



Aquatic Connectivity
Assessments of RoadStream Crossings





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

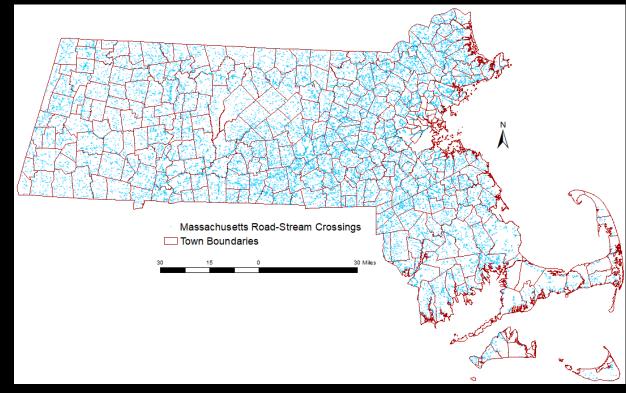
In Massachusetts, there is on average a road-stream crossing every 1.2 road miles and every 0.5 stream miles.

Est. 29,000 culverts and small bridges



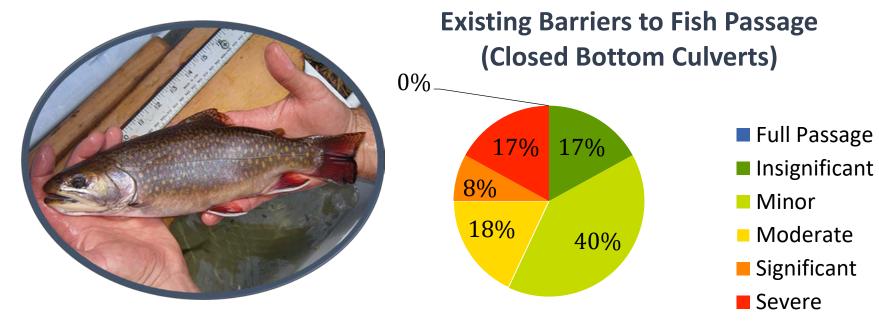
~ 6,400 assessed in MA











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









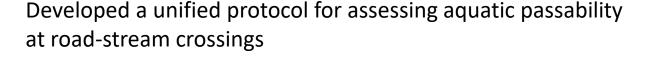
Aging and Degrading Infrastructure



North Atlantic Aquatic Connectivity Collaborative (NAACC)







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

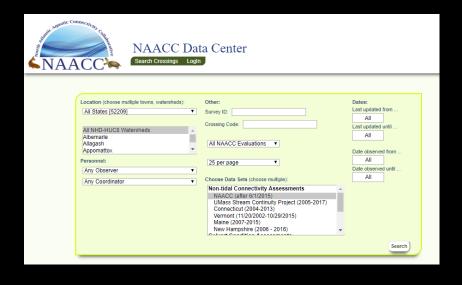
Lead Observers – lead survey teams, collect & enter data

https://streamcontinuity.org/naacc

https://naacc.org/

NAACC Websites Sites

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





https://naacc.org

https://streamcontinuity.org/naacc

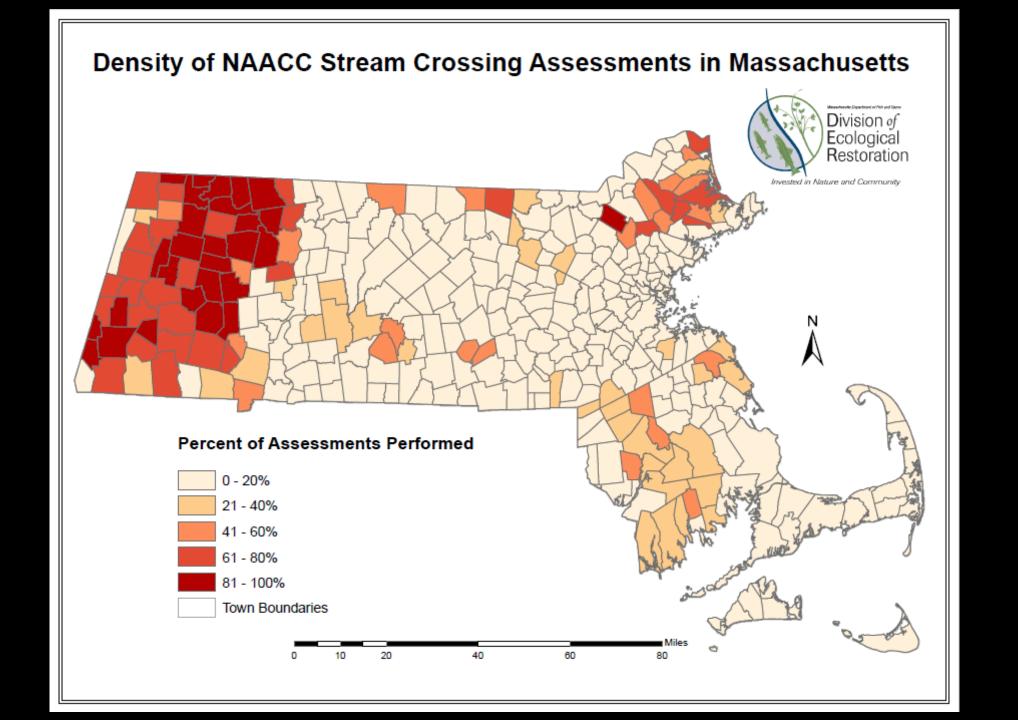


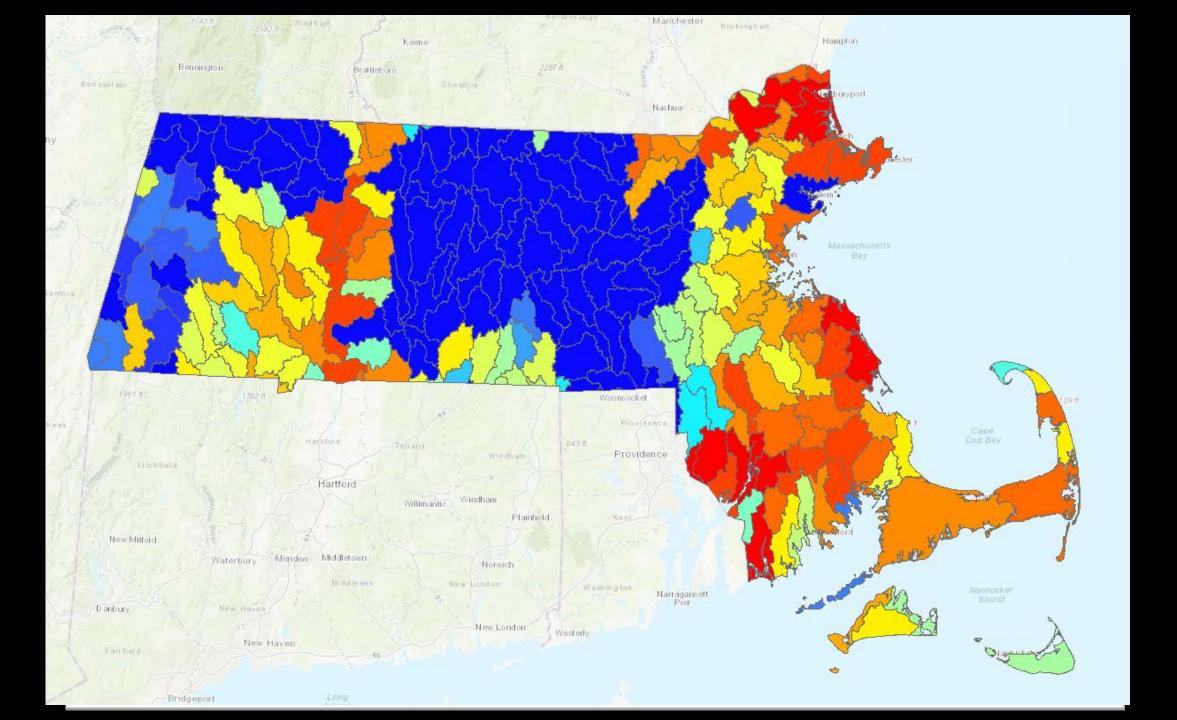
NAACC Assessment Protocols

- 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







2008 Survey

2015 Survey





Culvert Failure













Importance of Small Streams

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

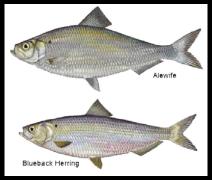


AmericanRivers.org





















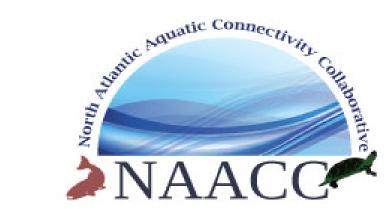












Project Infrastructure

- 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 NortheastConnectivity Project
 - UMass Critical LinkagesProject



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

Survey ld: 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









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

Bankfull Width Confidence: Low/Estimated

Road FIII Height (feet): 22

Tallwater 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

Evaluation of this stream crossing is estimated as: SEVERE BARRIER

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

Structure Material: Concrete

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

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

Slope Percent: No data

Internal Structures: None

Structure Substrate Matches Stream: None

Structure Substrate Coverage: None

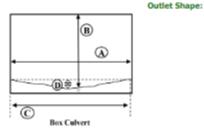
Severity: Minor

Water velocity matches that of the stream? Yes

Height above dry passage: No data

Structure Comments: No data

Inlet Shape:



(A)

(D) ⊕ •

Box Culvert

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

Outlet Armoring: Extensive

Outlet drop to stream bottom (feet): 4.0

Inlet Shape: Box Culvert

Inlet Grade: Inlet Drop

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

Slope Confidence: No data

Search Crossings

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

		Crossing Classification		
Metric	Flow Condition	Full AOP	Reduced AOP	No AOP
		If all are true	If any are true	If any are true
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
Jalet or Outlet Water Dooth	Typical-Low	> 0.3 ft		< 0.3 ft w/Outlet Drop to Water Surface > 0
Inlet or Outlet Water Depth	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

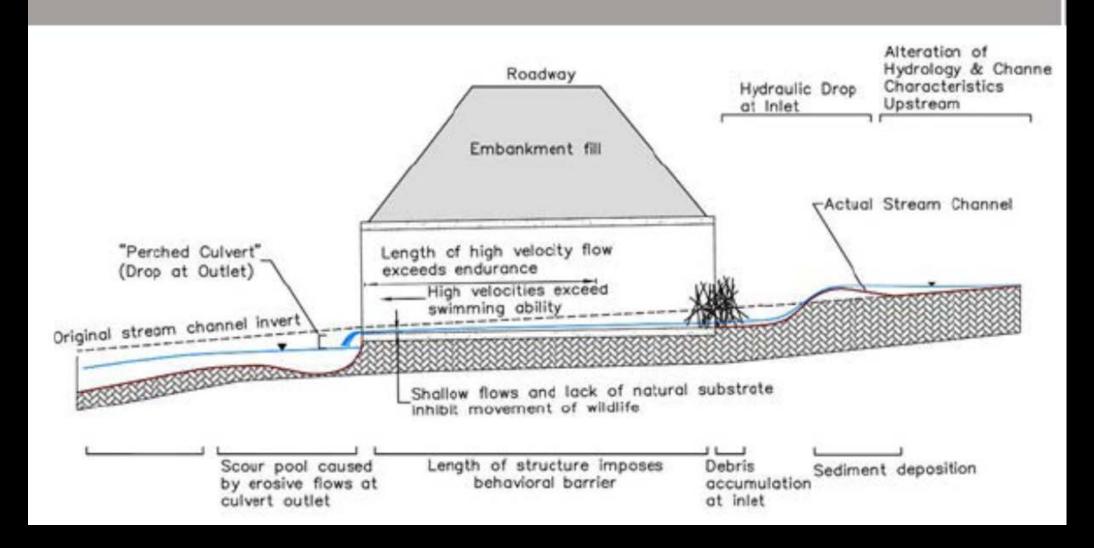
Table 3. Weights associated with each parameter in the scoring algorithm.

weight
0.161
0.135
0.090
0.088
0.082
0.080
0.071
0.070
0.057
0.052
0.045
0.037
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		

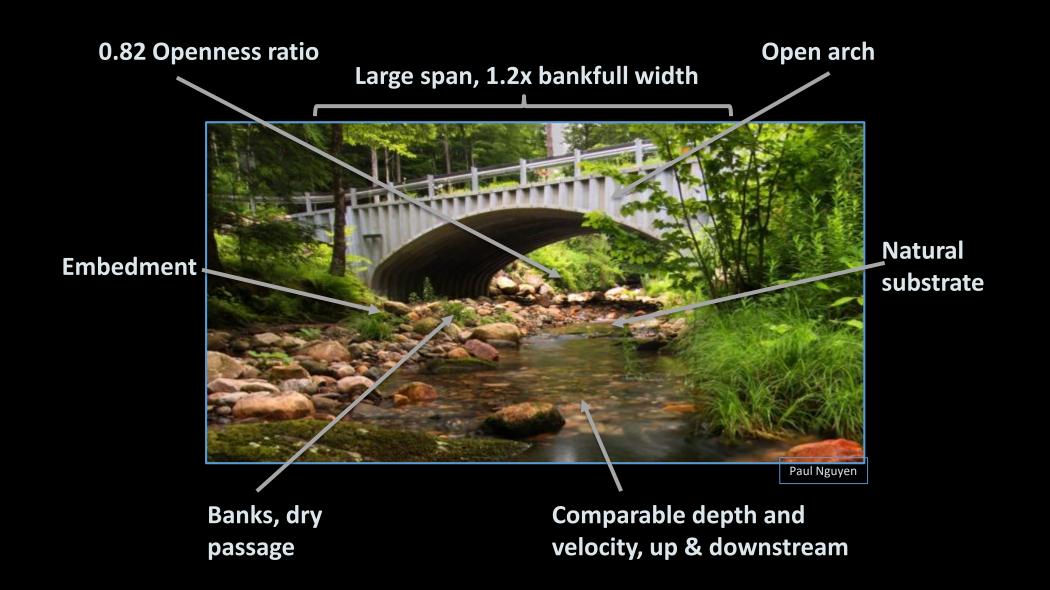
Conditions affecting wildlife passage at culverts

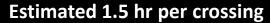
(Source: MassDOT Highway Division Stream Crossing Handbook)





Massachusetts Stream Crossing Standards (SCS)





- = 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





Park your vehicle responsibility 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 assessment, i.e. no interstate hwy, bridges largers 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







Safety Cones Team Members

Top of major tick lines are Top of lines are exactly a tenth of a foot even hundredths 7.48 7.46 Smaller black numbers 7.44 are tenths of a foot 7.42 7.40 -7.29 7.27 7.25 7.23 7.21 Bottom of lines are odd hundredths Large red numbers are whole feet Top of large tick line next to red number is whole foot

Help stop the spread of invasives!

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

CONTACTS

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

	Stre	am Crossing Surve	W	DATABASE SIGNAR	ENUIT	SINC
6	NAACC DATA		.y	DATA EMIRY RIVERMED BY	FEVE	P DATE
a	Crossing Code			Local ID State of		
DAIA	Date Observed (20/00/2000)	Lead Observer_				
	Town/County		Stream	1		
	Road	Type M SEU	LIILANE III A	AVED UNPAVED	DRAFWAY BAIL	■ RAIL RC
LKUSSING	GPS Coordinates (>= ruldryred	*N Latitude		-		angitude
	Location Description				×.	
	Crossing Type ERIDGE CULVERT BUILD STREAM NACCESSRE				Number of Culverts/	Bridge Cells
	Photo IDs INTEL 001	ET UPSTREAM		SOW VSTREAM	OTHER	
	Flow Condition NO HOW YPECAL	-LOW MODERATE HIG-	Crossing Condit	ion OK POCE	NEW DAKNOW	N.
	Tidal Site YES NO UNKNOWN	Alignment FLOW-AUGNED	SKEWED (>45%	Road Fill Height (book	culvert to road surface, bridge = 1	
	Bankfull Width (Optional) Confiden	ce F SH LOW/ESTIMATED	Constriction	SEVERE MODER	ATE SPANS FULL CH	ANNE & BAY
	Tailwater Scour Pool NONE SMALL	■ LARGE		SPAINS ONLY BANKFU	LL/ACTIVE CHANNEL	
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Field Data Form

Page 1

Crossing Data

&

Structure 1 Data

~ 80% of surveys



Stream Crossing Survey

DW WRASE FALKA BA	ENGRY JARKE
DATA ENTRY REVIEWED BY	FENEW DATE

A	Crossing CodeLocal ID @ptionst
DAT	Date Observed paragraphic Lead Observer
9	Town/CountyStream
SIN	Road Type MULTILANE MVED UNDAVED DRIVESWAY BAIL BAILBOAD
CROSSING DATA	GPS Coordinates the maldegrees
٥	Location Description
	Crossing Type BRIDGE CULVERT MULTIFLE CULVERT FORD NO CROSSING REMOVED CROSSING Number of Culverts/ Bridge Cells BURIED STREAM NACCESSIBLE PRITIALLY INACCESSIBLE OF UPSTREAM CHANNEL BRIDGE ADEQUATE
	Photo IDs INLET OUTLET UPSTREAM DOWNSTREAM OTHER
	Flow Condition NO FLOW TYPICAL-LOW MODERATE HIG- Crossing Condition OK POOR NEW UNKNOWN
	Tidal Site YES NO UNKNOWN Alignment F.OW-ALIGNED SKEWED (-45) Road Fill Height (too of savert to road sarfloor bridge = 0.
	Bankfull Width Systems Confidence F. SH COW/ESTIMATED Constriction SEVERE MODERATE SPANS FULL CHANNEL & BANKS
	Tailwater Scour Pool NONE SMALL LARGE SPANS ONLY BANKFULL/ACTIVE CHANNEL
i i	Crossing Comments
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	Inlet Dimensions A. Width . B. Height . C. Substrate/Water Width . D. Water Depth
	Slope % (Scations)
NDITIONS	Structure Substrate Matches Stream NONE COMPARABLE CONTRASTING NOT APPROPRIATE UNKNOWN Structure Substrate Type (Pollomb) NONE SILT SAND GRAVEL COBBLE SOULDER BEDROCK UNKNOWN Structure Substrate Coverage NONE 25% 50% 175% 100% UNKNOWN
AL CO	Physical Barriers (Pick wit that apply) NONE DEBRIS/SEDIMENT/ROCK DEFORMATION FREE FALL FENCING DRY OTHER Severity (Choose care's lifty based on barrier typefol above) NONE MINIOR MODERATE SEVERE
ON	Water Depth Matches Stream YES NO-SHALLOWER NO-DEEPER UNKNOWN DRY
DITI	Water Velocity Matches Stream YES NO-FASTER NO-SLOWER UNIVIOUNI DRY
ADE	Dry Passage through Structure? YES NO UNKNOWN Height above Dry Passage
	Comments

AQUATIC CONNECT VITY STREAM CROSSING SURVEY DATA FO

Field Form

Pages 2, 3, 4

Additional Structure Data

~ 98% of crossings have 3 or fewer structures

ST	RUCTURE 2 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					
喜	Outlet Grade (Pick one) AT STREAM GRADE FREE FALL CASCADE FREE FALL ONTO CASCADE CLOGGED/COLLAPSED/SUBMERGED UNKNOWN					
7	Outlet Dimensions A. Width B. Height C. Substrate/Water Width D. Water Depth					
Ü	Outlet Drop to Water Surface Outlet Drop to Stream Bottom E. A butment Height (Type 7 bridges only)					
	L. Structure Length (Overall length from inlet to outlet)					
_	Inlet Shape					
NE	Inlet Type PROJECTING HEADWALL WINGWALLS HEADWALL & WINGWALLS MITERED TO SLOPE OTHER NONE					
Ξ	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					
	Slope % [Optional Slope Confidence HIGH LOW Internal Structures NONE BAFFLES/WEIRS SUPPORTS OTHER					
NS	Structure Substrate Matches Stream NONE COMPARABLE CONTRASTING NOT APPROPRIATE UNKNOWN					
TIONS	Structure Substrate Type (Pick one) NONE SILT SAND GRAVEL COBBLE BOULDER BEDROCK UNKNOWN					
NDI	Structure Substrate Coverage NONE 25% 50% 75% 100% UNKNOWN					
0	Physical Barriers (Pick all that apply) NONE DEBRIS/SEDIMENT/ROCK DEFORMATION FREE FALL FENCING DRY OTHER					
IAL	Severity (Choose carefully based on barrier type(i) above) NONE MINOR MODERATE SEVERE					
TION	Water Depth Matches Stream YES NO-SHALLOWER NO-DEEPER UNKNOWN DRY					
=	Water Velocity Matches Stream YES NO-FASTER NO-SLOWER UNKNOWN DRY					
AD	Dry Passage through Structure? YES NO UNKNOWN Height above Dry Passage					
	Comments					
ST	RUCTURE 3 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					
ョ	Outlet Grade (Pick one) AT STREAM GRADE FREE FALL CASCADE FREE FALL ONTO CASCADE CLOGGED/COLLAPSED/SUBMERGED UNKNOWN					
5	Outlet Dimensions A. Width B. Height C. Substrate/Water Width D. Water Depth					
Ŭ	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 Shape 1 1 2 3 3 4 5 6 7 FORD UNKNOWN REMOVED					
ME	Inlet Type PROJECTING HEADWALL WINGWALLS HEADWALL & WINGWALLS MITERED TO SLOPE OTHER NONE					
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	Inlet Grade (Pick one) AT STREAM GRADE INLET GRADE PERCHED CLOGGED/COLLAPSED/SUBMERGED UNKNOWN					
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NDITIONS	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 Slope % [Dpctonal] Slope Confidence HIGH LOW Internal Structures NONE BAFFLES/WEIRS SUPPORTS OTHER Structure Substrate Matches Stream NONE COMPARABLE CONTRASTING NOT APPROPRIATE UNKNOWN					
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Field Form

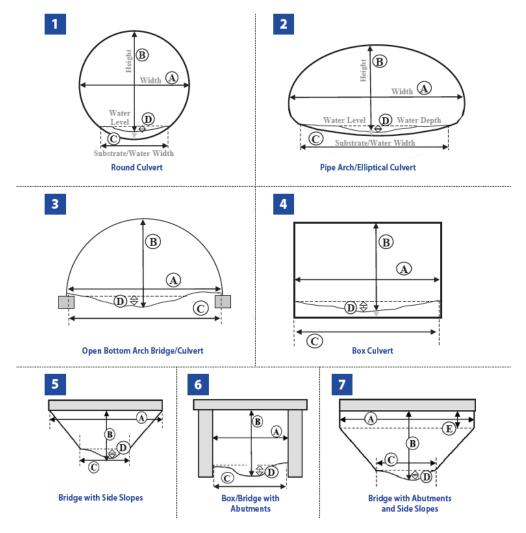
Page 5

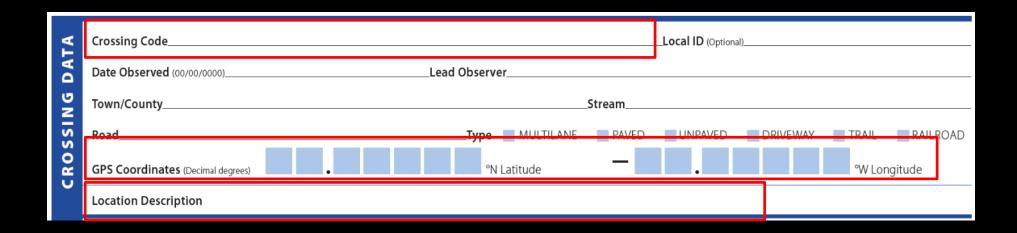
Shape &
Dimension
Reference

Structure Shape & Dimensions

- 1) Select the Structure Shape number from the diagrams below and record it on the form for Inlet and Outlet Shape.
- Record on the form in the approriate 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).

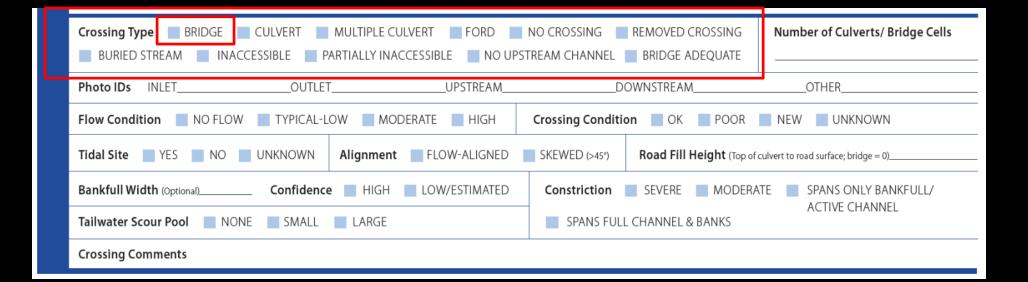




xy44261527037520

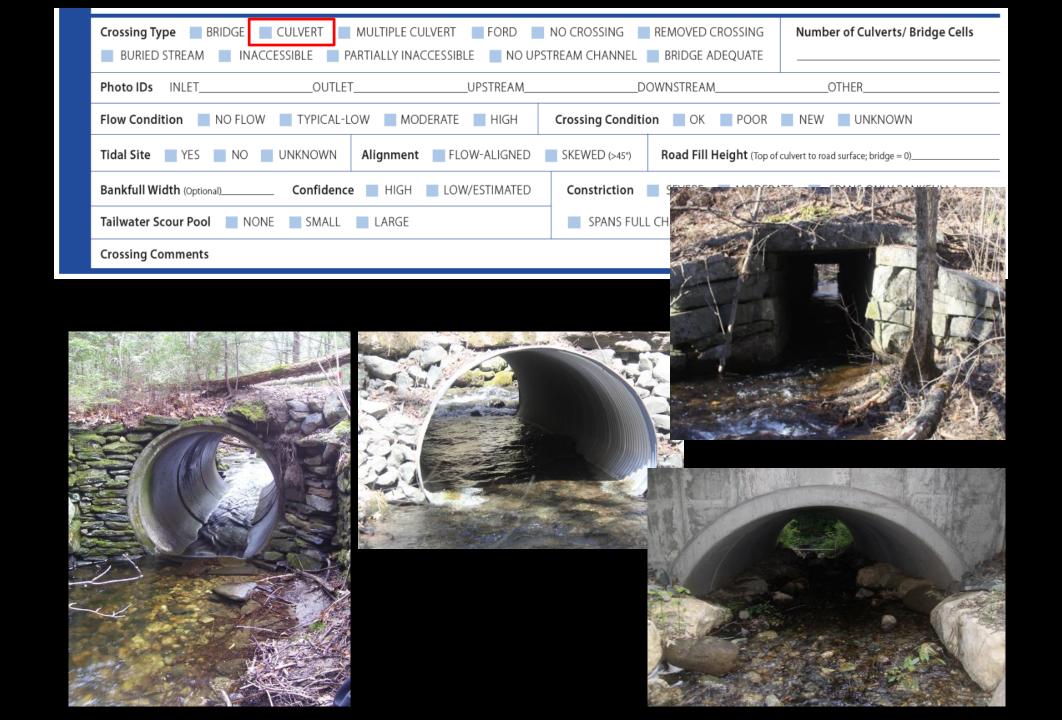
44.26152°(N), -70.37520°(W)

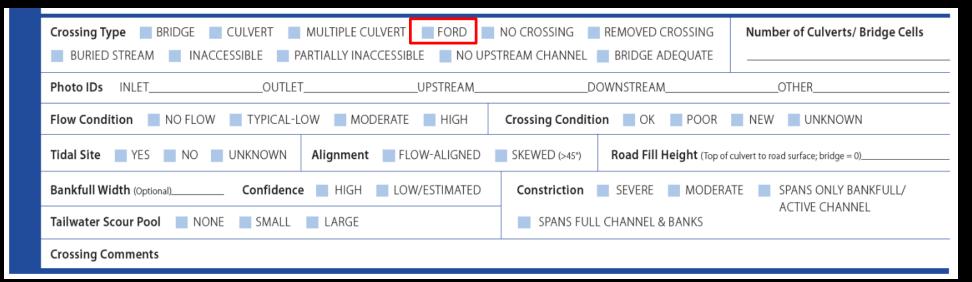
50 ft east of Main St, Cold Brook Ave intersection





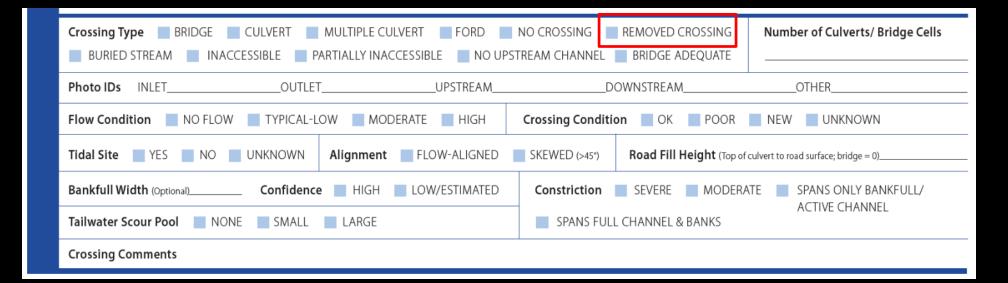






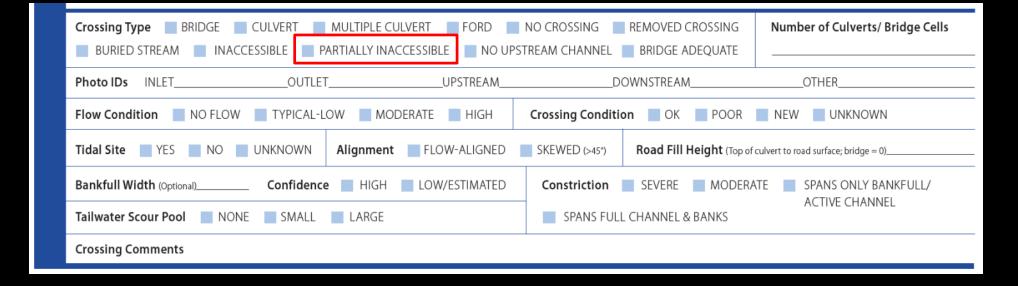






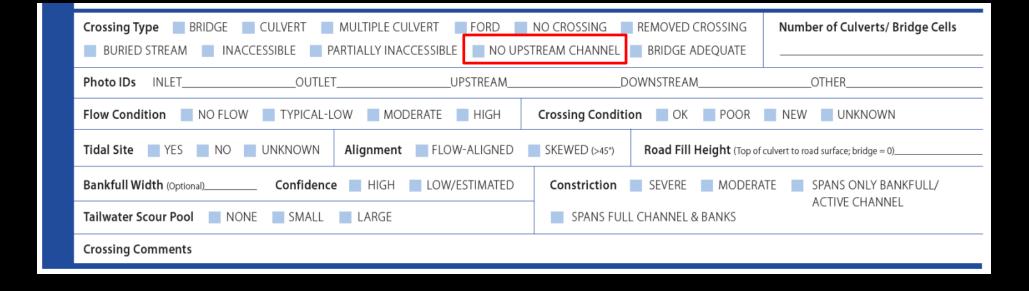






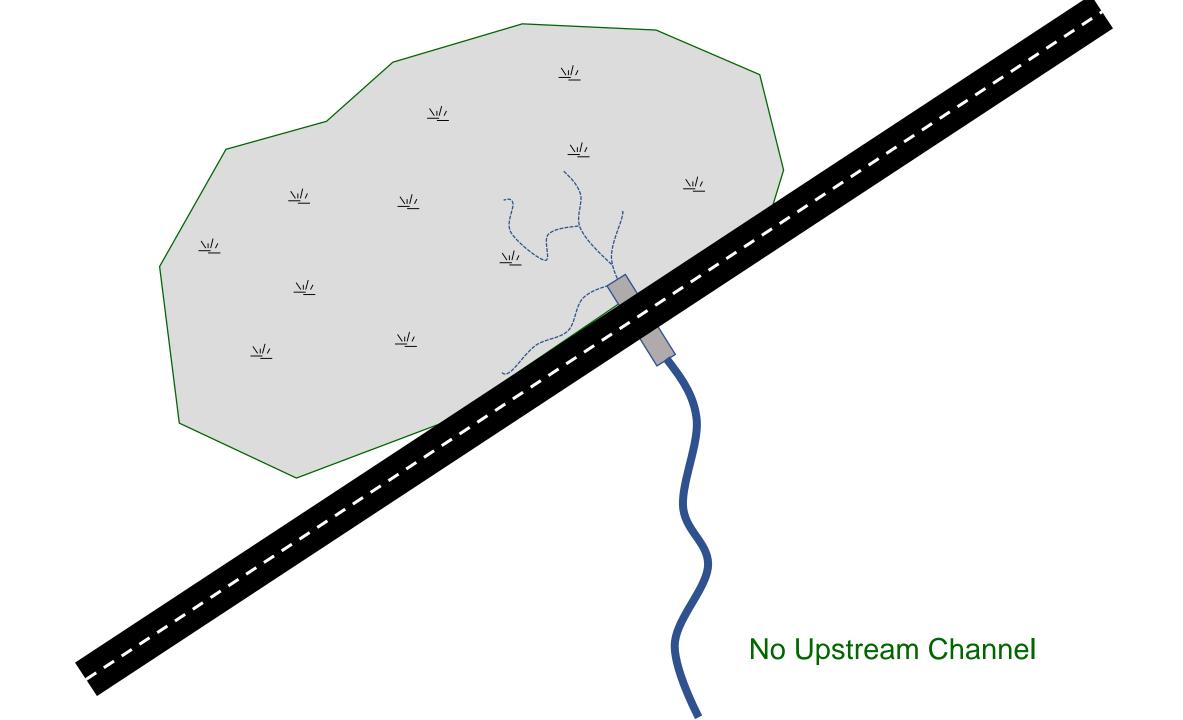
- For when you can access a crossing but can't access the inlet or outlet well enough to collect data
- Observers will be allowed to enter data but validation rules on required fields will be relaxed
- "Inaccessible" reserved for crossings that cannot be assessed at all

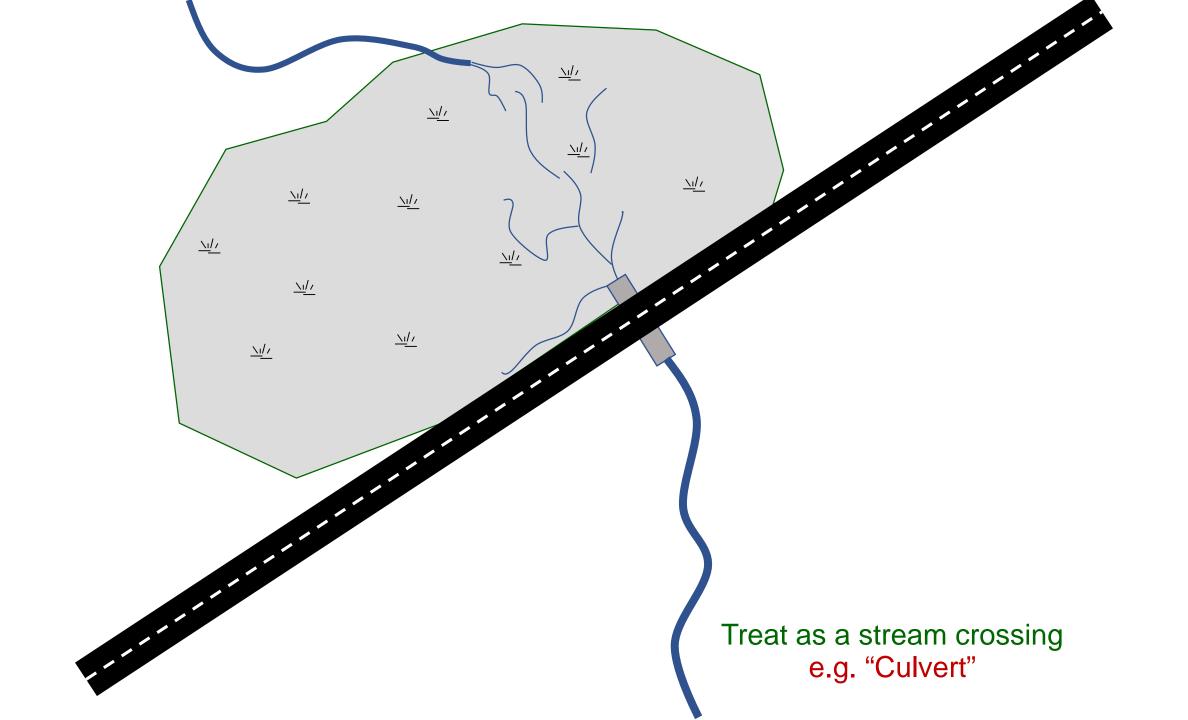
No score will be given

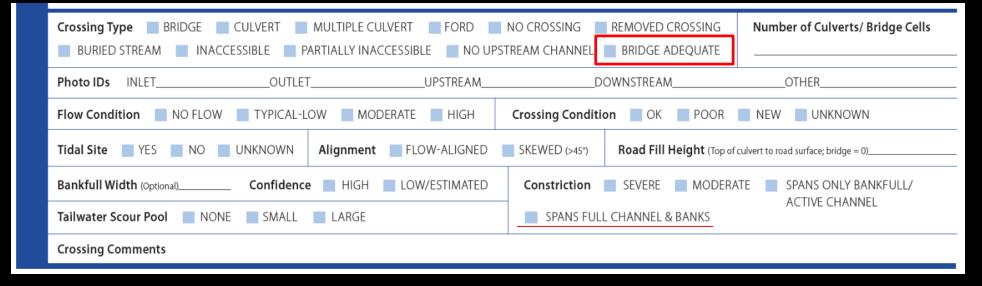


- Culverts at stream headwater (origin)
- Wetland crossings
- Observers will be allowed to enter data but validation rules on required fields will be relaxed

No score will be given







- 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

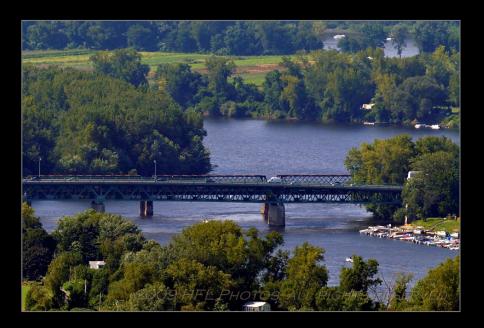
* Dry Passage



Bridge Adequate



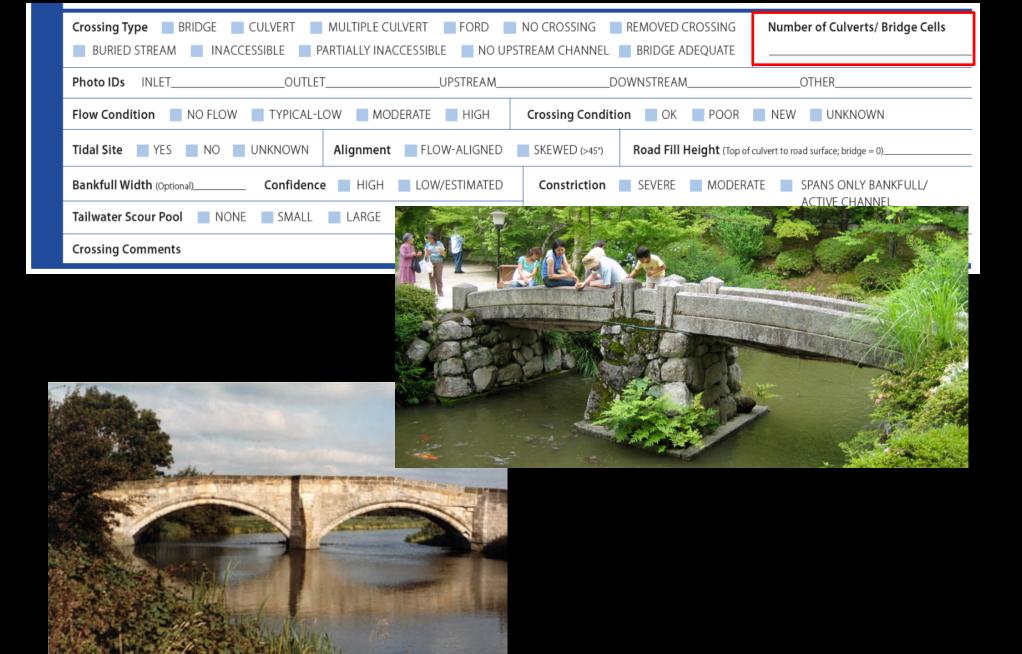




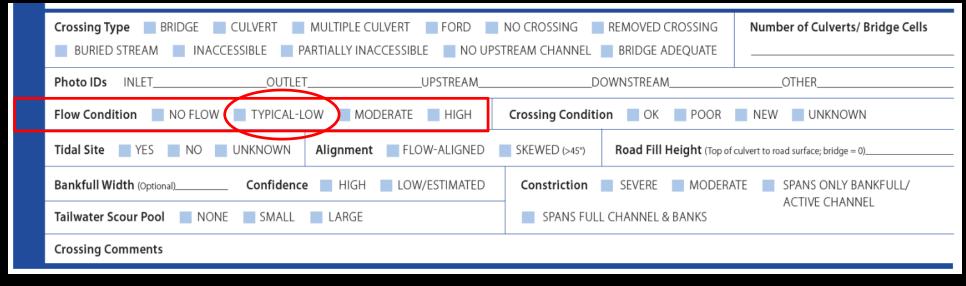
Not Bridge Adequate











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

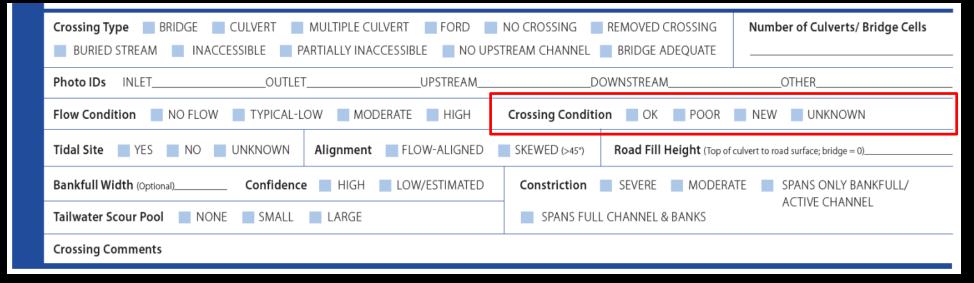








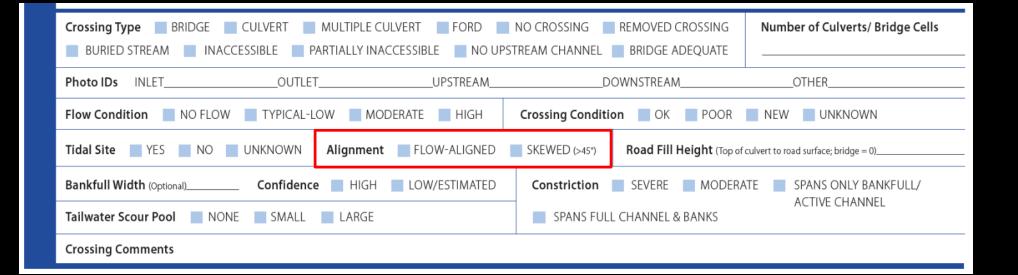


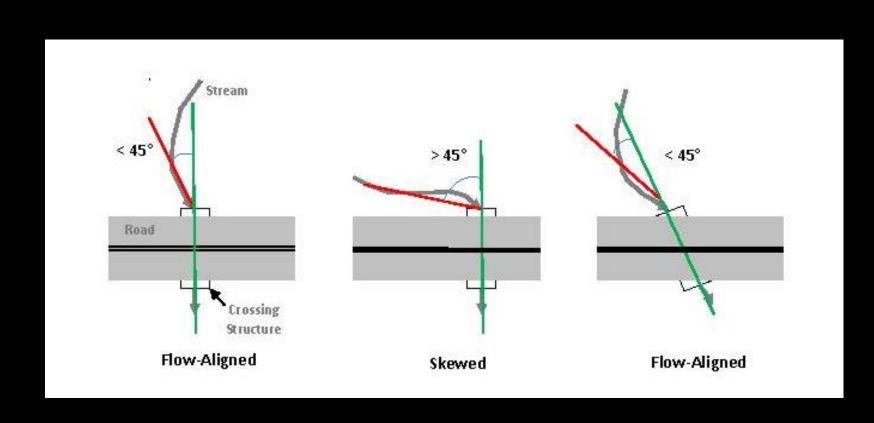


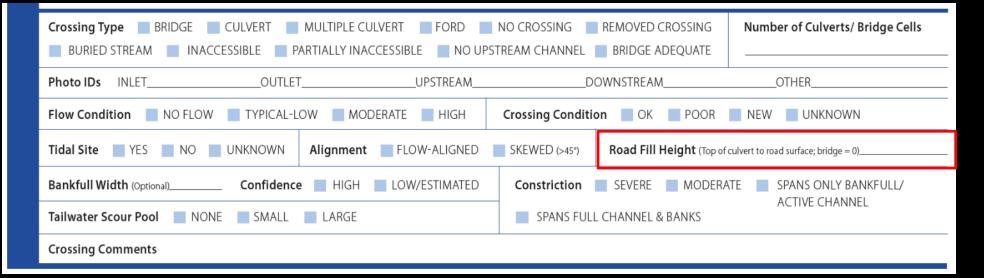


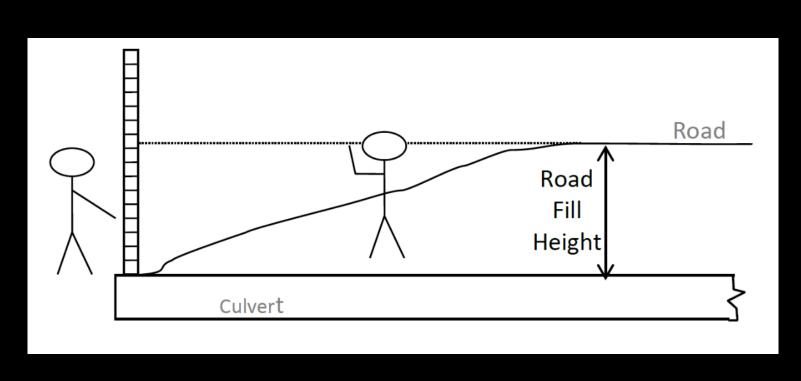


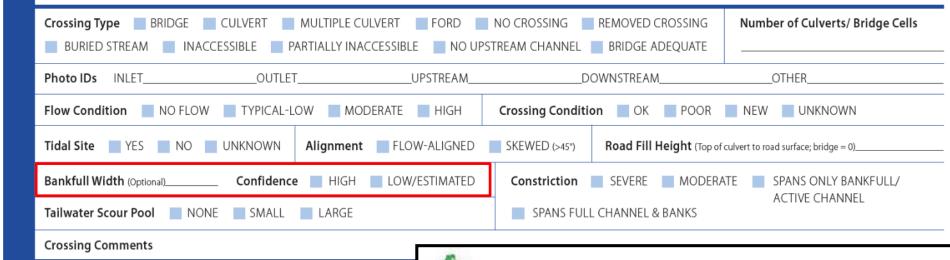






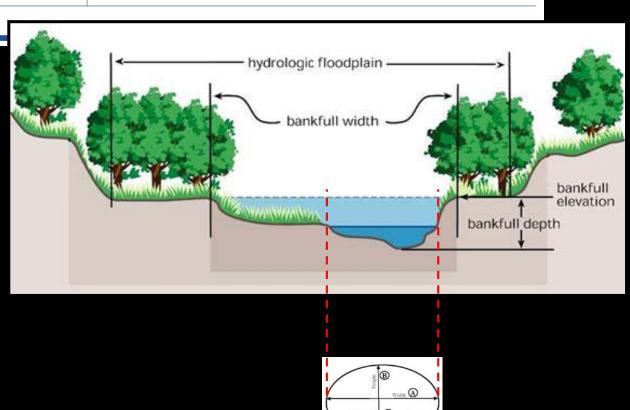






Indicators of Bankfull Width

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

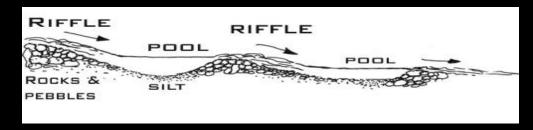




Bankfull Width Confidence: High or Low/Estimate

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



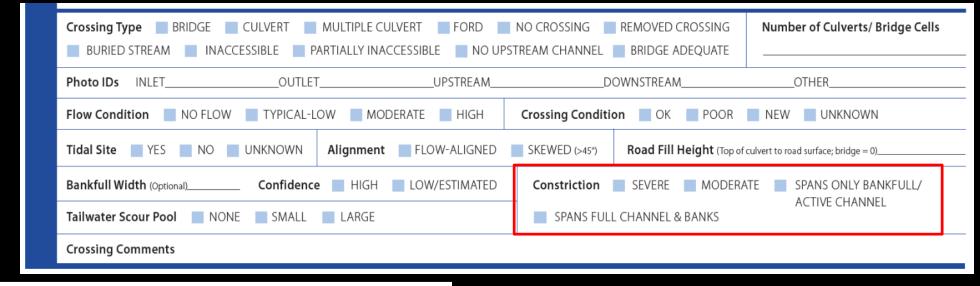


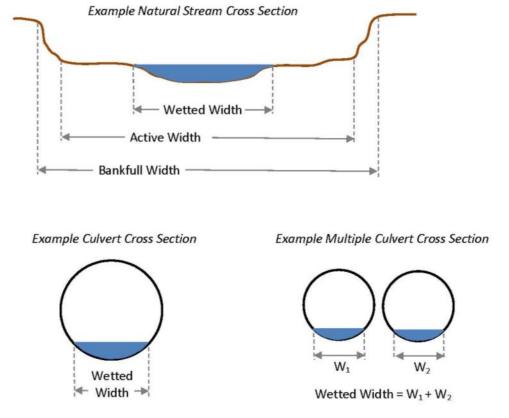
Bankfull Width











Severe

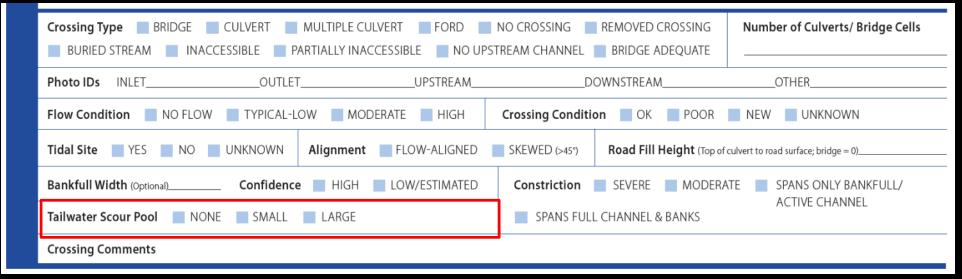
structure width < 50% Bankfull Width

Moderate

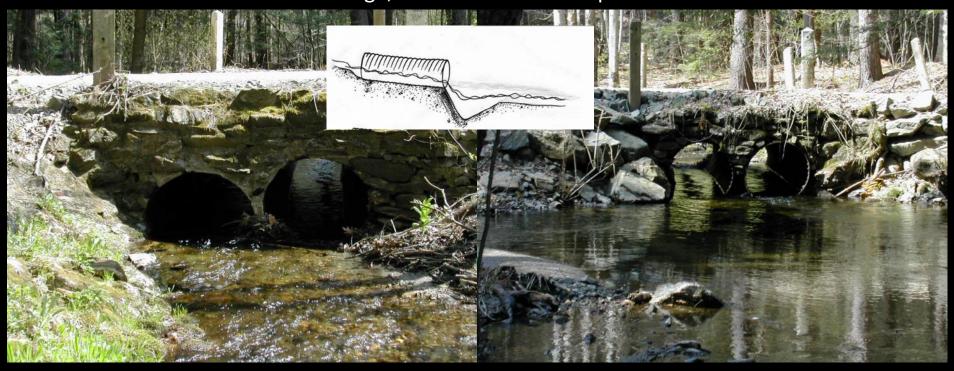
50% Bankfull Width< structure width < 100% Bankfull Width

Spans Only Bankfull/Active Channel

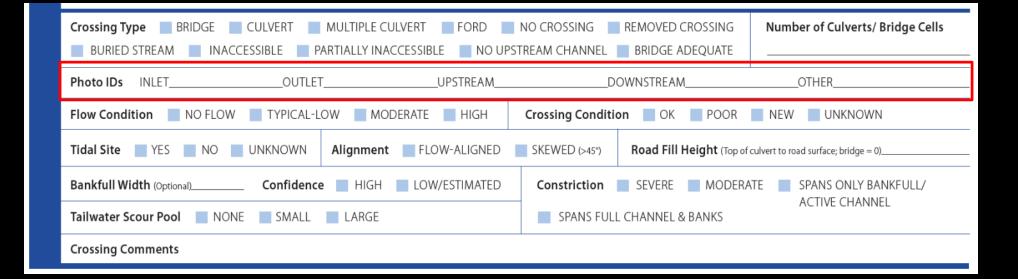
Spans Full Channel and Banks



Tailwater Scour Pool = Small, if wider or deeper than natural reference Large, if 2x wider or 2x deeper than natural reference







Crossing Photos

Style v. Substance







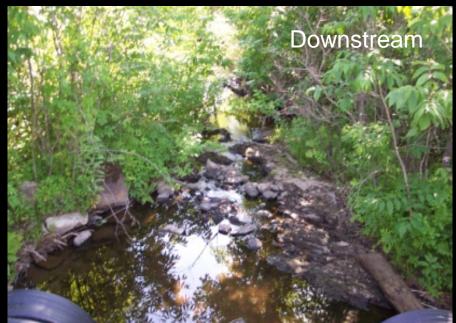
















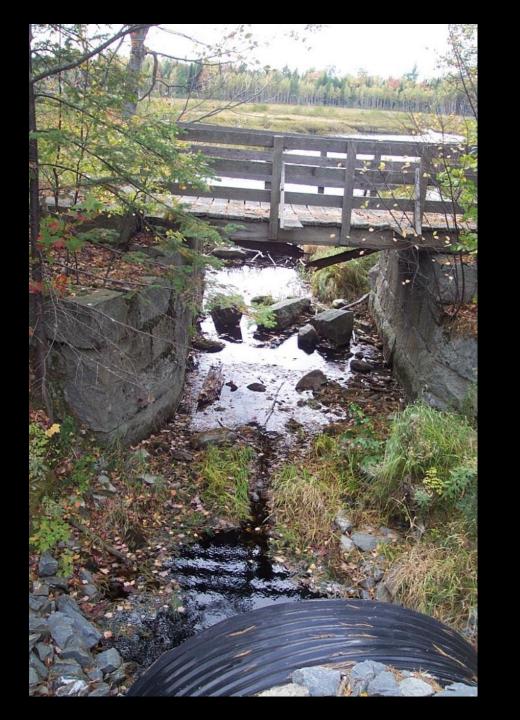








Think Context!























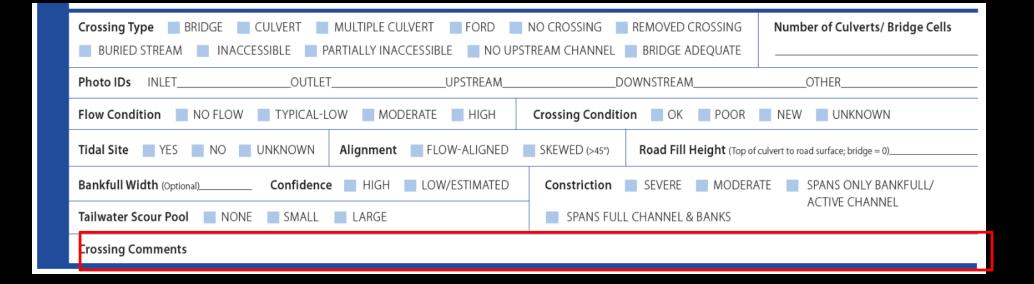
Other photos



Stream Crossing Survey

Town/County Road Crossing Type BRIDGE XCUUVERT Location Description Crossing Type BRIDGE XCUUVERT BUNED STREAM INACCESSIBLE Photo IDs INLET Tidal Site Photo IDs Inlet Shape Crossing Comments A. Width Outlet Dimensions A. Width Coutlet Dimensions A. Width Coutlet Dimensions A. Width Structure Bubstrate Matches Stream Structure Substrate Date (not one) Structure Substrate Coverage NONE None Structure Substrate Coverage None None Structure Substrate Coverage None Structure Substrate Coverage None None None None Structure Substrate Coverage None None Structure Substrate Coverage None N	ATA	9/2/11
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through Structure? YES NO UNKNOWN	TIG	YES NO-FASTER NO-SLOWER UNKNOWN
Comments	DA	YES NO NUKNOWN
		Comments

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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"

Structure Data

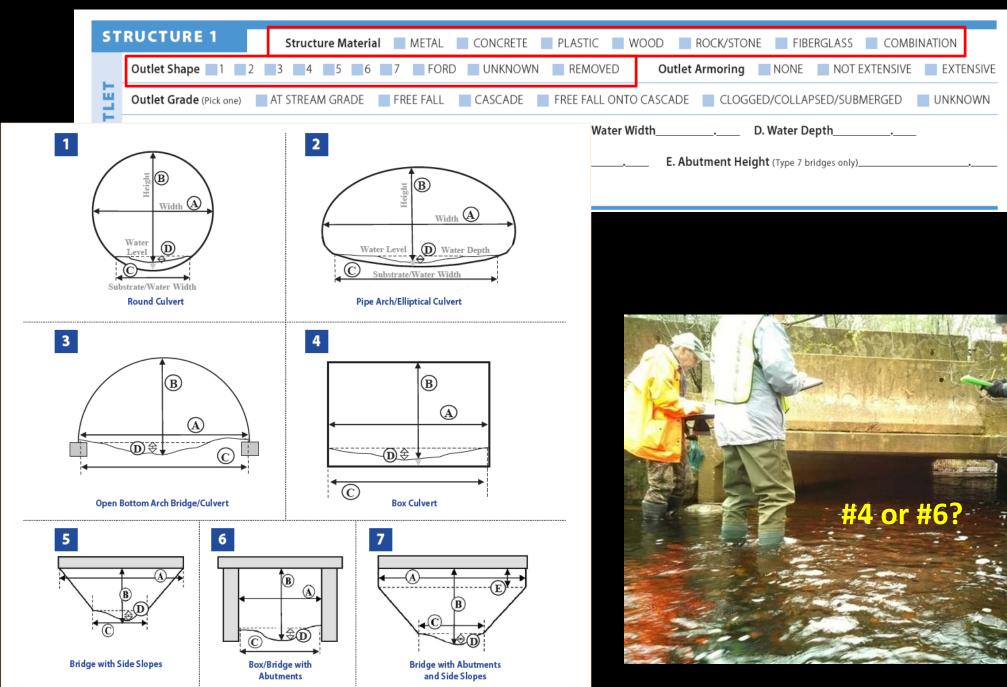


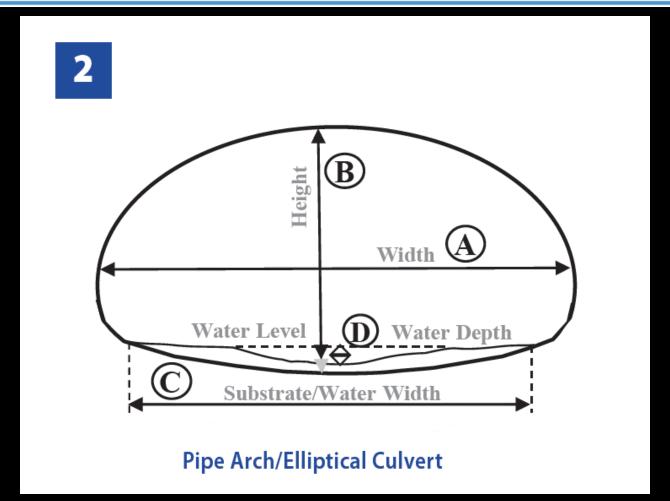
Stream Crossing Survey

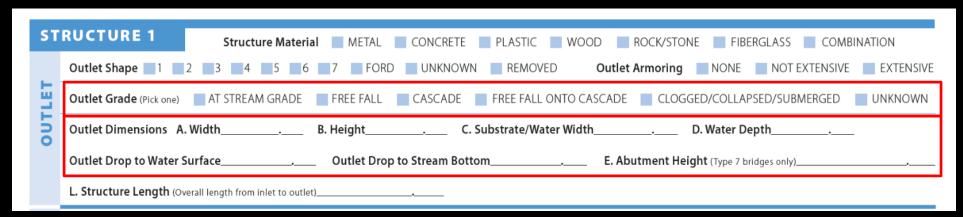
DATABASE ENTRY BY	ENRIV WIE		
DATA ENTRY REVIEWED BY	FENEW DATE		

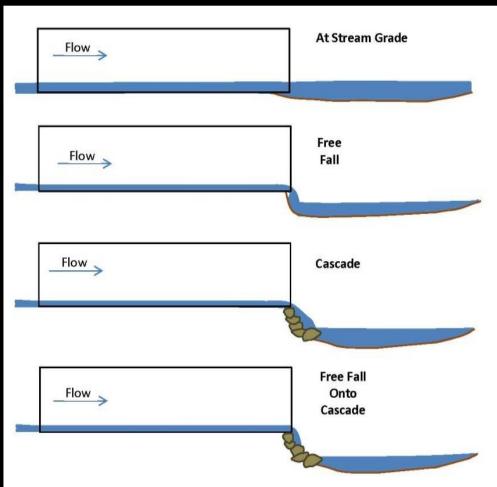
	Crossing Code	Local ID @pilo relt	
1	Date Observed (2007012-0000) Lead Observer_		
	Town/County	Stream	
		TILANE AVED UNPAVED DRIVEWAY RAIL	BAH
j	GPS Coordinates (Decimaldegrees) • "N Latitude	- W Longitu	ude
	Location Description		
	Crossing Type BRIDGE CULVERT MULTIPLE CULVERT FORD N	AND LABOR TO BE A STATE OF THE	ge Ce
	Photo IDs INLET OUTLET UPSTREAM.	DOWNSTREAMOTHER	
	Flow Condition NO FLOW YPICAL-LOW MODERATE HIG-	rossing Condition OK POOR NEW UNKNOWN	
	Tidal Site YES NO UNKNOWN Alignment FLOW-ALIGNED	SKEWED 6459 Road Fill Height (Top of cavert to road sarface; bridge = 0,	
	Bankfull Width (Optiona) Confidence F.SH LOW/ESTIMATED	Constriction SEVERE MODERATE SPANS FULL CHANNE	E. & P
	Tailwater Scour Pool NONE SMALL LARGE	SPANS ONLY BANKFULL/ACTIVE CHANNEL	
Ė	Crossing Comments	Section 2007 (SNS) A 275 and UMAII a 2007 2 ft Middle Acceptant (UCU)	
292	Outlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN R Outlet Grade (Pickong) ATSTREAM GRADE FREE-FAIT CASCADE FREE Outlet Dimensions A. Width . B. Height . C. Substrate	F FALL ONTO CASCADE CLOGGED/COLLAPSED/SCEMFRGED	FX
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AQUATIC CONNECT VITY STREAM, CROSSING SURVEY DATA FORM



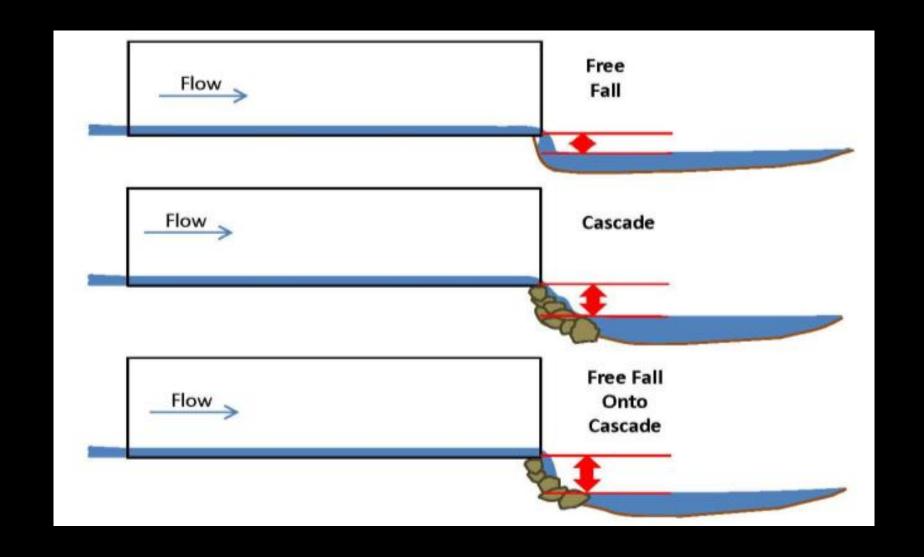




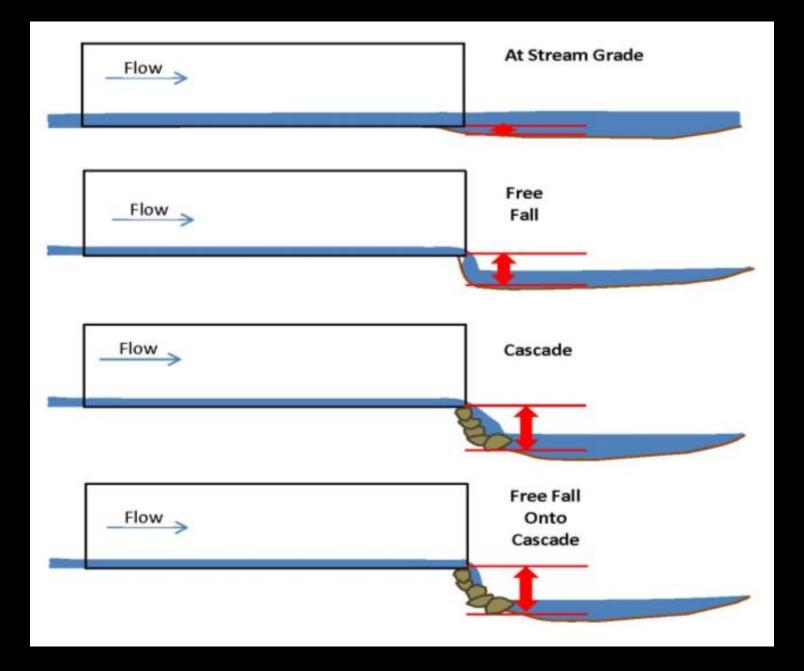




Outlet Drop to Water Surface



Outlet Drop to Stream Bottom









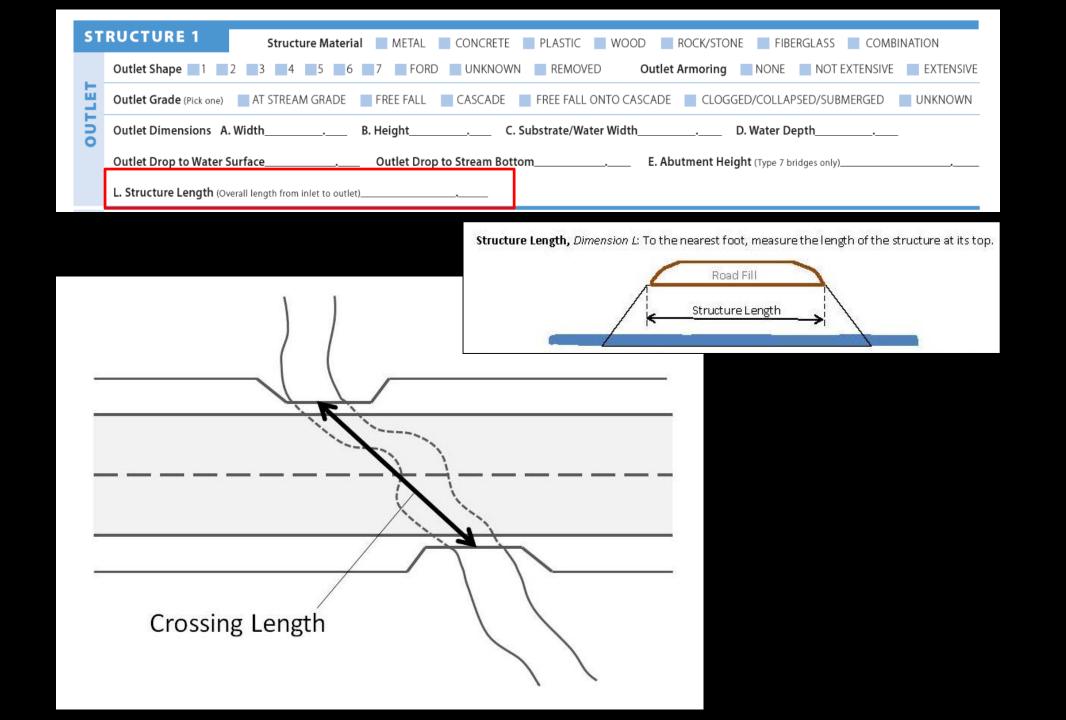




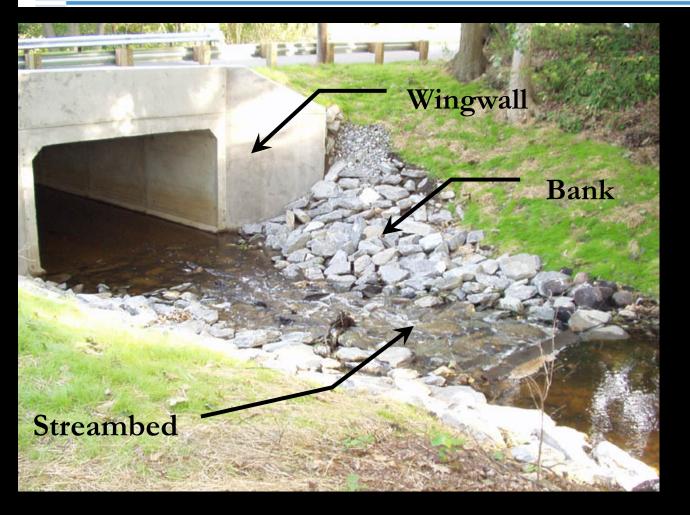








ST	RUCTURE 1 Structure Material METAL CONCRETE PLASTIC WOOD ROCK/STONE FIBERGLASS COMBINATION
	Outlet Shape 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED Outlet Armoring NONE NOT EXTENSIVE EXTENSIVE
H	Outlet Grade (Pick one) AT STREAM GRADE FREE FALL CASCADE FREE FALL ONTO CASCADE CLOGGED/COLLAPSED/SUBMERGED UNKNOWN
DUT	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)



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

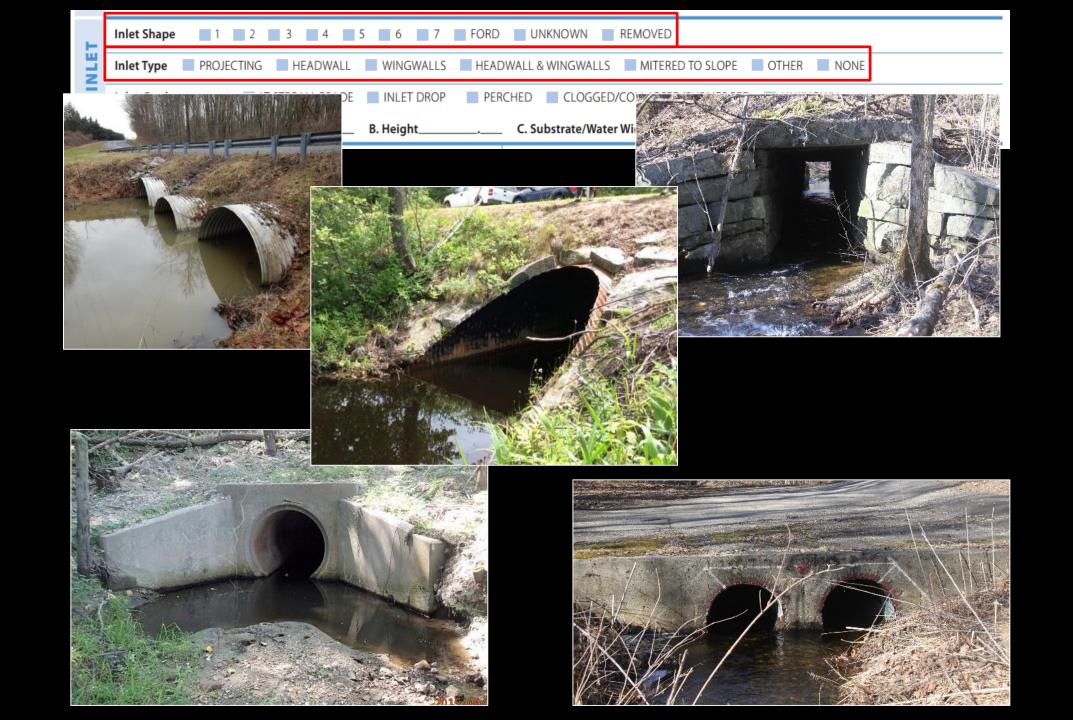
Extensive: material covers an area more than 50% of the stream width, which was put in place specifically to minimize scour at the outlet

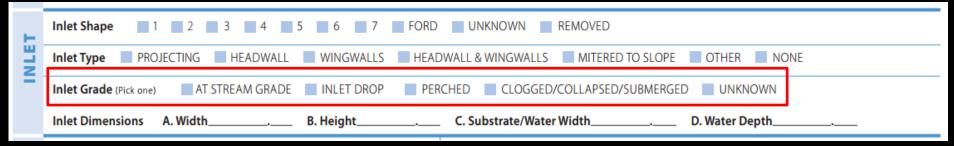






Extensive Outlet Armoring

















Inlet 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.



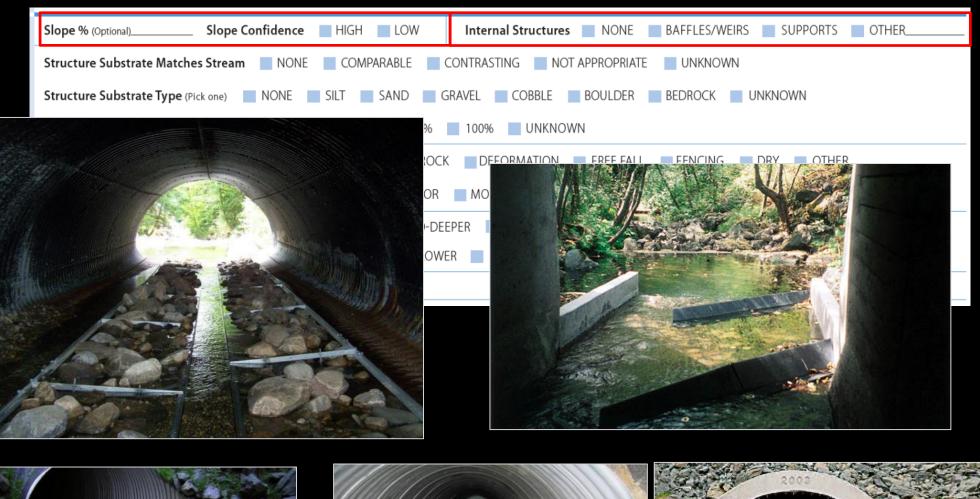








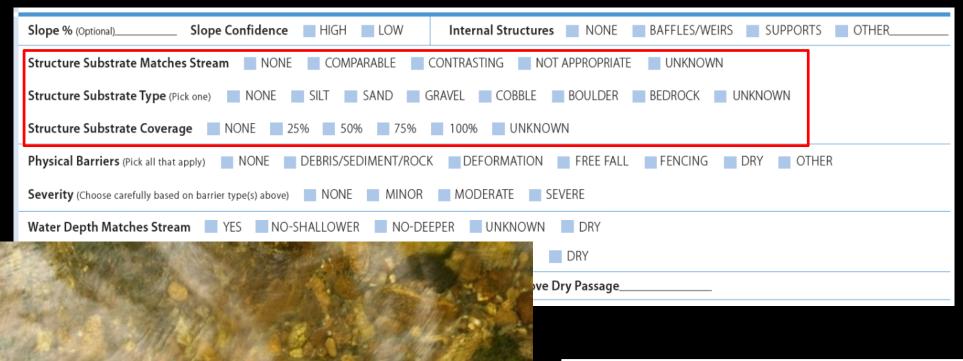








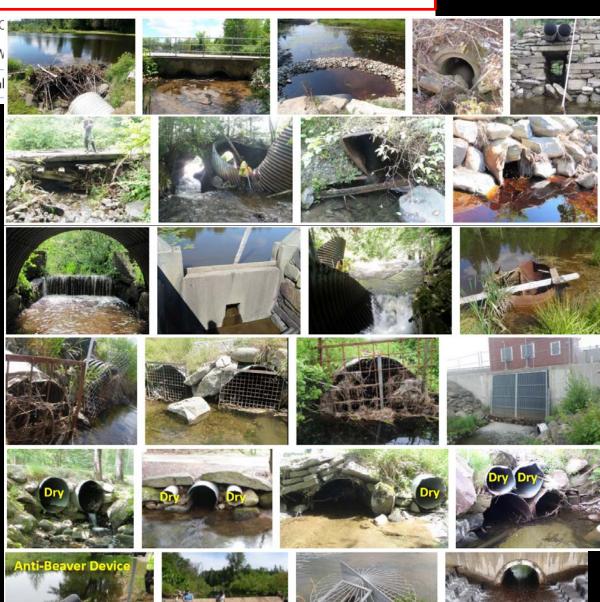




Substrate Type	Feet	Approximate Relative Size
Silt	< 0.002	Finer than salt
Sand	0.002 - 0.01	Salt to peppercorn
Gravel	0.01 - 0.2	Peppercorn to tennis ball
Cobble	0.2 - 0.8	Tennis ball to basketball
Boulder	> 0.8	Bigger than a basketball
Bedrock	Unmeasurable	Unknown - buried

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	1
Dalada (Gadharan (Dad	None	None beyond few leaves or twigs as may occur in stream	1
Debris/Sediment/Rock Logs, branches, leaves,	Minor	< 10% of the open area of the structure is blocked	1
silt, sand, gravel, rock	Moderate	10% - 50% of open area blocked	7
	Severe	> 50% of open area of structure blocked	7
Defermention	None	Small dents and cracks – insignificant effect on flow	
Deformation Significant dents, crushed metal,	Minor	Flow is limited < 10%	7
collapsing structures	Moderate	Flow is limited between 10% - 50%	7
	Severe	Flow is limited > 50%	7
Free Fell	None	No vertical drop exists - apart from Outlet Grade	7
Free Fall Vertical or near-vertical drop	Minor	0.1 - 0.3 foot vertical drop - apart from Outlet Grade	7
	Moderate	0.3 - 0.5 foot vertical drop - apart from Outlet Grade	7
	Severe	> 0.5 foot vertical drop - apart from Outlet Grade	7
Foncing	None	No fencing exists in any part of the structure	7
Fencing Wire, metal grating, wood	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	7
Dry	Minor	May be passable at somewhat higher flows	
	Moderate	Not likely passable at higher flows	7
	Severe	Impassable at higher flows	7
Other	Minor	Use best judgment based on above standards	
	Moderate	Use best judgment based on above standards	7
	Severe	Use best judgment based on above standards	

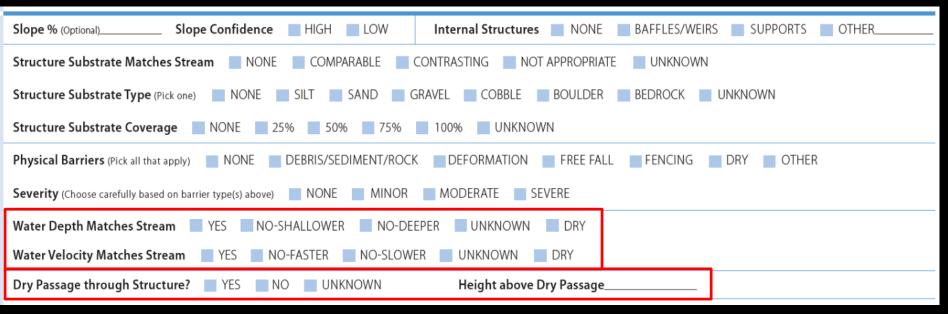


Dam w/no Free Fall













Dry Passage for Wildlife?



☐ No



Dry Passage for Wildlife?



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

Survey ld: 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

			Crossing Classification	
Metric	Flow Condition	Full AOP	Reduced AOP	No AOP
		If all are true	If any are true	If any are true
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 Dooth	Typical-Low	> 0.3 ft		< 0.3 ft w/Outlet Drop to Water Surface > 0
Inlet or Outlet Water Depth	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

