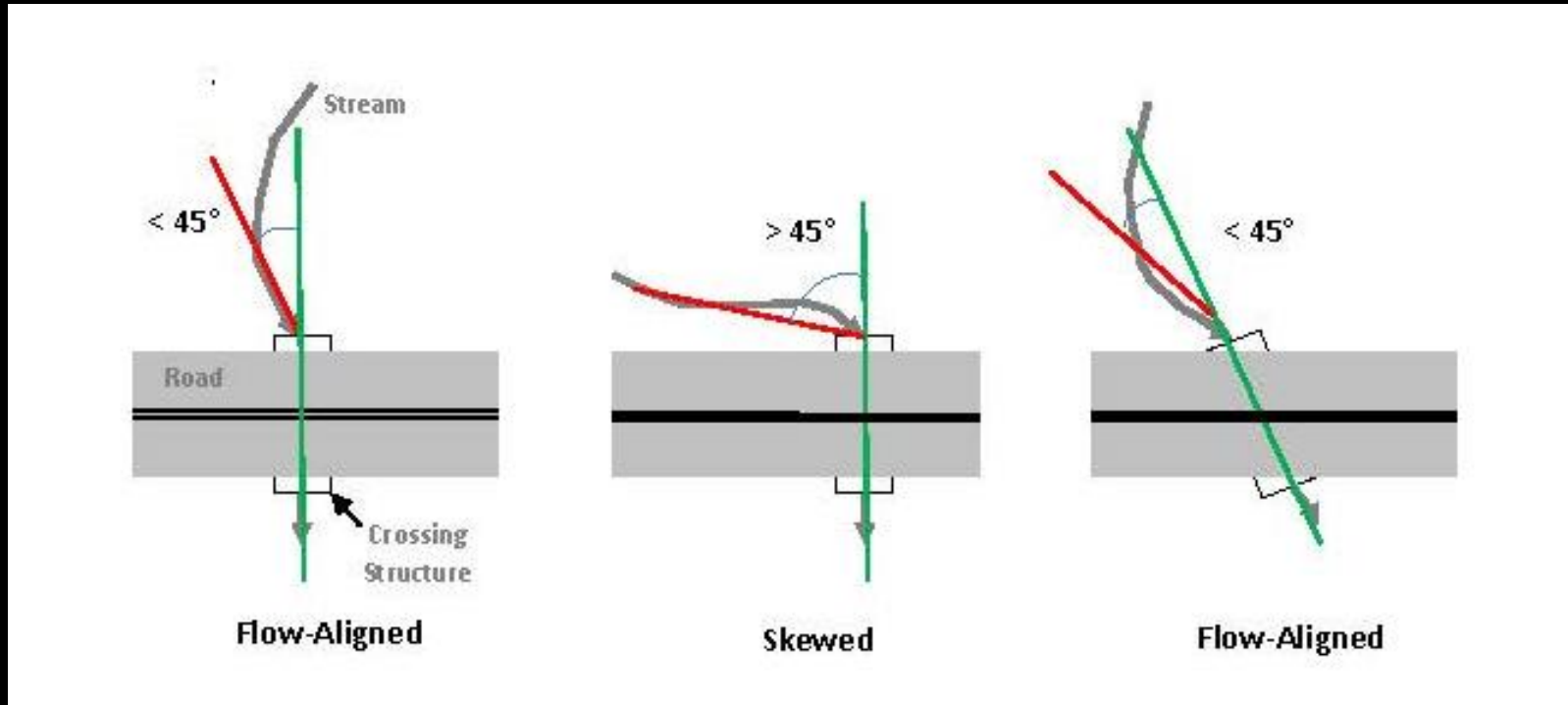
Flow Conditions



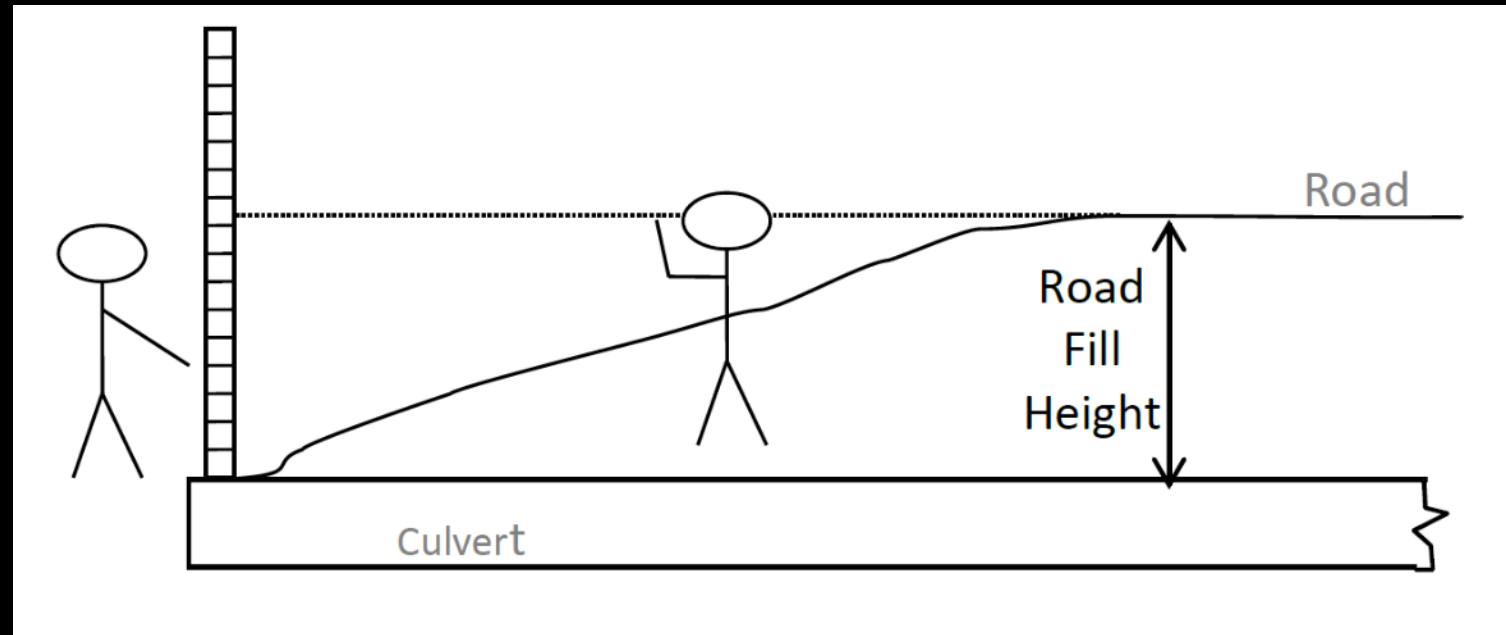
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Crossing Comments _____		



Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE		Number of Culverts/ Bridge Cells _____
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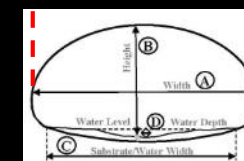
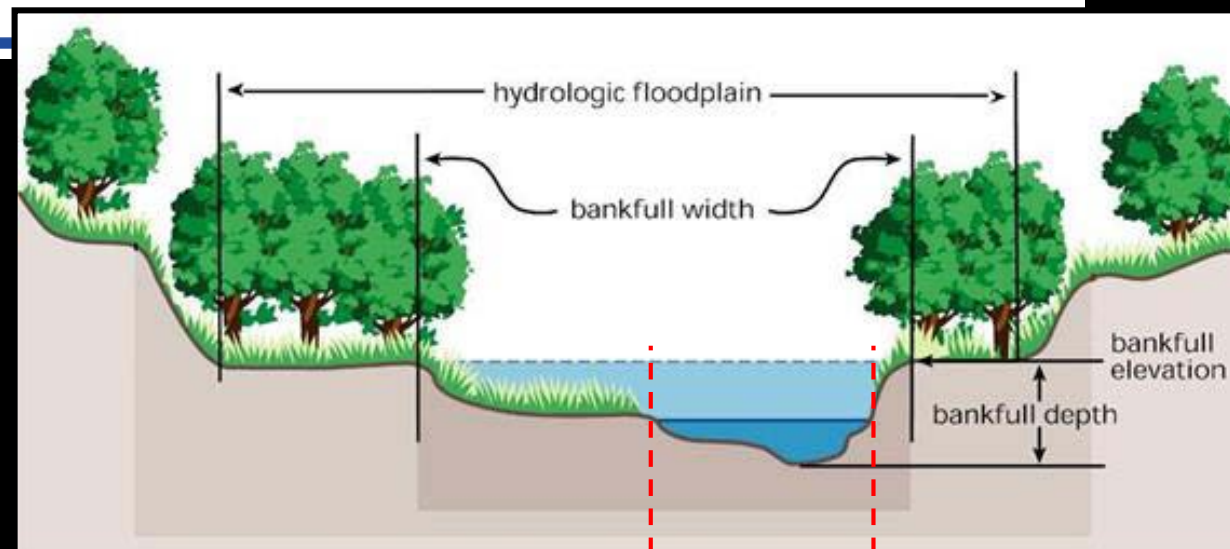
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Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		
Crossing Comments _____		

Indicators of Bankfull Width

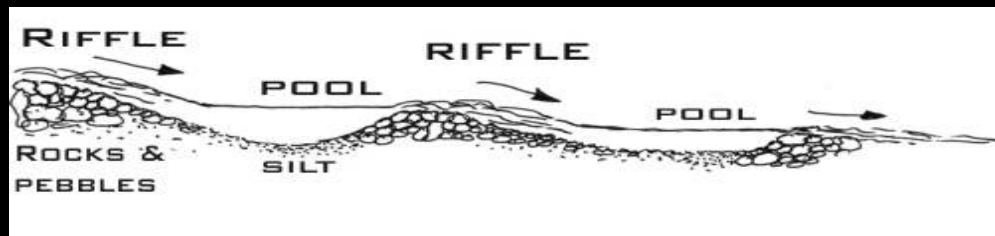
- Abrupt transition from bank to floodplain
- Top of point bars
- Bank undercuts
- Changes in bank material
- Change in vegetation



Bankfull Width Confidence: High or Low/Estimate

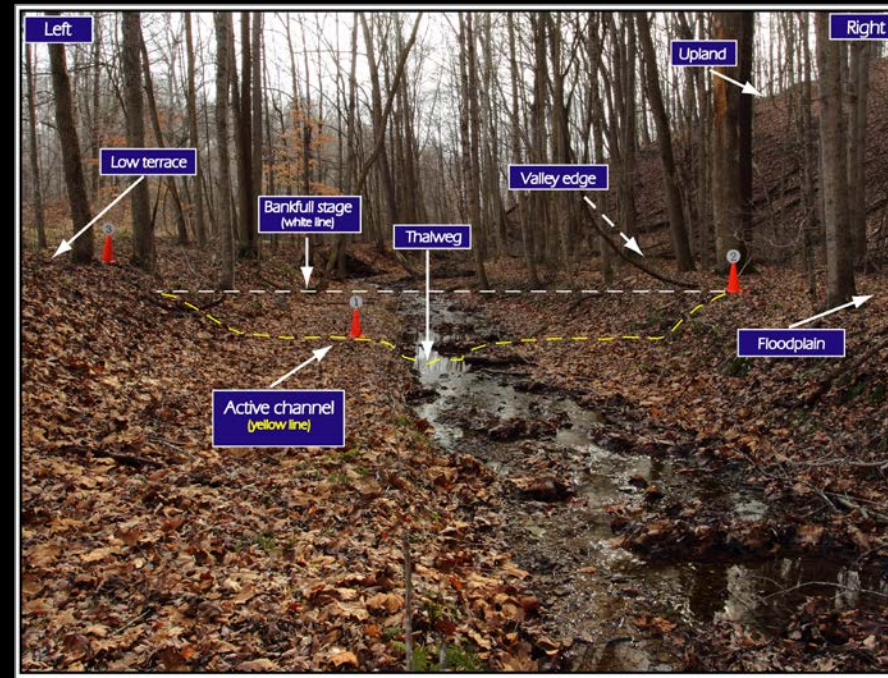
High

- Average of 3 measurements
- Typically upstream of the crossing
- **Outside the influence of the structure**
- Natural Reference Reach
- NAACC recommends 10 to 20 times the width of the stream, upstream of the culvert
- At the top of a riffle before a pool



Low/Estimate

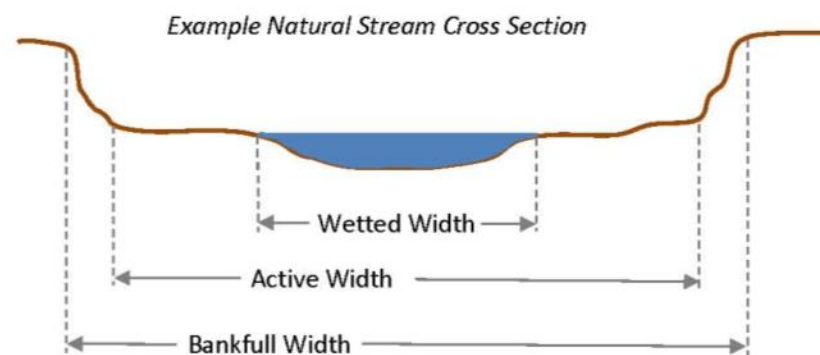
- Braided stream channels
- Feeder streams or tributaries before your reference reach
- Channelizing, i.e bank reinforcement
- Measured on a bend (depositional point bar)
- Large rocks and Debris
- Est. b/c of an impoundment/pond
- USGS StreamStats
- Eyeballed



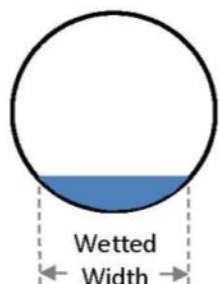
Bankfull Width



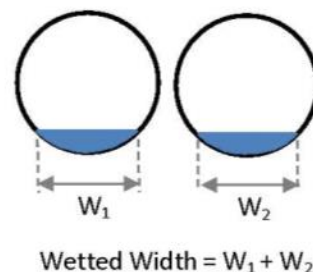
Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE		Number of Culverts/ Bridge Cells _____
Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____		
Flow Condition <input type="checkbox"/> NO FLOW <input type="checkbox"/> TYPICAL-LOW <input type="checkbox"/> MODERATE <input type="checkbox"/> HIGH		Crossing Condition <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> NEW <input type="checkbox"/> UNKNOWN
Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN	Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (>45°)	Road Fill Height (Top of culvert to road surface; bridge = 0) _____
Bankfull Width (Optional) _____ Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED	<div style="border: 2px solid red; padding: 5px;"> Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ ACTIVE CHANNEL <input type="checkbox"/> SPANS FULL CHANNEL & BANKS </div>	
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		
Crossing Comments		



Example Culvert Cross Section



Example Multiple Culvert Cross Section



Severe

structure width < 50% Bankfull Width

Moderate

50% Bankfull Width < structure width < 100% Bankfull Width

Spans Only Bankfull/Active Channel

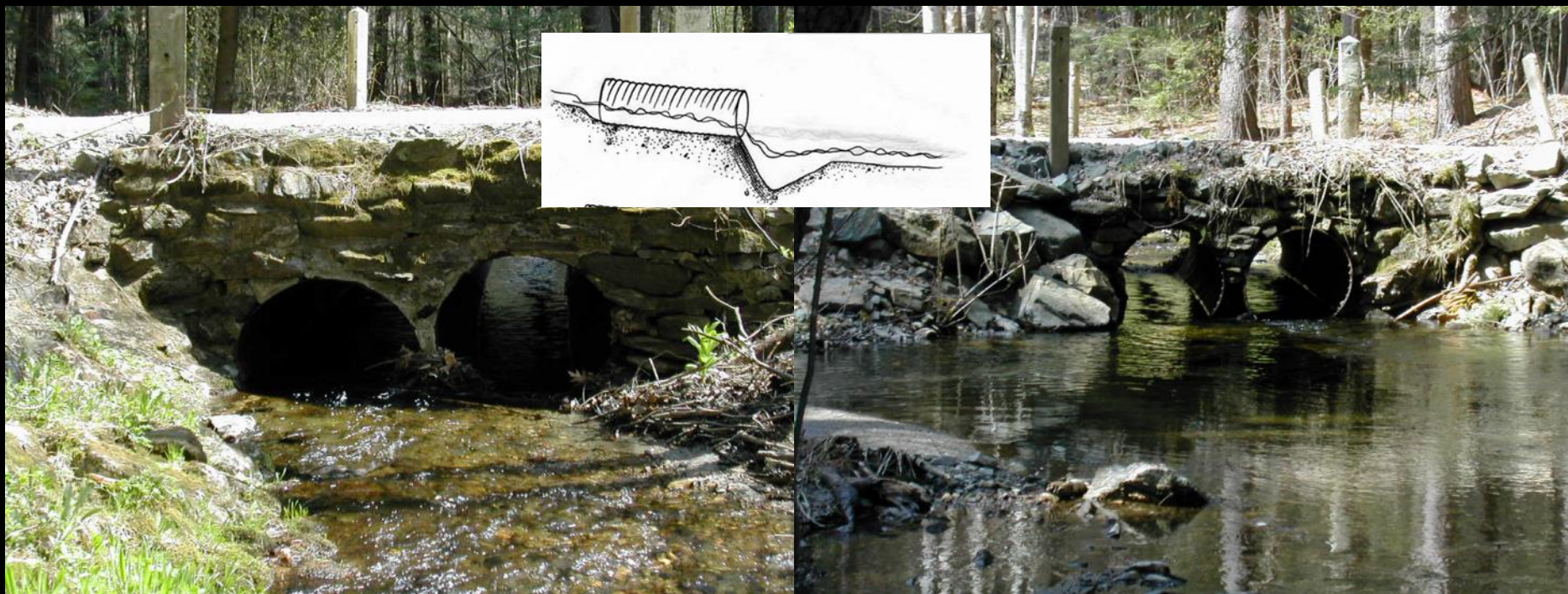
Spans Full Channel and Banks

Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE		Number of Culverts/ Bridge Cells _____
Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____		
Flow Condition <input type="checkbox"/> NO FLOW <input type="checkbox"/> TYPICAL-LOW <input type="checkbox"/> MODERATE <input type="checkbox"/> HIGH		Crossing Condition <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> NEW <input type="checkbox"/> UNKNOWN
Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN	Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (>45°)	Road Fill Height (Top of culvert to road surface; bridge = 0) _____
Bankfull Width (Optional) _____ Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ ACTIVE CHANNEL
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		<input type="checkbox"/> SPANS FULL CHANNEL & BANKS
Crossing Comments _____		

Tailwater Scour Pool =

Small, if wider or deeper than natural reference

Large, if 2x wider or 2x deeper than natural reference



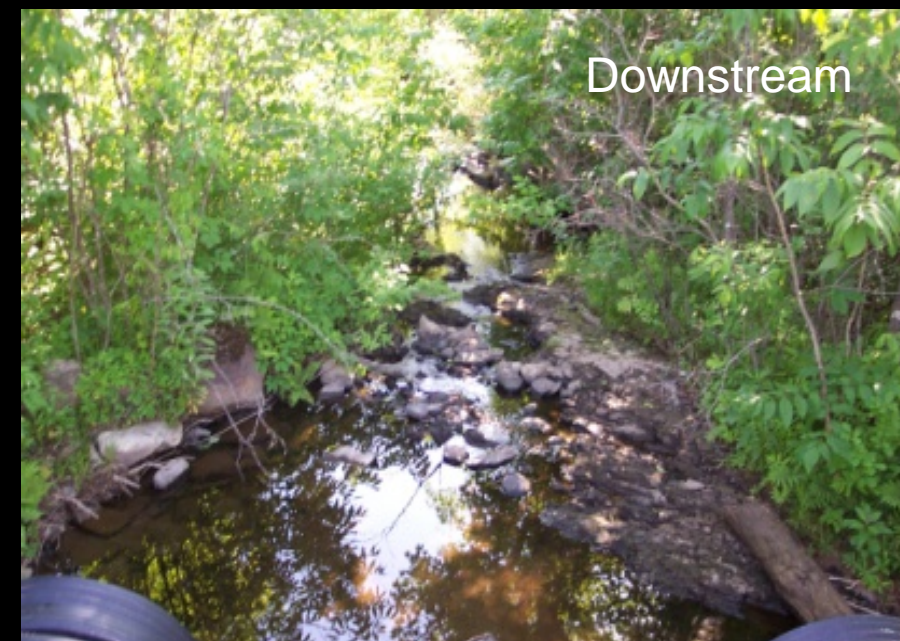


Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE						Number of Culverts/ Bridge Cells _____
Photo IDs INLET_____ OUTLET_____ UPSTREAM_____ DOWNSTREAM_____ OTHER_____						
Flow Condition <input type="checkbox"/> NO FLOW <input type="checkbox"/> TYPICAL-LOW <input type="checkbox"/> MODERATE <input type="checkbox"/> HIGH				Crossing Condition <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> NEW <input type="checkbox"/> UNKNOWN		
Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (>45°)		Road Fill Height (Top of culvert to road surface; bridge = 0)_____		
Bankfull Width (Optional)_____		Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ ACTIVE CHANNEL		
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE				<input type="checkbox"/> SPANS FULL CHANNEL & BANKS		
Crossing Comments _____						

Crossing Photos

Style v. Substance







Upstream



Inlet



Outlet



Downstream

Think
Context!





Like This...











Wow!

Having people in some photos can be great for outreach...





Other photos





Stream Crossing Survey DATA FORM

ENTRY DATE
REVIEW DATE

CROSSING DATA

Crossing Code	Local ID (Optional)	
Date Observed (00/00/0000)	9/2/11	Lead Observer
Town/County	Upton Rd	Stream
Road	Grafton Rd	Type
GPS Coordinates (Decimal degrees)	42.20245	PAVED UNPAVED DRIVEWAY TRAIL RAILROAD
Location Description	1	71.62621
Crossing Type	BRIDGE	NO CROSSING REMOVED CROSSING
BURIED STREAM	INACCESSIBLE	NO UPSTREAM CHANNEL
Photo IDs	INLET 23:34 OUTLET 23:28	DOWNSTREAM 23:29 OTHER
Flow Condition	NO FLOW	TYPICAL-LOW MODERATE HIGH
Tidal Site	YES	NO
Bankfull Width (Optional)	10.5	Confidence
Tailwater Scour Pool	NONE	SMALL LARGE
Crossing Comments	Asphalt intact, see back in plot	

STRUCTURE 1

Outlet Shape	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Outlet Grade	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Outlet Dimensions	A. Width	5.4	B. Height	5.5	C. Substrate/Water Width	0.0	D. Water Depth	0.0																																																																																												
Outlet Drop to Water Surface	0.0	Outlet Drop to Stream Bottom	0.0	E. Abutment Height (Type 7 bridges only)	NA																																																																																															

L. Structure Length (Overall length from inlet to outlet)

Inlet Shape 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Inlet Type

Inlet Grade (Pick one) 1 AT STREAM GRADE 2 PERCHED 3 CLOGGED/COLLAPSED/SUBMERGED 4 UNKNOWN

Inlet Dimensions A. Width 5.4 B. Height 5.4 C. Substrate/Water Width 0.0 D. Water Depth 0.0

Slope % (Optional) Slope Confidence HIGH LOW Internal Structures NONE BAFFLES/WEIRS SUPPORTS OTHER

Structure Substrate Matches Stream NONE COMPARABLE NOT APPROPRIATE UNKNOWN

Structure Substrate Type (Pick one) NONE SILT SAND GRAVEL COBBLE BOULDER BEDROCK UNKNOWN

Structure Substrate Coverage NONE 25% 50% 75% 100% UNKNOWN

Physical Barriers (pick all that apply) NONE DEBRIS/SEDIMENT/ROCK DEFORMATION FREE FALL FENCING DRY OTHER

Severity (Choose carefully based on barrier type(s) above) NONE MINOR MODERATE SEVERE

Water Depth Matches Stream YES NO-SHALLOWER NO-DEEPER UNKNOWN DRY

Water Velocity Matches Stream YES NO-FASTER NO-SLOWER UNKNOWN DRY

Dry Passage through Structure? YES NO UNKNOWN Height above Dry Passage

Comments

Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> INACCESSIBLE <input type="checkbox"/> PARTIALLY INACCESSIBLE <input type="checkbox"/> NO UPSTREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE				Number of Culverts/ Bridge Cells _____	
Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____					
Flow Condition <input type="checkbox"/> NO FLOW <input type="checkbox"/> TYPICAL-LOW <input type="checkbox"/> MODERATE <input type="checkbox"/> HIGH			Crossing Condition <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> NEW <input type="checkbox"/> UNKNOWN		
Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (>45°)		Road Fill Height (Top of culvert to road surface; bridge = 0) _____	
Bankfull Width (Optional) _____		Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS ONLY BANKFULL/ ACTIVE CHANNEL	
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		<input type="checkbox"/> SPANS FULL CHANNEL & BANKS			
Crossing Comments					

Crossing Comments:

- Evidence of utilities
- Date stamp on structure
- Information from talking to neighbors,
ex. how often does this flood?
- Explanation of additional photos and site conditions,
ex. stonewall acting as a dam 45 ft upstream
- “bankfull estimated from USGS Stream Stats”

AQUATIC CONNECTIVITY
Stream Crossing Survey
DATA FORM

DATA BASE ENTRY BY	ENTRY DATE
DATA ENTRY REVIEWED BY	REVIEW DATE

CROSSING DATA	Crossing Code _____	Local ID (Optional) _____
	Date Observed (MM/DD/YYYY) _____	Lead Observer _____
	Town/County _____	Stream _____
	Road _____	Type <input type="checkbox"/> MULTILANE <input type="checkbox"/> PAVED <input type="checkbox"/> UNPAVED <input type="checkbox"/> DRIVEWAY <input type="checkbox"/> RAIL <input type="checkbox"/> RAILROAD
	GPS Coordinates (Decimal degrees) <input type="text"/> ° <input type="text"/> ' <input type="text"/> " N Latitude — <input type="text"/> ° <input type="text"/> ' <input type="text"/> " W Longitude	
	Location Description	
Crossing Type <input type="checkbox"/> BRIDGE <input type="checkbox"/> CULVERT <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> NO CROSSING <input type="checkbox"/> REMOVED CROSSING <input type="checkbox"/> BURIED STREAM <input type="checkbox"/> ACCESSIBLE <input type="checkbox"/> PARTIALLY ACCESSIBLE <input type="checkbox"/> NO UPS/STREAM CHANNEL <input type="checkbox"/> BRIDGE ADEQUATE		Number of Culverts/ Bridge Cells <input type="text"/>
Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSIDE _____ OTHER _____		
Flow Condition <input type="checkbox"/> NO FLOW <input type="checkbox"/> TYPICAL LOW <input type="checkbox"/> MODERATE <input type="checkbox"/> HIGH		Crossing Condition <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> NEW <input type="checkbox"/> UNKNOWN
Tidal Site <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN	Alignment <input type="checkbox"/> FLOW-ALIGNED <input type="checkbox"/> SKEWED (45°)	Road Fill Height (Top of culvert to road surface; bridge = DL) _____
Bankfull Width (Optional) _____ Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW/ESTIMATED		Constriction <input type="checkbox"/> SEVERE <input type="checkbox"/> MODERATE <input type="checkbox"/> SPANS FULL CHANNEL & BANKS
Tailwater Scour Pool <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE		<input type="checkbox"/> SPANS ONLY BANKFULL/ACTIVE CHANNEL
Crossing Comments		

STRUCTURE 1		Structure Material										WOOD										ROCK/STONE										FIBERGLASS										COMBINATION									
OUTLET	Outlet Shape	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> FORD <input type="checkbox"/> UNKNOWN <input type="checkbox"/> REMOVED										Outlet Armoring										<input type="checkbox"/> NONE <input type="checkbox"/> NOT EXTENSIVE <input type="checkbox"/> EXTENSIVE																													
	Outlet Grade (pick one)	<input type="checkbox"/> AT STREAM GRADE <input type="checkbox"/> FREE FALL <input type="checkbox"/> CASCADE <input type="checkbox"/> FREE FALL ONTO CASCADE <input type="checkbox"/> CLOGGED/COLLAPSED/SUBMERGED <input type="checkbox"/> UNKNOWN																																																	
	Outlet Dimensions	A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____																																																	
	Outlet Drop to Water Surface _____	Outlet Drop to Stream Bottom _____										E. Abutment Height (Type / bridges only) _____																																							
	L. Structure Length (Overall length from inlet to outlet) _____																																																		
INLET	Inlet Shape	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> FORD <input type="checkbox"/> UNKNOWN <input type="checkbox"/> REMOVED																																																	
	Inlet Type	<input type="checkbox"/> PROJECTING <input type="checkbox"/> HEADWALL <input type="checkbox"/> WINGWALLS <input type="checkbox"/> HEADWALL & WINGWALLS <input type="checkbox"/> WATERED TO SLOPE <input type="checkbox"/> OTHER <input type="checkbox"/> NONE																																																	
	Inlet Grade (pick one)	<input type="checkbox"/> AT STREAM GRADE <input type="checkbox"/> INLET GRADE <input type="checkbox"/> PERCHED <input type="checkbox"/> CLOGGED/COLLAPSED/SUBMERGED <input type="checkbox"/> UNKNOWN																																																	
	Inlet Dimensions	A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____																																																	
	Slope % (estimate) _____	Slope Confidence <input type="checkbox"/> HIGH <input type="checkbox"/> LOW										Internal Structures										<input type="checkbox"/> NONE <input type="checkbox"/> BA-FLES/WEIRS <input type="checkbox"/> SUPPORTS <input type="checkbox"/> OTHER _____																													
ADDITIONAL CONDITIONS	Structure Substrate Matches Stream <input type="checkbox"/> NONE <input type="checkbox"/> COMPARABLE <input type="checkbox"/> CONTRASTING <input type="checkbox"/> NOT APPROPRIATE <input type="checkbox"/> UNKNOWN																																																		
	Structure Substrate Type (pick one) <input type="checkbox"/> NONE <input type="checkbox"/> SILT <input type="checkbox"/> SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> COBBLE <input type="checkbox"/> BOULDER <input type="checkbox"/> BEDROCK <input type="checkbox"/> UNKNOWN																																																		
	Structure Substrate Coverage <input type="checkbox"/> NONE <input type="checkbox"/> 25% <input type="checkbox"/> 50% <input type="checkbox"/> 75% <input type="checkbox"/> 100% <input type="checkbox"/> UNKNOWN																																																		
	Physical Barriers (pick all that apply) <input type="checkbox"/> NONE <input type="checkbox"/> DEBRIS/SEDIMENT/ROCK <input type="checkbox"/> DEFORMATION <input type="checkbox"/> FREE FALL <input type="checkbox"/> FENCING <input type="checkbox"/> DRY <input type="checkbox"/> OTHER _____																																																		
	Severity (Choose carefully based on barrier type(s) above) <input type="checkbox"/> NONE <input type="checkbox"/> MINOR <input type="checkbox"/> MODERATE <input type="checkbox"/> SEVERE																																																		
	Water Depth Matches Stream <input type="checkbox"/> YES <input type="checkbox"/> NO-SHALLOWER <input type="checkbox"/> NO-DEEPER <input type="checkbox"/> UNKNOWN <input type="checkbox"/> DRY																																																		
	Water Velocity Matches Stream <input type="checkbox"/> YES <input type="checkbox"/> NO-FASTER <input type="checkbox"/> NO-SLOWER <input type="checkbox"/> UNKNOWN <input type="checkbox"/> DRY																																																		
Dry Passage through Structure? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN _____ Height above Dry Passage _____																																																			
Comments _____																																																			

STRUCTURE 1

Structure Material

☐ METAL
 ☐ CONCRETE
 ☐ PLASTIC
 ☐ WOOD
 ☐ ROCK/STONE
 ☐ FIBERGLASS
 ☐ COMBINATION

Outlet Shape

☐ 1
 ☐ 2
 ☐ 3
 ☐ 4
 ☐ 5
 ☐ 6
 ☐ 7
 ☐ FORD
 ☐ UNKNOWN
 ☐ REMOVED

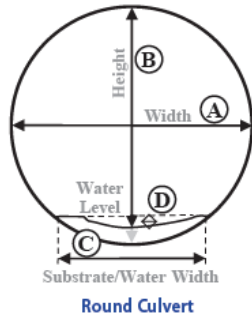
Outlet Armoring

☐ NONE
 ☐ NOT EXTENSIVE
 ☐ EXTENSIVE

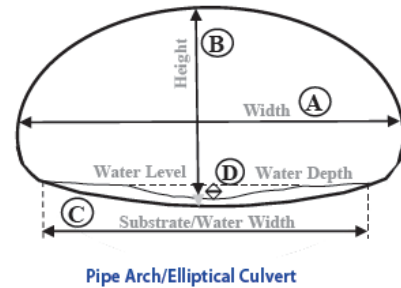
Outlet Grade (Pick one)

☐ AT STREAM GRADE
 ☐ FREE FALL
 ☐ CASCADE
 ☐ FREE FALL ONTO CASCADE
 ☐ CLOGGED/COLLAPSED/SUBMERGED
 ☐ UNKNOWN

1



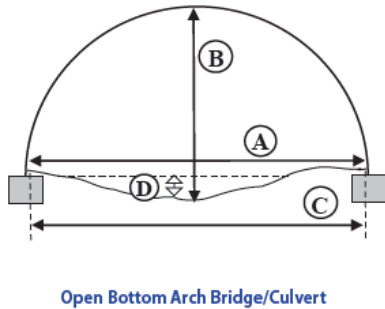
2



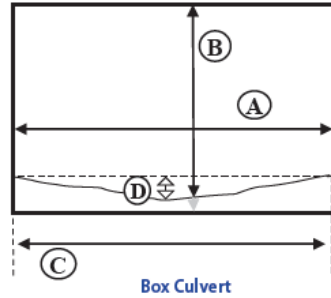
Water Width _____ D. Water Depth _____

E. Abutment Height (Type 7 bridges only) _____

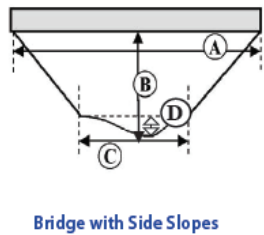
3



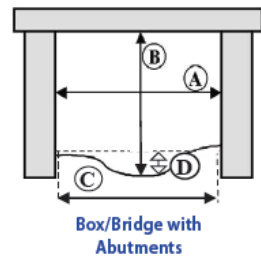
4



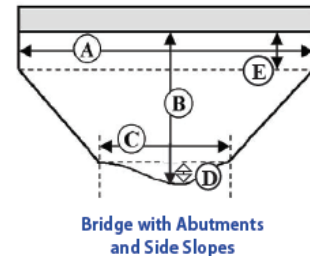
5



6



7



STRUCTURE 1

Structure Material

☐ METAL

☐ CONCRETE

☐ PLASTIC

☐ WOOD

☐ ROCK/STONE

☐ FIBERGLASS

☐ COMBINATION

Outlet Shape

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

☐ FORD

☐ UNKNOWN

☐ REMOVED

Outlet Armoring

☐ NONE

☐ NOT EXTENSIVE

☐ EXTENSIVE

Outlet Grade (Pick one)

☐ AT STREAM GRADE

☐ FREE FALL

☐ CASCADE

☐ FREE FALL ONTO CASCADE

☐ CLOGGED/COLLAPSED/SUBMERGED

☐ UNKNOWN

Outlet Dimensions

A. Width _____

B. Height _____

C. Substrate/Water Width _____

D. Water Depth _____

Outlet Drop to Water Surface _____

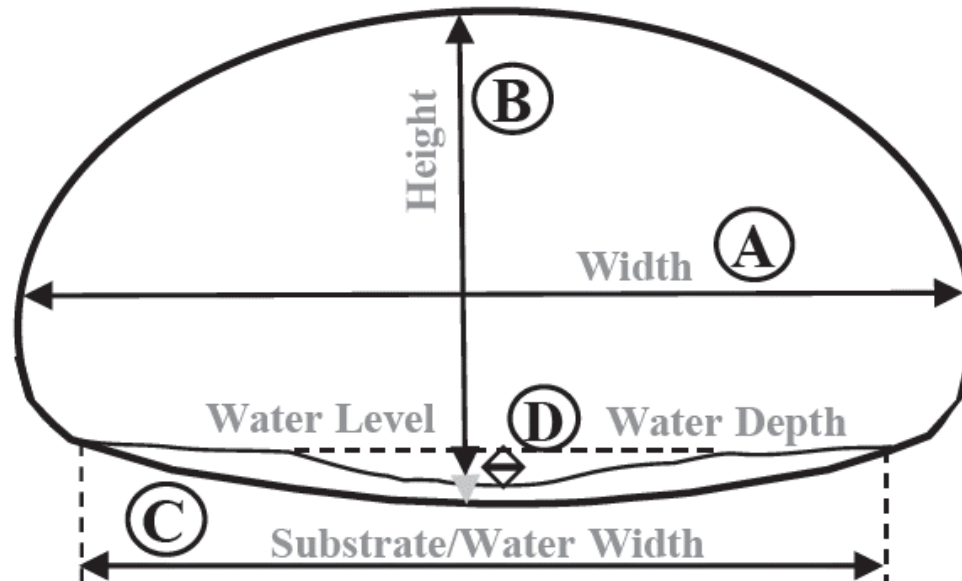
Outlet Drop to Stream Bottom _____

E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) _____

OUTLET

2



Pipe Arch/Elliptical Culvert

STRUCTURE 1

Structure Material

☐ METAL

☐ CONCRETE

☐ PLASTIC

☐ WOOD

☐ ROCK/STONE

☐ FIBERGLASS

☐ COMBINATION

Outlet Shape

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

☐ FORD

☐ UNKNOWN

☐ REMOVED

Outlet Armoring

☐ NONE

☐ NOT EXTENSIVE

☐ EXTENSIVE

OUTLET

Outlet Grade (Pick one)

☐ AT STREAM GRADE

☐ FREE FALL

☐ CASCADE

☐ FREE FALL ONTO CASCADE

☐ CLOGGED/COLLAPSED/SUBMERGED

☐ UNKNOWN

Outlet Dimensions

A. Width _____

B. Height _____

C. Substrate/Water Width _____

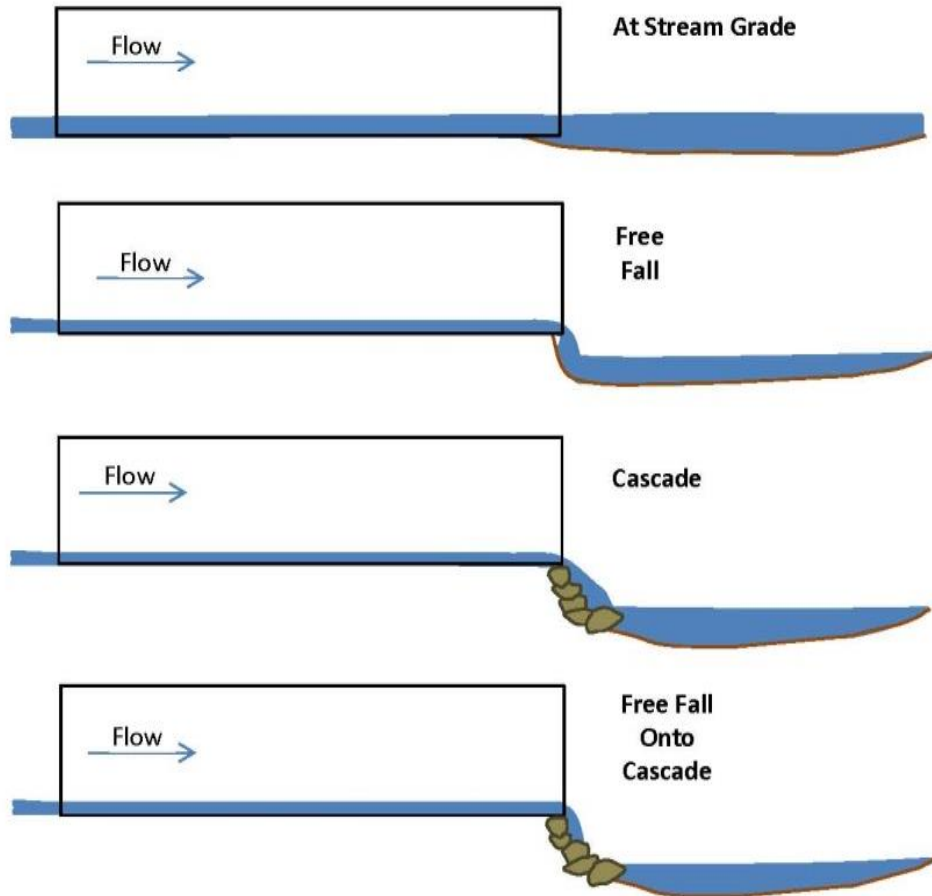
D. Water Depth _____

Outlet Drop to Water Surface _____

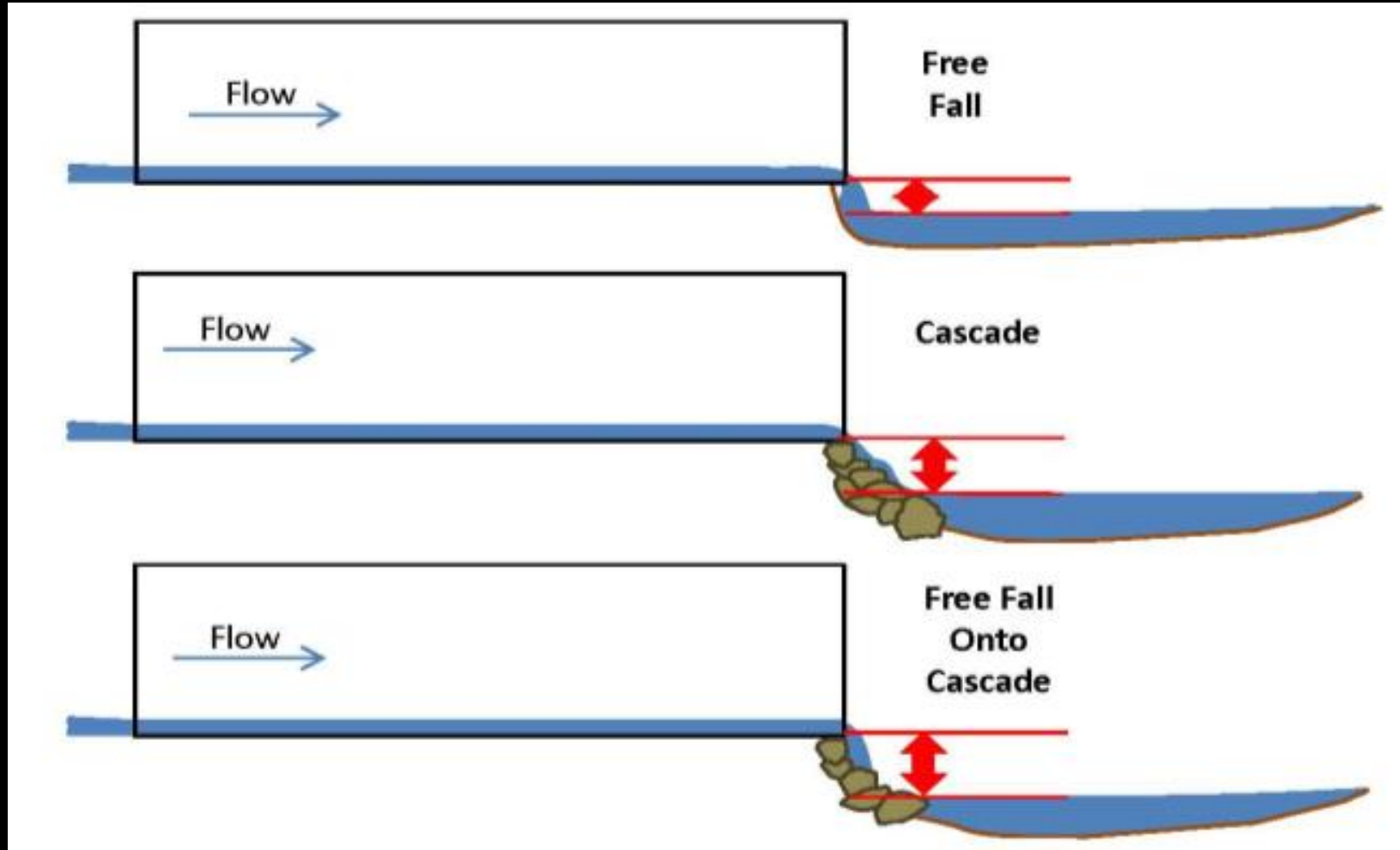
Outlet Drop to Stream Bottom _____

E. Abutment Height (Type 7 bridges only) _____

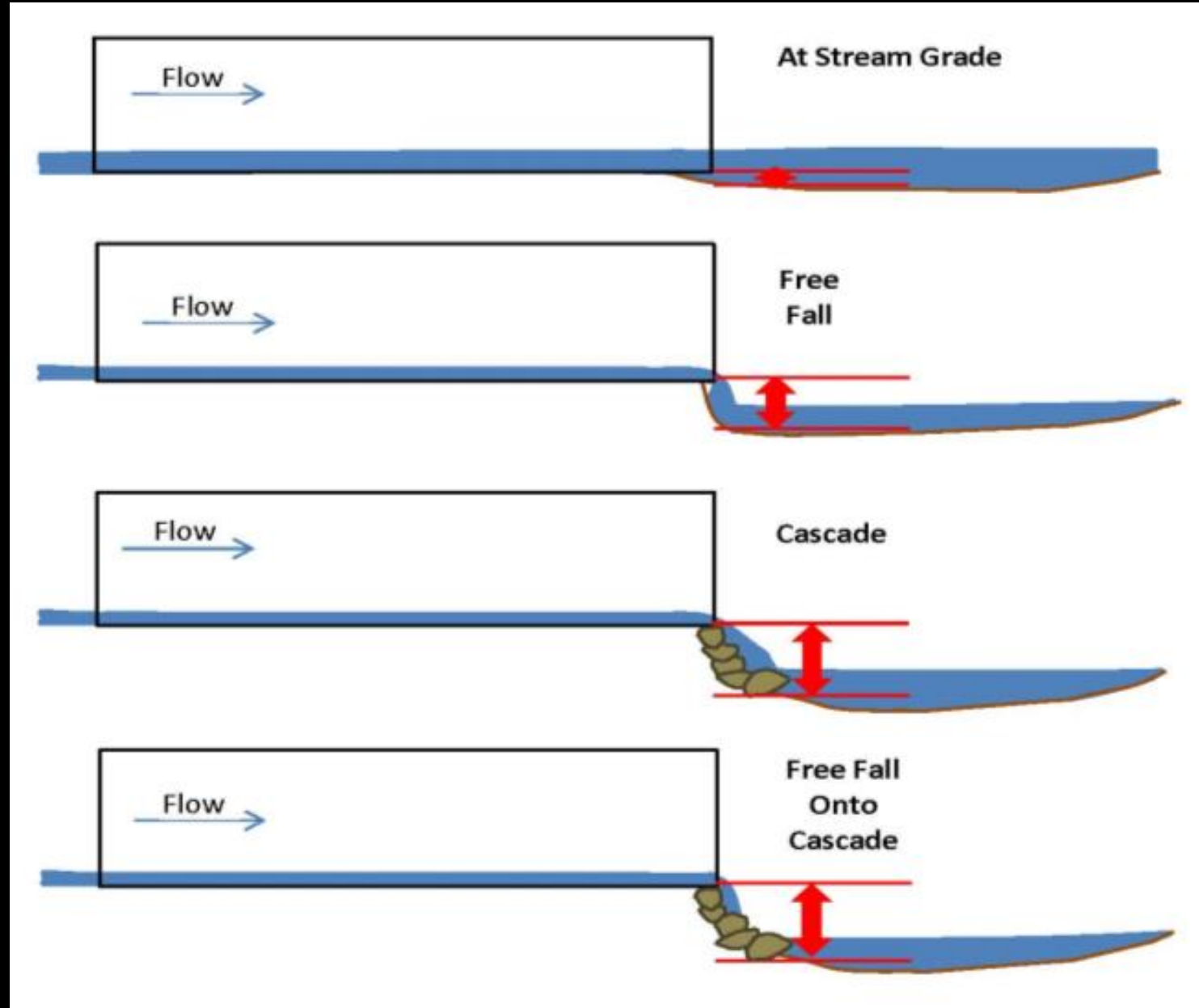
L. Structure Length (Overall length from inlet to outlet) _____



Outlet Drop to Water Surface



Outlet Drop to Stream Bottom





Free Fall



Free Fall Onto Cascade





STRUCTURE 1

Structure Material

☐ METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

Outlet Shape

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring

☐ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one)

☐ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions

A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____

Outlet Drop to Water Surface _____

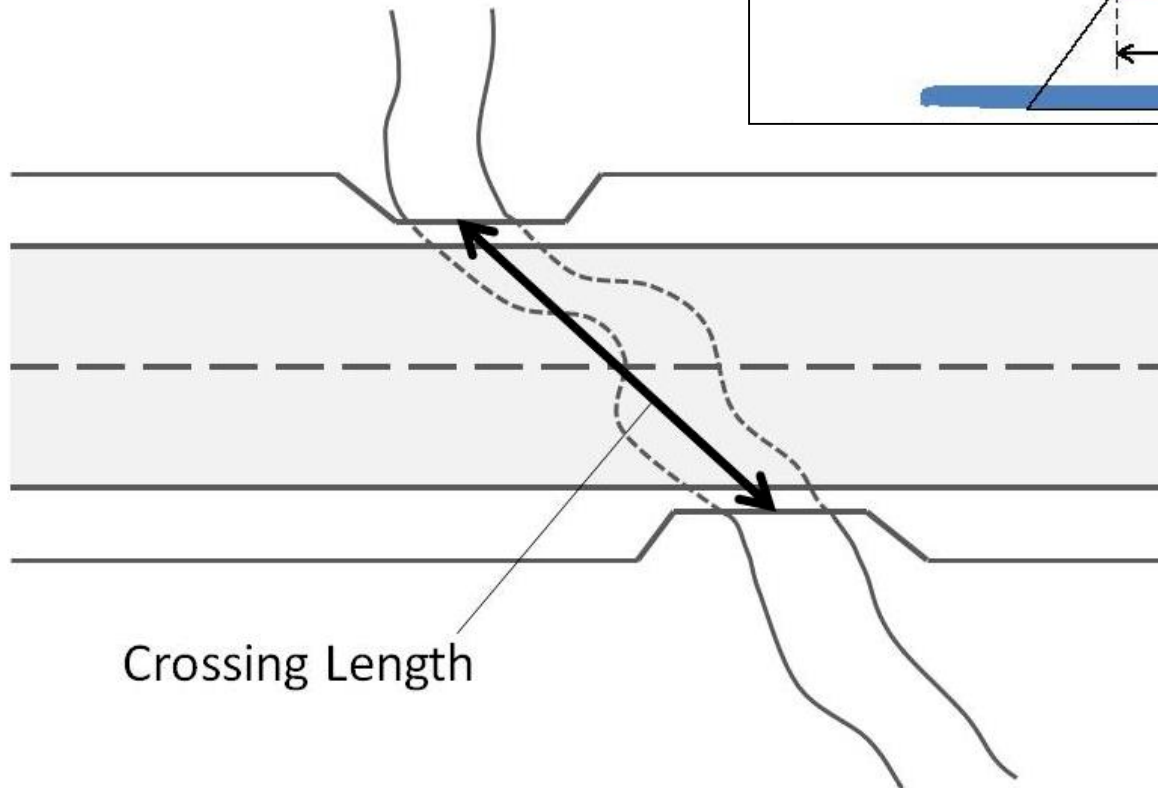
Outlet Drop to Stream Bottom _____

E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) _____

OUTLET

Structure Length, Dimension L: To the nearest foot, measure the length of the structure at its top.



STRUCTURE 1

Structure Material

☐ METAL

☐ CONCRETE

☐ PLASTIC

☐ WOOD

☐ ROCK/STONE

☐ FIBERGLASS

☐ COMBINATION

Outlet Shape

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

☐ FORD

☐ UNKNOWN

☐ REMOVED

Outlet Armoring

☐ NONE

☐ NOT EXTENSIVE

☐ EXTENSIVE

Outlet Grade (Pick one)

☐ AT STREAM GRADE

☐ FREE FALL

☐ CASCADE

☐ FREE FALL ONTO CASCADE

☐ CLOGGED/COLLAPSED/SUBMERGED

☐ UNKNOWN

Outlet Dimensions

A. Width _____

B. Height _____

C. Substrate/Water Width _____

D. Water Depth _____

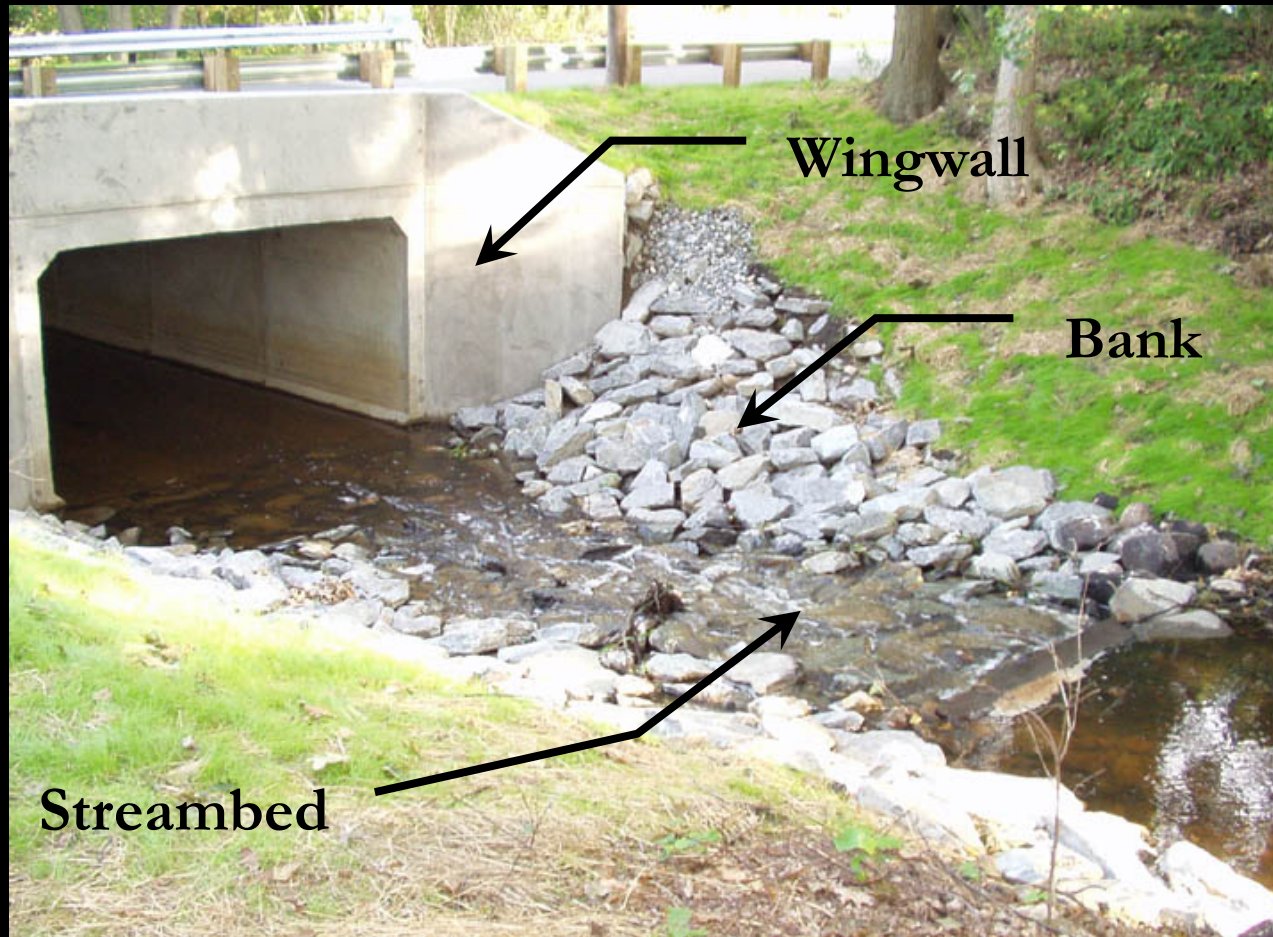
Outlet Drop to Water Surface _____

Outlet Drop to Stream Bottom _____

E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) _____

OUTLET



None: not counting fallen rocks from the embankment or that are natural to the stream. Most cascades do not constitute armoring unless specifically put in place to minimize outlet scour

Not Extensive: layer of material covering an area less than 50% of the stream width placed purposely to prevent outlet scour

Extensive: material covers an area more than 50% of the stream width, which was put in place specifically to minimize scour at the outlet



Extensive Outlet Armoring

INLET

Inlet Shape ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

B. Height _____ C. Substrate/Water Width _____



INLET

Inlet Shape ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☐ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____



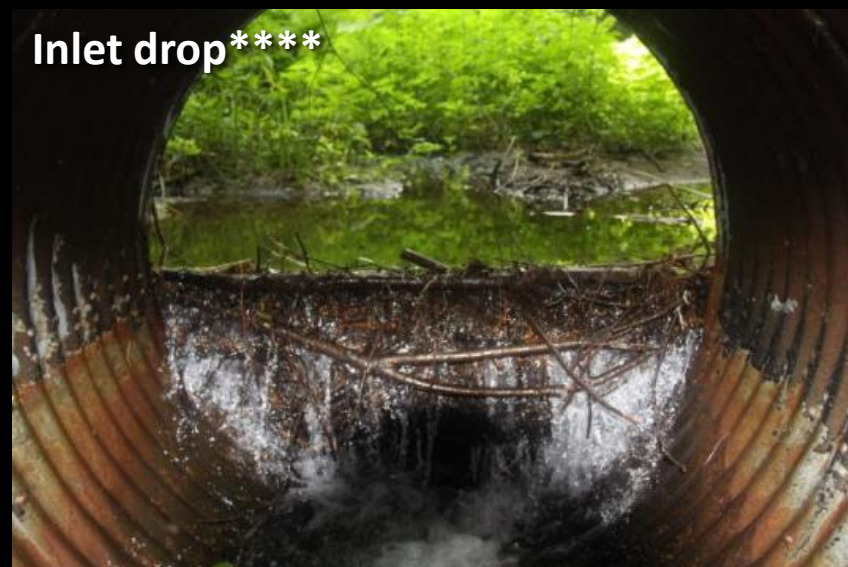
Inlet drop



At grade



Perched



Inlet drop****

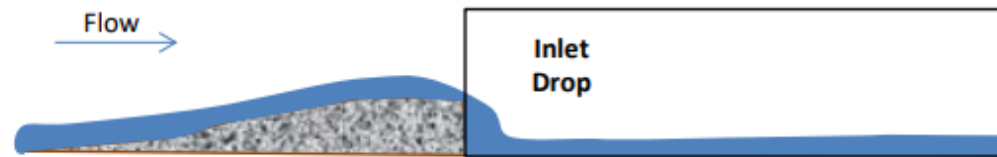


Inlet drop

Inlet drop***



Inlet Drop: Water in the stream has a near-vertical drop from the stream channel down into the inlet of the structure. This usually occurs because sediment has accumulated above the inlet. The drop should be very obvious and not typical of natural drops in that stream. If there is a debris blockage or dam at the inlet, use **Physical Barriers** to record those features, and mark *At Stream Grade* here.





Clogged/Collapse/Submerged

Slope % (Optional) _____ Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☐ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER _____

Structure Substrate Matches Stream ☐ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☐ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

% ☐ 100% ☐ UNKNOWN

ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

OR ☐ MO

H-DEEPER ☐

OWER ☐



Slope % (Optional)_____

Slope Confidence

HIGH

LOW

Internal Structures

NONE

BAFFLES/WEIRS

SUPPORTS

OTHER_____

Structure Substrate Matches Stream

NONE

COMPARABLE

CONTRASTING

NOT APPROPRIATE

UNKNOWN

Structure Substrate Type (Pick one)

NONE

SILT

SAND

GRAVEL

COBBLE

BOULDER

BEDROCK

UNKNOWN

Structure Substrate Coverage

NONE

25%

50%

75%

100%

UNKNOWN

Physical Barriers (Pick all that apply)

NONE

DEBRIS/SEDIMENT/ROCK

DEFORMATION

FREE FALL

FENCING

DRY

OTHER

Severity (Choose carefully based on barrier type(s) above)

NONE

MINOR

MODERATE

SEVERE

Water Depth Matches Stream

YES

NO-SHALLOWER

NO-DEEPER

UNKNOWN

DRY

 DRY

ove Dry Passage_____



Substrate Type	Feet	Approximate Relative Size
<i>Silt</i>	< 0.002	Finer than salt
<i>Sand</i>	0.002 – 0.01	Salt to peppercorn
<i>Gravel</i>	0.01 – 0.2	Peppercorn to tennis ball
<i>Cobble</i>	0.2 – 0.8	Tennis ball to basketball
<i>Boulder</i>	> 0.8	Bigger than a basketball
<i>Bedrock</i>	Unmeasurable	Unknown - buried

Physical Barriers (Pick all that apply)

☐ NONE

☐ DEBRIS/SEDIMENT/ROCK

☐ DEFORMATION

☐ FREE FALL

☐ FENCING

☐ DRY

☐ OTHER

Severity (Choose carefully based on barrier type(s) above)

☐ NONE

☐ MINOR

☐ MODERATE

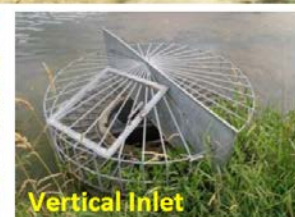
☐ SEVERE

Physical Barrier	Severity	Severity Definition
None	None	No physical barriers exist - apart from Outlet Grade
Debris/Sediment/Rock <i>Logs, branches, leaves, silt, sand, gravel, rock</i>	None	None beyond few leaves or twigs as may occur in stream
	Minor	< 10% of the open area of the structure is blocked
	Moderate	10% - 50% of open area blocked
	Severe	> 50% of open area of structure blocked
Deformation <i>Significant dents, crushed metal, collapsing structures</i>	None	Small dents and cracks – insignificant effect on flow
	Minor	Flow is limited < 10%
	Moderate	Flow is limited between 10% - 50%
	Severe	Flow is limited > 50%
Free Fall <i>Vertical or near-vertical drop</i>	None	No vertical drop exists - apart from Outlet Grade
	Minor	0.1 - 0.3 foot vertical drop - apart from Outlet Grade
	Moderate	0.3 - 0.5 foot vertical drop - apart from Outlet Grade
	Severe	> 0.5 foot vertical drop - apart from Outlet Grade
Fencing <i>Wire, metal grating, wood</i>	None	No fencing exists in any part of the structure
	Minor	Widely spaced wires or grating with > 0.5 foot (6 inch) gaps
	Moderate	Wires or grating with 0.2 - 0.5 foot (~ 2-6 inches) spacing
	Severe	Wires or grating with < 0.2 foot (~ 2 inch) spacing
Dry	Minor	May be passable at somewhat higher flows
	Moderate	Not likely passable at higher flows
	Severe	Impassable at higher flows
Other	Minor	Use best judgment based on above standards
	Moderate	Use best judgment based on above standards
	Severe	Use best judgment based on above standards

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Physical Barriers (pg 32, Instruction Guide)

Anti-Beaver Device

Dam w/no Free Fall

Vertical Inlet

Physical Barriers







1984

DRY

Slope % (Optional)_____		Slope Confidence		<input type="checkbox"/> HIGH	<input type="checkbox"/> LOW	Internal Structures		<input type="checkbox"/> NONE	<input type="checkbox"/> BAFFLES/WEIRS	<input type="checkbox"/> SUPPORTS	<input type="checkbox"/> OTHER_____
Structure Substrate Matches Stream		<input type="checkbox"/> NONE	<input type="checkbox"/> COMPARABLE	<input type="checkbox"/> CONTRASTING	<input type="checkbox"/> NOT APPROPRIATE	<input type="checkbox"/> UNKNOWN					
Structure Substrate Type (Pick one)		<input type="checkbox"/> NONE	<input type="checkbox"/> SILT	<input type="checkbox"/> SAND	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> COBBLE	<input type="checkbox"/> BOULDER	<input type="checkbox"/> BEDROCK	<input type="checkbox"/> UNKNOWN		
Structure Substrate Coverage		<input type="checkbox"/> NONE	<input type="checkbox"/> 25%	<input type="checkbox"/> 50%	<input type="checkbox"/> 75%	<input type="checkbox"/> 100%	<input type="checkbox"/> UNKNOWN				
Physical Barriers (Pick all that apply)		<input type="checkbox"/> NONE	<input type="checkbox"/> DEBRIS/SEDIMENT/ROCK	<input type="checkbox"/> DEFORMATION	<input type="checkbox"/> FREE FALL	<input type="checkbox"/> FENCING	<input type="checkbox"/> DRY	<input type="checkbox"/> OTHER			
Severity (Choose carefully based on barrier type(s) above)		<input type="checkbox"/> NONE	<input type="checkbox"/> MINOR	<input type="checkbox"/> MODERATE	<input type="checkbox"/> SEVERE						
Water Depth Matches Stream		<input type="checkbox"/> YES	<input type="checkbox"/> NO-SHALLOWER	<input type="checkbox"/> NO-DEEPER	<input type="checkbox"/> UNKNOWN	<input type="checkbox"/> DRY					
Water Velocity Matches Stream		<input type="checkbox"/> YES	<input type="checkbox"/> NO-FASTER	<input type="checkbox"/> NO-SLOWER	<input type="checkbox"/> UNKNOWN	<input type="checkbox"/> DRY					
Dry Passage through Structure?		<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> UNKNOWN	Height above Dry Passage_____						



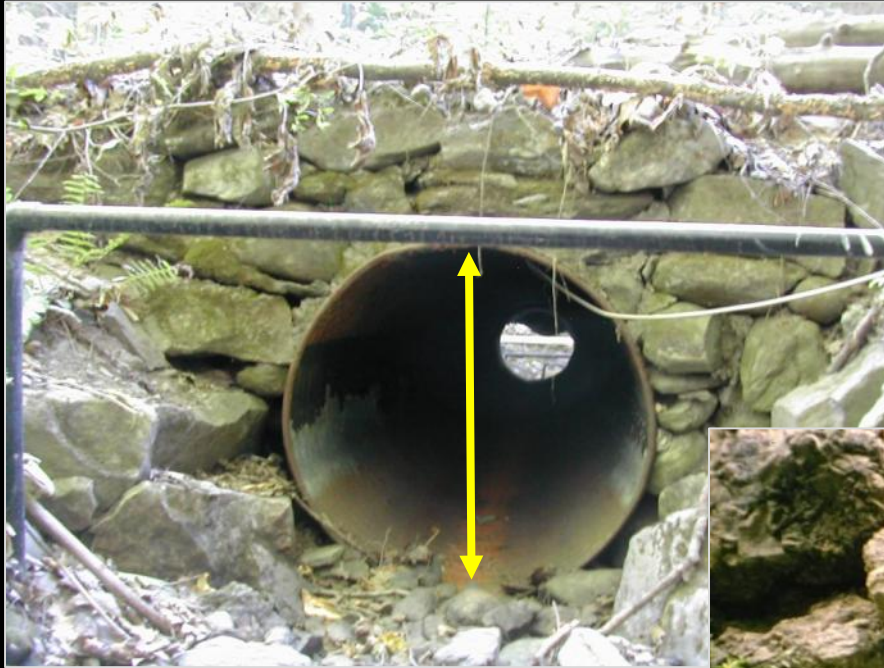
Dry Passage for Wildlife?



☐ No



Dry Passage for Wildlife?



☐ Yes

*Must connect banks on either side



Data Set: NAACC (after 6/1/2015)

Survey Id: 76254 Crossing Code: xy4226776572744046

AOP Coarse Screen: No AOP NAACC Aquatic Passability Score: 0.48

Data checked and accurate by Jake Lehan on 03-12-2020

Table 1 below identifies characteristics and conditions that allow crossings to be classified as providing “Full AOP,” “Reduced AOP,” or “No AOP.”

Table 1. NAACC Coarse Screen

Metric	Flow Condition	Crossing Classification		
		Full AOP	Reduced AOP	No AOP
		<i>If all are true</i>	<i>If any are true</i>	<i>If any are true</i>
Inlet Grade		At Stream Grade	Inlet Drop or Perched	
Outlet Grade		At Stream Grade		Cascade, Free Fall onto Cascade
Outlet Drop to Water Surface		= 0		≥ 1 ft
Outlet Drop to Water Surface/ Outlet Drop to Stream Bottom				> 0.5
Inlet or Outlet Water Depth	Typical-Low	> 0.3 ft		< 0.3 ft w/Outlet Drop to Water Surface > 0
	Moderate	> 0.4 ft		< 0.4 ft w/Outlet Drop to Water Surface > 0
Structure Substrate Matches Stream		Comparable or Contrasting		
Structure Substrate Coverage		100%	< 100%	
Physical Barrier Severity		None	Minor or Moderate	Severe

Table 3. Weights associated with each parameter in the scoring algorithm.

parameter	weight
Outlet drop	0.161
Physical barriers	0.135
Constriction	0.090
Inlet grade	0.088
Water depth	0.082
Water velocity	0.080
Scour pool	0.071
Substrate matches stream	0.070
Substrate coverage	0.057
Openness	0.052
Height	0.045
Outlet armoring	0.037
Internal structures	0.032

Descriptor	Aquatic Passability Score(s)
No barrier	1.0
Insignificant barrier	0.80 – 0.99
Minor barrier	0.60 – 0.79
Moderate barrier	0.40 – 0.59
Significant barrier	0.20 – 0.39
Severe barrier	0.00 – 0.19



Thank you!

For more information about NAACC Road-Stream Crossing Assessments in Massachusetts
contact Jacob.Lehan@mass.gov