Minnesota DEPARTMENT OF NATURAL RESOURCES

Stream Survey

Stream Crossing Full Assessment Form

All units are to be entered in feet. * = Mandatory field to complete.

Location: Observer*:_______________________Date*:____/____/_____County:_________T___R___S___

Stream name*:____________________ Stream mile:____UTM:* N___________________E_________________

Alt. name:_____________________ Stream Kittle or AUID (circle which)*:______________________________

DNR Major watershed/HUC 8*(circle which):______________ Road/Path/Railway name*:___________________

Elevation method*: ☐ Monument ☐ RTK ☐ Benchmark/LiDAR ☐ Handheld GPS Accuracy*:_______________

HI:__________ Water level ☐ High ☐ Baseflow ☐ Low Velocity method: ☐ Meter ☐ Surface

Crossing: Benchmark location:_________________________________

Crossing type*: ☐ Span Bridge Total span* (sum of culverts):______

☐ Culvert(s) Num. (if multiple):___ Offset*?: ☐ Y ☐ N Outlet drop*:___

☐ Ford Crossing properly aligned*? ☐ Y ☐ N

Other:_______________________ Year built:________

Inlet type: ☐ Projecting ☐ Mitered ☐ Headwall ☐ Apron ☐ Wingwall ☐ Trash rack ☐ Other:________________

Outlet type: ☐ At stream grade ☐ Cascade over riprap ☐ Freefall into pool ☐ Freefall onto riprap ☐ Apron

Bridge condition: ☐ Good ☐ Fair ☐ Poor Condition issues:________________________ Road Fill depth:____

Openings (left to right, facing downstream)

	Opening 1		Opening 2		Opening 3		Opening 4	
Type*	☐Thalweg ☐ Offset ☐ Floodplain		☐Thalweg ☐ Offset ☐ Floodplain		☐Thalweg ☐ Offset ☐ Floodplain		☐Thalweg ☐ Offset ☐ Floodplain	
Shape*	☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch		☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch		☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch		☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch	
Material*	☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic		☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic		☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic		☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic	
Flow restriction	☐ Y ☐ N Type:_____________		☐ Y ☐ N Type:_____________		☐ Y ☐ N Type:_____________		☐ Y ☐ N Type:_____________	
Length*								
Width *								
Height*								
Inlet invert*	FS	El.	FS	El.	FS	El.	FS	El.
Outlet invert*	FS	El.	FS	El.	FS	El.	FS	El.
Benchmark el.	FS	El.	FS	El.	FS	El.	FS	El.
Water depth								
Substrate?*	☐ Y ☐ N		☐ Y ☐ N		☐ Y ☐ N		☐ Y ☐ N	
Subst. depth								
Subst. size	☐ Cobble ☐ Gravel ☐ Sand ☐ Silt ☐ Bdrk		☐ Cobble ☐ Gravel ☐ Sand ☐ Silt ☐ Bdrk		☐ Cobble ☐ Gravel ☐ Sand ☐ Silt ☐ Bdrk		☐ Cobble ☐ Gravel ☐ Sand ☐ Silt ☐ Bdrk	
% plugged*								
Max. velocity	fps		fps		fps		fps	
% at max vel.	%		%		%		%	

Stream:

Bankfull width*:______________ Bankfull estimate confidence*: ☐ High ☐ Medium ☐ Low

Riffle max. water depth:______ Riffle max. velocity:______ Riffle dominant substrate:______

Scour Pool*: ☐ Y ☐ N Depth:____ Width:____ Length:____ Upstream pool*: ☐ Y ☐ N

Upstream deposition*: ☐ Y ☐ N Bank erosion caused by crossing*: ☐ Y ☐ N Channel gradient:_____

Floodprone width:_____ Sedimentation from road grade or embankment (circle)

Road/Rail/Path:

Ownership:_______________________________ Surface materials: ☐ paved ☐ gravel ☐ native Road width:____

Upstream fill depth:_____ Downstream fill depth:____

Summary:

Barrier to fish passage at some flows*? ☐ Y ☐ N Stream stability impact*: ☐ Y ☐ N

Priority: ☐ High ☐ Med. ☐ Low Limiting factor for passage*: ☐ Outlet drop ☐ Velocity ☐ Depth ☐ Substrate

Recommended corrective actions*: ____

____

____

Notes and comments: ____

____

____

Photos:

1) Crossing, facing upstream
2) Crossing, facing downstream
3) Stream, facing upstream from crossing
4) Stream, facing downstream from crossing

Sketch:

Stream Survey

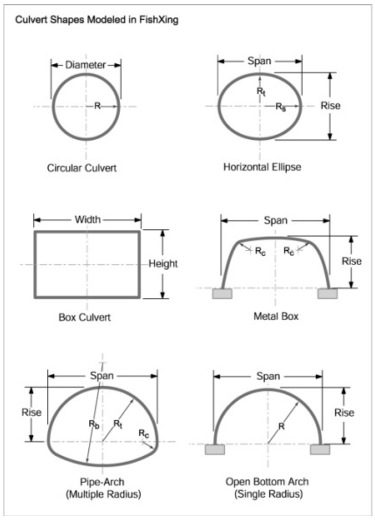
Stream Crossing Full Survey Instructions

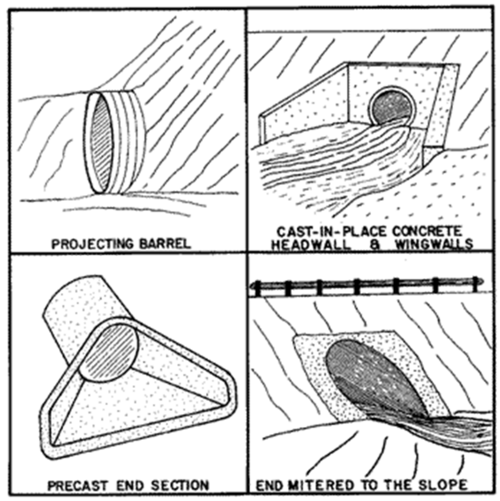
Location:

UTM:	Location should be taken as a single point at the upstream side of the crossing.
DNR Major Watershed/ HUC 8:	Circle watershed class used; enter DNR major watershed as two digit number.
Road/path/railway name:	Use the Federal/State/County name if applicable, rather than local names
Elevation method:	If collected, invert elevations should be tied to real world elevations. If a monument is not available at the bridge and you do not have access to survey-grade GPS equipment, a laser level can be used to take invert elevations relative to a benchmark, preferably the crown of the road above the crossing, so that the elevation can later be determined in the office using LiDAR in ArcGIS. The approx. accuracy of this method is +/-0.6 feet.
Water level:	Is the stream above, at, or below typical baseflow discharge? Use gage information from this or an adjoining watershed to check your field assessment, as well as considering recent precipitation data.
Velocity method:	If stream velocity measurements are taken, what method was used? Velocity meters are used to assess mean velocity as measured at 0.6 of the depth, while measuring travel time of a floating object across a fixed distance measures surface velocity.
Benchmark location:	Describe detailed location where benchmark was measured.

Crossing:

Type:	Check box for thalweg culvert, offset channel culvert, or floodplain culvert.
Shape:	Refer to diagram on the following page.
Offset culverts:	If multiple culverts are present, are there baseflow and high flow culverts set at different elevations?
Total span:	For crossings with multiple culverts, add the width of each culvert. Do not include the width of walls between culverts. For clear-span bridges, measure the total length of the bridge from abutment to abutment.
Outlet drop:	If applicable, measure the drop in water surface elevation from the outlet of the culvert to the water surface of the scour pool.
Crossing alignment:	Is crossing alignment appropriate for the planform of the stream? Use the “notes” field at the end of the form if explanation is needed.
Openings:	Record data on multiple culverts, starting with the furthest left culvert as you face downstream.
Inlet type:	Refer to diagram on the following page.
Invert:	Invert is measured by excavating down to below embedded substrate to the culvert, if present. If crossing is a bottomless structure, measure the highest thalweg elevation on the upstream and downstream side of the bridge. See “Elevation method” above for selection of benchmark.
Water depth:	Minimum thalweg water depth within the crossing. Useful if collected at low flows.
Substrate:	Substrate must be present throughout the culvert in order to check “yes” to this category. Record the dominant substrate size, and minimum depth of substrate found in culvert. Put NA if crossing is a bottomless structure.
% plugged:	Percent of culvert cross section lost to debris jams, substrate filling, or partial crushing.
Velocity:	Measure maximum thalweg velocity within crossing, and estimate % of crossing length at that velocity





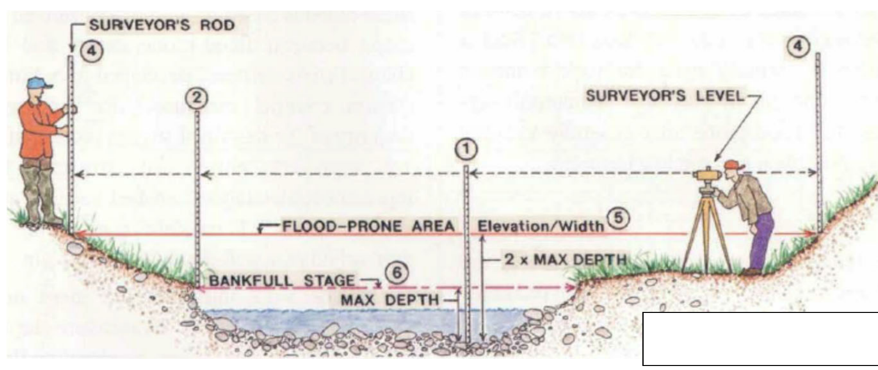
Source: FishXing.com

Stream:

Bankfull width: Bankfull width should be measured at a riffle, away from the influence of the crossing. "High" confidence widths must be measured on streams with obvious bankfull features, and validated either by gage information or regional curves. "Medium" bankfull widths do not have strong agreement, but good bankfull features are present. "Low" confidence widths are based on regional curves and lack obvious instream features.

Riffle depth, velocity, and Substrate: Measure minimum thalweg water depth, velocity, and substrate at the same riffle where you estimated bankfull width

Floodprone width: Estimate the 50 year floodplain, which is the width at an elevation of two times the maximum riffle depth.



Road/Rail/Path:

Fill depth: Measure depth of fill from top of culvert to base of road bed.

Summary:

Barrier to fish passage: Does the crossing inhibit upstream fish passage at high or low flow?

Priority: Priority ratings are based on the degree of impact, the relative impact to other crossings in the watershed, and the priority of stream based on potential aquatic resources.

Scour and upstream pool: Undersized or perched culverts often affect stream morphology, impounding water on the upstream side and creating an overly wide and deep pool on the downstream side. Presence/absence can be noted, or measurements of the scour pool can be taken to better quantify the degree of scour.

Upstream deposition: Undersized culverts can affect sediment transport, causing the stream to deposit sediment upstream of the crossing rather than passing it through.