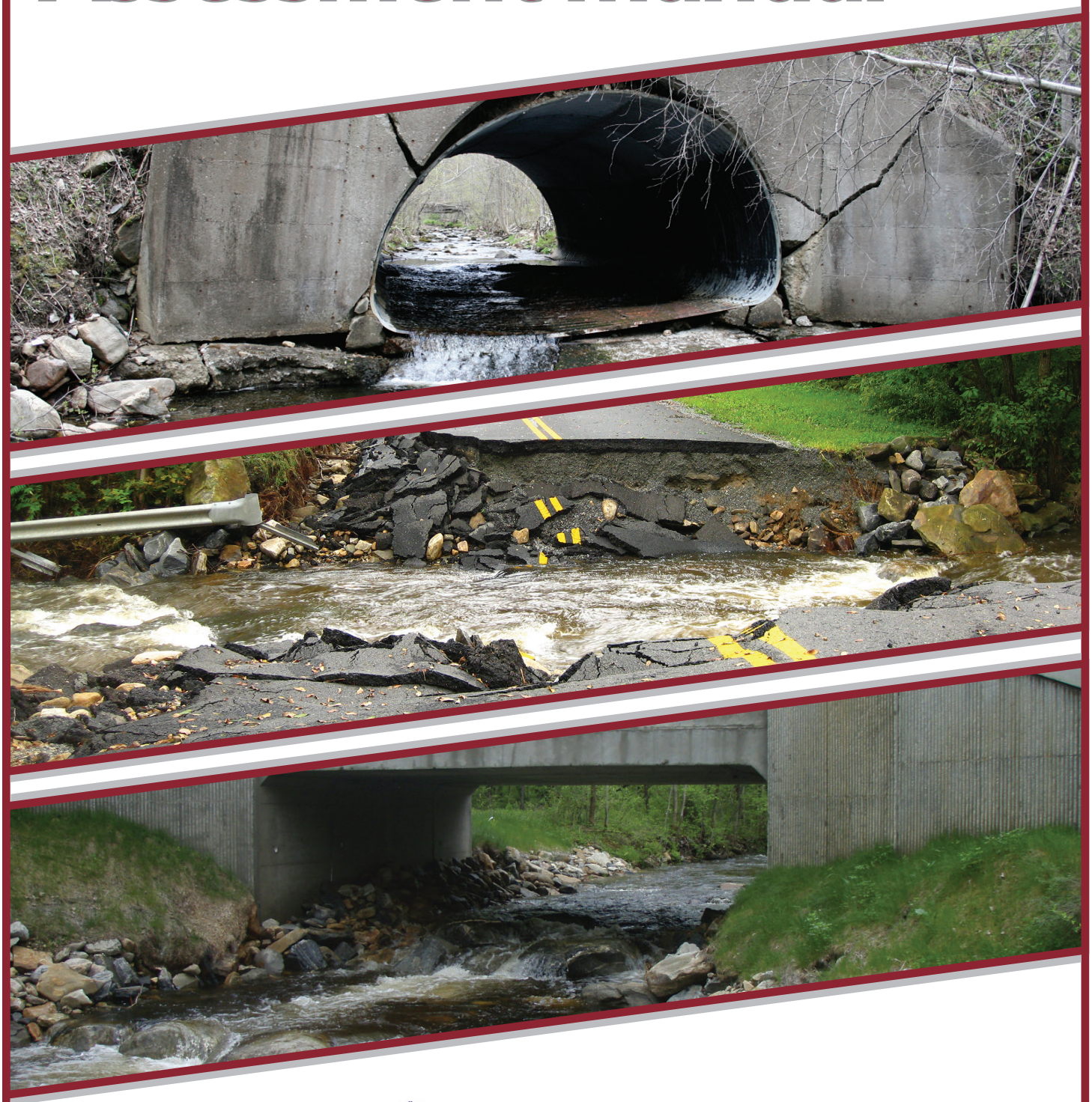
2019 Edition

Culvert Condition Assessment Manual



The Center for Agriculture, Food and the Environment

North Atlantic Aquatic Connectivity Collaborative NAACC

The Nature Conservancy

UMassAmherst
College of Engineering
UMass Transportation Center

Purpose

This document provides guidance for completing the Culvert Condition Assessment Form. The information collected will assist in the identification of culverts for repair or replacement. The assessment data form is to be used for an entire road-stream crossing, which may include single or multiple culverts or multiple cell bridges. The top of the form (see page 22) contains general information about the crossing and the bottom half of that page is for specific data on the condition of the crossing. The form is designed for a rapid assessment by trained lay observers (not necessarily engineers) for purposes of flagging crossings that should be examined more closely for potential structural deficiencies. It is essential to gather all of the data required for each structure for accurate assessment of the entire crossing. This assessment module is one of several develop and maintained by the North Atlantic Aquatic Connectivity Collaborative (NAACC). Data collected through use of this Culvert Assessment Form will be stored in the NAACC online database on the NAACC website: https://www.streamcontinuity.org/

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Safety

Safely conducting the Culvert Assessment is of the utmost importance. The conditions under which assessments can be done should require the following items for a team of two assessors. Assessments requiring advanced safety equipment (i.e. climbing rope, air monitoring devices) should not be done unless conducted by people with the proper safety training and equipment.

List of Culvert Sites and Map
Assessment Guide
Blank Assessment Forms
Clipboards and Writing Implements
2 Waterproof Flashlights and/or Headlights
4 28" Orange Collapsible Safety Cones with Reflective Bands
2 Class II Safety Vests
2 Safety Glasses
2 Work Gloves and/or Heavy Rubber Gloves
Camera
Hand Held GPS
2 Chest Waders
2 Cell Phones and/or Portable Radios
Bug Spray
First Aid Kit with Blood Stop
Snake Bite and Poisonous Vegetation Kits
Pruning Shears or Machete
A Pocket Rod
Chipping Hammer
Duct Tape
Gallon Size Ziploc Bags
5 Gallon Bucket (to carry items)
100' Reel Tape (measurements should be in feet and tenths of feet)
Telescoping Stadia Rod
Measuring Wheel
Small Round Point Shovel
Small Iron Rake (7" wide)
Wasp and Hornet Spray
Probing Rod or Walking Stick

Completing the Culvert Condition Assessment Form

Before heading to the field, plan a route and discuss a strategy to most efficiently assess the maximum number of culverts within the time allowed. Make sure you have everything in your vehicle that you will need for the entire time you plan to stay in the field. When you arrive at the site, identify a safe location to park the vehicle. If it is on the shoulder of the road, place the orange safety cones in a manner to alert traffic as to its presence. Ideally the vehicle is parked off the roadway as not to interfere with traffic. Don your personnel protective equipment, scan the site for potential hazards and collect your forms and tools.

Start by completing all general information on the Culvert Assessment Form such as Date, Lead Observer, Location, Time, Weather, etc... If any information is unknown, leave the space blank.

Position yourself on the road as close to the midpoint of the culvert as is safely possible to determine and record the GPS coordinates in decimal degrees. A GPS device is required for this step. GPS devices should be set to WGS84 datum.

Starting with the outlet side of the culvert and record the pertinent data in the boxed sections of the form. If there is a circumstance or area of concern that is not covered on the form, record the information in the "Notes" section. Take as many photographs as is necessary to properly record the condition of the culvert and appurtenances. Identify the photographs by number and description in the shaded area at the bottom of the form.

Safely move to the inlet side of the culvert, record the pertinent data in the boxed sections of the form. If there is a circumstance or area of concern that is not covered on the form, record the information in the "Notes" section. Take as many photographs as is necessary to properly record the condition of the culvert and appurtenances. Identify the photographs by number and description in the shaded area at the bottom of the form.

Observe the condition of the pavement or soil above the culvert and note any holes or cracks which could indicate a void underneath.

In the field assess each aspect of the culvert (including appurtenances) as "Adequate," "Poor," or "Critical." Aspects that are new, excellent, very good or good are all classified as "Adequate" for purposes of this assessment. The manual describes, in text and photographs, characteristics of culverts that would lead to assessments of adequate, poor and critical. If you are unsure of any terminology on the form, please refer to the glossary on page 24.

It is necessary to complete a Culvert Assessment Form for each culvert. For example, if two culverts are side by side and have identical characteristics, two culvert forms must still be completed. Standing at the inlet of a crossing with multiple culverts looking downstream, the culvert on the left will be #1. Continue numbering the culverts sequentially going from left to right.

For maintenance purposes, the Performance Problems Requiring Action section should be completed and the appropriate agencies notified of any areas of concern.

Complete and store the Culvert Assessment Form(s) and then head safely to the next crossing location.

Culvert Reference Material

A glossary of terms used in the Culvert Condition Assessment Form may be found on page 25 of this manual. The Culvert Assessment Reference Chart which contains detailed descriptions of Culvert Shapes and Dimensions can be found on page 23

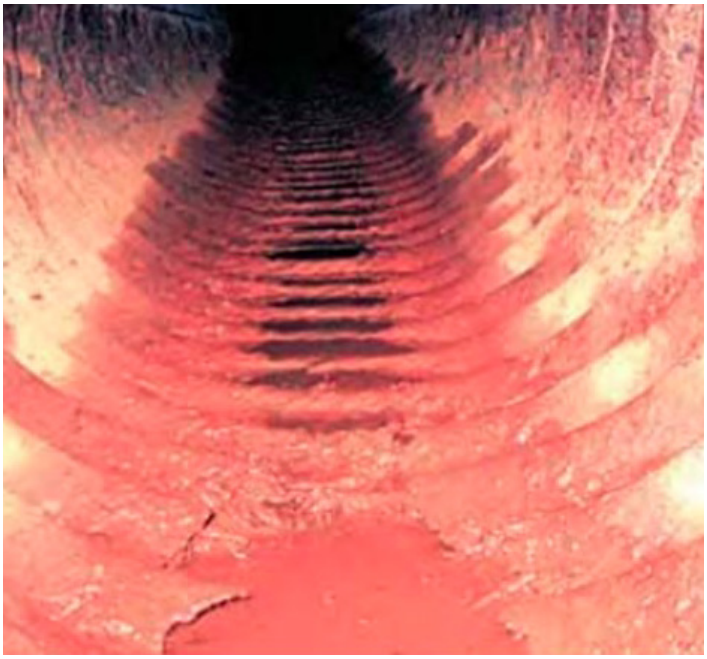
Invert Deterioration

Adequate

Minor corrosion and pitting, no holes or distortion. Cannot penetrate metal with sharp point of chipping hammer. Minor isolated spalls in concrete.

Poor

Perforations visible and/or connection hardware failing (metal). Heavy abrasion and scaling with exposed steel reinforcement (concrete). Heavy abrasion or scour damage (plastic). Displaced mortar and/or blocks, holes in invert area (masonry).



Critical

Holes or section loss with extensive voids beneath invert and/or embankment/roadway damage. Holes and gaps with extensive infiltration of soil, bedding, or backfill material (masonry).

Joints & Seams

Adequate

Minor separation of joints and seams up to 1", minor backfill infiltration.

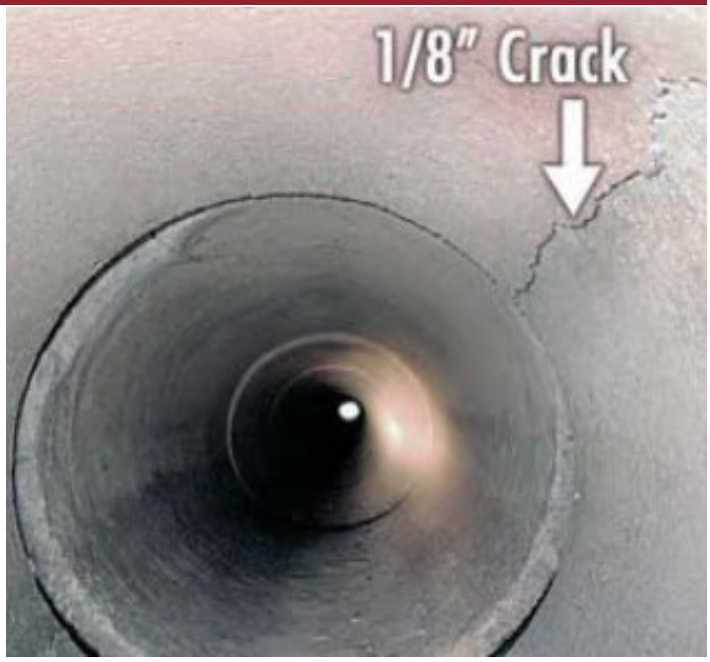
Poor

Significant separation of joints and seams between 1" to 3"; infiltration of backfill into culvert; voids visible in fill through offset of joints.

Critical

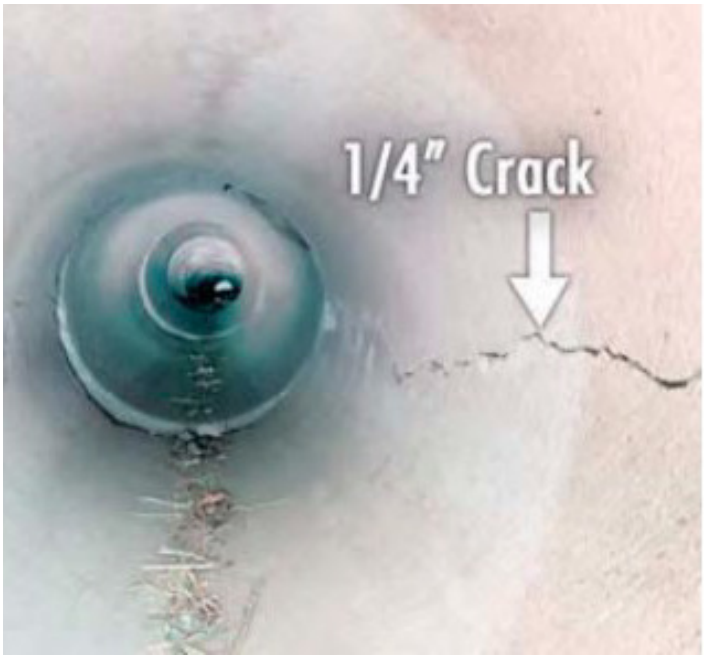
Severe separation of joints and seams greater than 3"; infiltration of backfill into culvert; large voids visible in fill through offset of joints.

Structural Integrity of Barrel (Concrete)



Adequate

Longitudinal cracks less than 1/8" in width, spalls up to 1/4" deep.



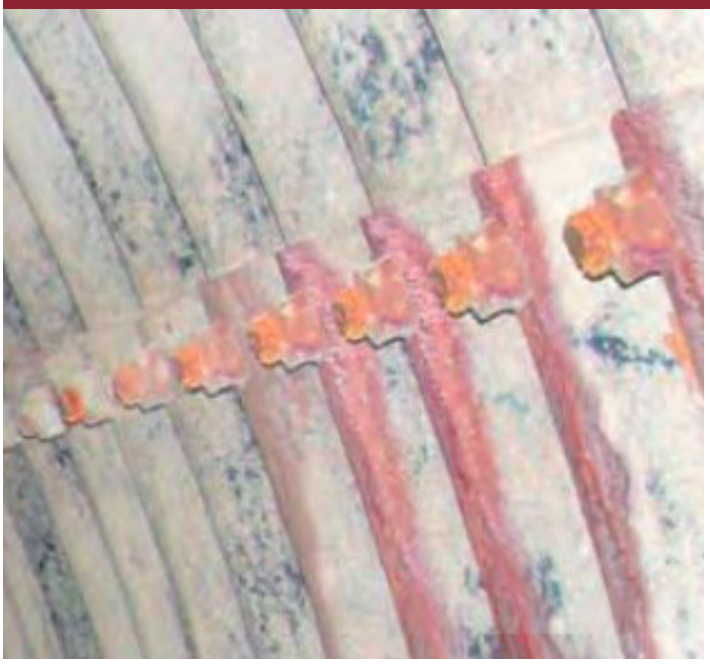
Poor

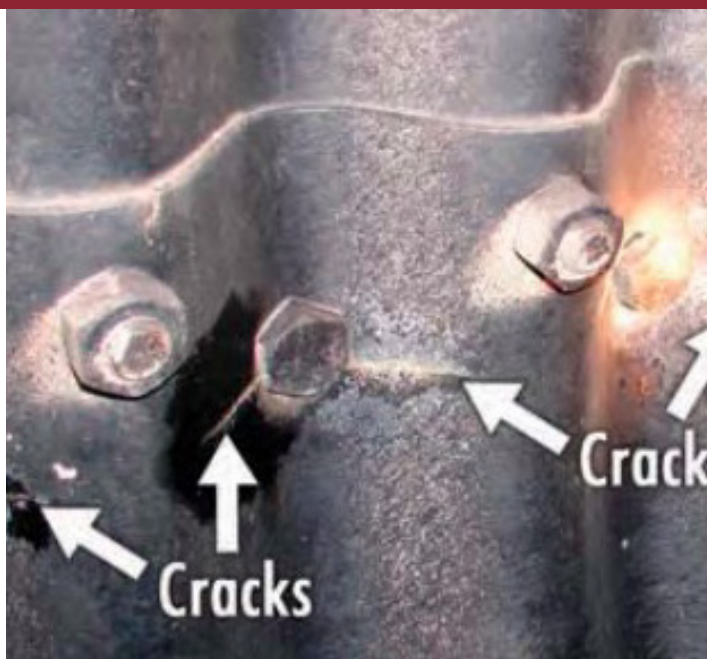
Longitudinal cracks between 1/8"-1/4" in width, spalls larger than 1/2" deep, and spalls have exposed rebar.

Critical

Severe cracking and spalls greater than 1/2" on culvert walls, sections of culvert are partially collapsed, major corrosion of rebar.

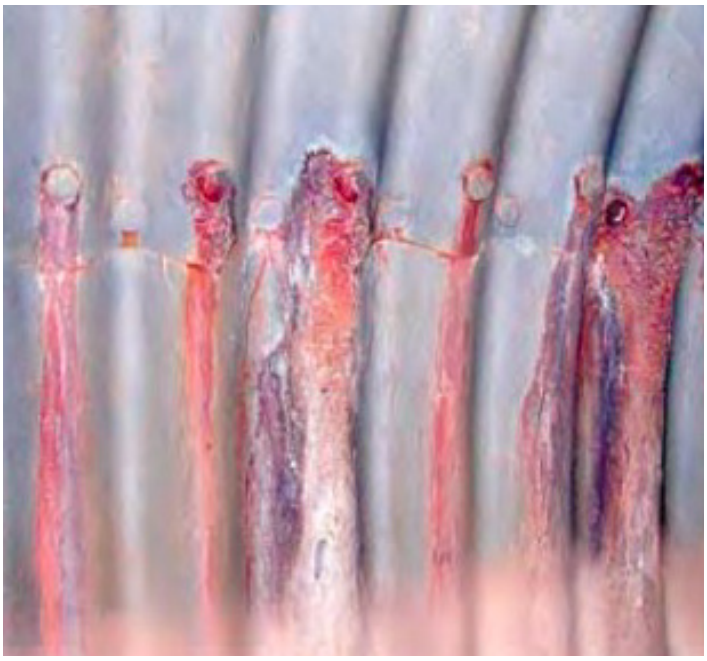
Structural Integrity of Barrel (Metal)





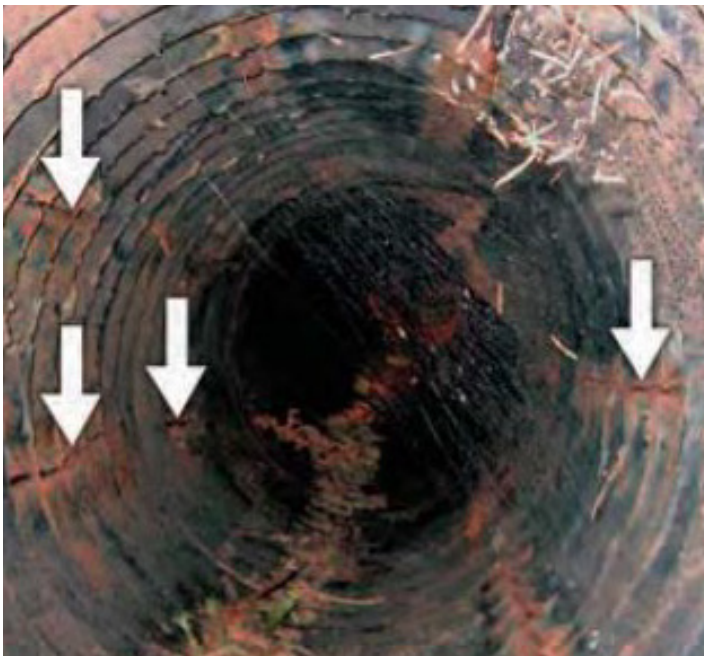
Adequate

Minor cracking around bolt holes or seams at isolated sections.



Poor

Significant cracking and/or deterioration along bolt holes and isolated seams of plates.



Critical

Severe cracking and or deterioration along bolt holes and along seams of plates.

Structural Integrity of Barrel (Plastic)

Adequate

Minor isolated rip or tear caused by debris less than 6″ in length and 1/2″ in width. Minor cuts or gouges to end sections from maintenance or construction activities.

Poor

Cracking, splits or tears over 6″ in length and up to 3/4″ in width. Openings in pipe causing loss of backfill material.

Critical

Cracking, splits, punctures, or tears over 6″ in length and over 1″ in width. Openings in pipe causing loss of backfill material.

Headwall/Wingwall

Adequate

Minor spalls and cracks less than 1/8" in width. No exposed rebar or surface evidence of rebar corrosion. Minor settlement of the wall.

Poor

Significant spalls and cracks between 1/8" to 1/4" in width. Exposed rebar with corrosion. Significant settlement of the wall.

Critical

Extensive deterioration with loss of concrete. Corrosion of rebar and extensive section loss. Extensive settlement of the wall.

Apron

Adequate

Some minor undermining of culvert and small scour hole. Some deterioration of joint between apron and headwall.

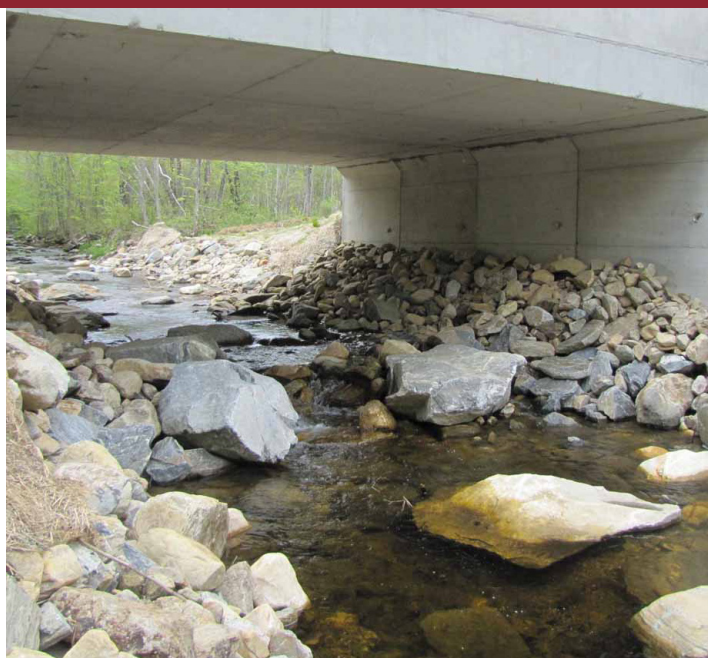
Poor

Significant undermining of culvert and evidence of scour hole. Significant deterioration of joint between apron and headwall.

Critical

Extensive undermining of culvert and development of a large hole under a structural element of the culvert. Substantial deterioration of joint between apron and headwall.

Armoring



Adequate

Streambed and streambanks are reinforced with a protective covering of rocks or engineering materials.

Poor

Significant displacements, undermining or deterioration affecting the performance of the culvert structure.

Critical

Partially or totally failed, significantly affecting performance and/or causing embankment/roadway damage or undermining of the culvert barrel or footings.

Embankment Piping

Fair

Embankment moist only in areas surrounding culvert barrel. No evidence of flow or sediment transport observed.

Poor

Evidence of seepage through the embankment along the outside of the culvert barrel, sediment transport not observed.

Critical

Evidence of flow through embankment along the outside of culvert barrel. Evidence of sediment transport, "voids" or sink holes observed.

Cross-Section Deformation (Metal)

METAL	CULVERT SIZES (Round Pipes) Original pipe diameter 12″	24″	36″	48″	60″	72″	84″
GOOD	< 12 1/2	< 25 3/16	< 37 3/4	< 50 1/4	< 63	< 75 1/2	< 88 1/4
FAIR (5% - 15%)	12 1/2 - 13 3/4	25 3/16 - 27 1/2	37 3/4 - 41 1/2	50 1/4 - 55 1/4	63 - 69	75 1/2 - 82 3/4	88 1/4 - 96 1/2
POOR (15% -20%)	13 3/4 - 14 1/2	27 1/2 - 28 3/4	41 1/2 - 43 1/4	55 1/4 - 57 1/2	69 - 72	82 3/4 - 86 1/2	96 1/2 - 101
CRITICAL (>20%)	> 14 1/2	> 28 3/4	> 43 1/4	> 57 1/2	> 72	> 86 1/2	> 100

Observed culvert width or span

Adequate

Minor distortions isolated within the pipe resulting in flattening of invert and/or crown. Isolated sections are slightly non-symmetrical. Span dimension is within 5-15% of design.

Poor

Significant distortions within the pipe resulting in flattening of invert and/or crown of pipe. Span dimension is within 15-20% of design.

Critical

Severe distortions and deflection within the pipe; flattening of the crown or invert; structure is partially collapsed. Span dimension is greater than 20% of design.

Cross-Section Deformation (Plastic)

PLASTIC	CULVERT SIZES (Round Pipes)						
	Original pipe diameter						
	12″	24″	36″	48″	60″	72″	84″
GOOD	< 12 1/2	< 25 3/16	< 37 3/4	< 50 1/4	< 63	< 75 1/2	< 88 1/4
FAIR (5% - 10%)	12 1/2 - 13 1/4	25 3/16 - 26 3/8	37 3/4 - 39 1/2	50 1/4 - 52 3/4	63 - 66	75 1/2 - 79 1/4	88 1/4 - 92 1/2
POOR (10% -15%)	13 1/4 - 13 3/4	26 3/8 - 27 1/2	39 1/2 - 41 1/2	52 3/4 - 55 1/4	66 - 69	79 1/4 - 82 3/4	92 1/2 - 96 1/2
CRITICAL (>15%)	> 13 3/4	> 27 1/2	> 41 1/2	> 55 1/4	> 69	> 82 3/4	> 96 1/2

Observed culvert width or span

Adequate

Minor isolated distortions and dimpling within the pipe. Pipe deflection 5-10% from original shape.

Poor

Significant distortions; wall buckling; flattening of invert/crown throughout the pipe. Pipe deflection 10-15% from original shape.

Critical

Severe distortions; wall buckling; flattening of invert/crown throughout the pipe; cracking/tearing present. Pipe deflection greater than 20% of original shape.

Structural (Longitudinal) Alignment

Adequate

Minimal horizontal or vertical misalignment of the pipe.

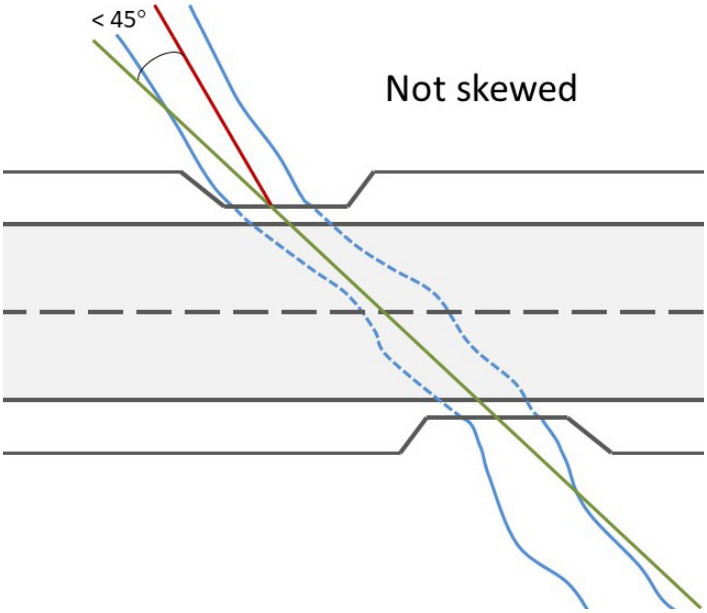
Poor

Significant horizontal or vertical misalignment of the pipe (Note: do not confuse this with constructed pipe bends).

Critical

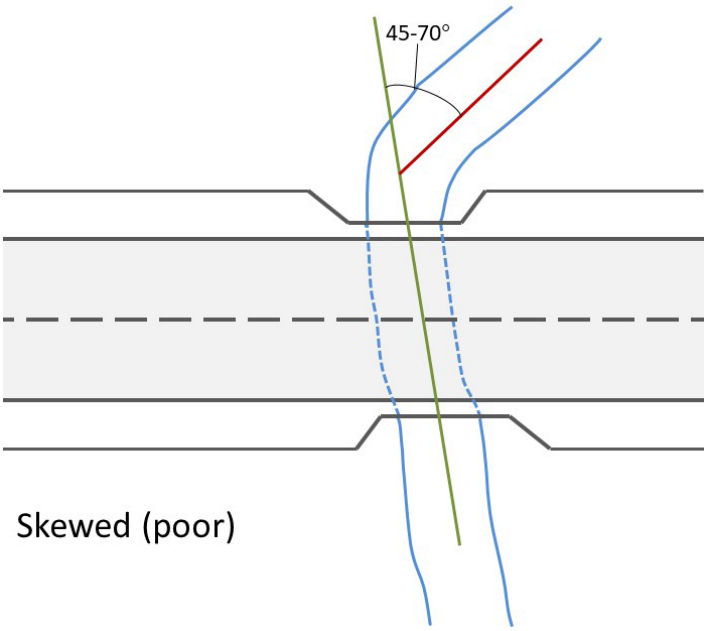
Significant misalignment resulting in deformation of pipe or embankment/roadway damage.

Channel Alignment



Adequate

Angle measured from upstream channel to centerline of culvert barrel is from 0-45 degrees.



Poor

The stream channel approaches the crossing at an angle of 45-70 degrees from the centerline of the structure.

Critical

The stream channel approaches the crossing at an angle of 70-90 degrees from the centerline of the structure.

Footing

Adequate

Minor to moderate deterioration. Concrete -moderate cracking, scaling or leaching (minor delamination or spalling). Masonry - moderate weathering (minor joint deterioration). Slight settlement or undermining. Minor footing exposure.

Poor

Extensive deterioration. Concrete - extensive cracking, scaling or leaching (delamination or spalling may be prevalent). Masonry - extensive weathering (significant joint deterioration). Significant settlement or undermining. Footing exposed and undermined.

Critical

Severe or critical deterioration. Function or structural capacity of the culvert has been severely impacted - immediate repairs or structural analysis may be required. Concrete - severe cracking, scaling, delamination, or spalling. Masonry - severe weathering (failed joints or displaced masonry blocks) Severe settlement or undermining.

Level of Blockage

Adequate

Blockage is 10-30% of opening.

Poor

Blockage is 30-75% of opening.

Critical

Blockage is >75% of opening.

Flared End Section

Adequate

Minor cracking, deterioration, or deformation. Minor undermining.

Poor

Significant cracks, piping or undermining affects >50% of appurtenance. End crushed or separated from barrel.

Critical

Deterioration is significantly effecting performance and/or causing embankment and/or roadway damage.

Buoyancy or Crushing

Adequate

Hydraulic uplift is overcome by a combination of the weight of the pipe, weight of the fill material over the pipe and weight of the water in the pipe.

Poor

Light to moderate denting or deformation of inlet and/or outlet end of flexible pipe culvert. The invert of the inlet is at the streambed elevation (no uplift).

Critical

Invert of inlet bent upward above stream bed or mitered edges crumpled inward.

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID**: (Optional)_____ **Date Observed:** (00/00/0000) ____/____/_____ Lead **Observer:**_____

Number of Culverts: ____ **Culvert** ___ **of** ____ **Stream:**_____ **Road:**_____

Location: (St.#, Pole#, Etc.)_____ **Town:**_____ **County**:_____ State:_____

GPS Coordinates: __ __ . __ __ __ __ __°N Latitude __ __ . __ __ __ __ __ °W Longitude Time:_____ Weather:_____

Crossing Type: ☐Bridge ☐Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☐Metal ☐Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert**: _____

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____**B. Height:**____**C. Substrate/Water Width:**____**D. Water Depth:**____**E. Abutment Height:**____

Inlet Grade: ☐At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____**B. Height:**____**C. Substrate/Water Width:**____**D. Water Depth:**____**E. Abutment Height:**____

Outlet Grade: ☐At Stream Grade ☐Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					**OUTLET** *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Channel Alignment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Level of Blockage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Invert Deterioration	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Buoyancy or Crushing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Cross-Section Deformation	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Structural Integrity of Barrel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Joints and Seams	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Footings	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Headwall/Wingwalls	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Apron	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Embankment Piping	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:_____

_____

_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

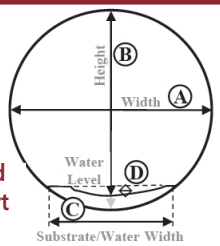
Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

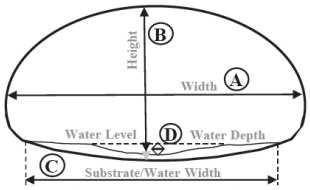
Culvert Assessment Reference Chart

CULVERT SHAPE & DIMENSIONS

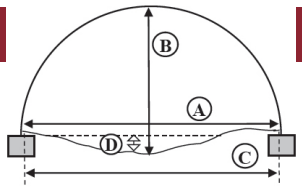
1. Round Culvert



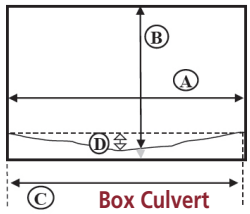
2. Pipe Arch/Elliptical Culvert



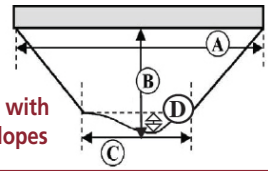
3. Open Bottom Arch Bridge/Culvert



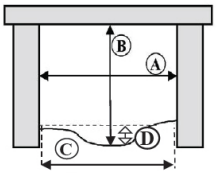
4. Box Culvert



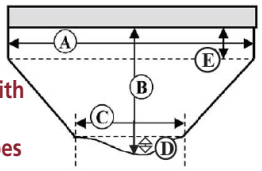
5. Bridge with Side Slopes



6. Box/Bridge with Abutments



7. Box/Bridge with Abutments and Side Slopes



CULVERT CONDITION REFERENCE

Structural (Longitudinal) Alignment

Poor: Significant horizontal or vertical misalignment of the pipe (Note: do not confuse this with constructed pipe bends).

Critical: Significant misalignment resulting in deformation of pipe or embankment/ roadway damage.

Channel Alignment

Poor: The stream channel approaches the crossing at an angle of 45-70 degrees from the centerline of the structure.

Critical: The stream channel approaches the crossing at an angle of 70-90 degrees from the centerline of the structure.

Level of Blockage

Poor: Debris/sediment/vegetation blocks 1/3 of more of the inlet/outlet opening.

Critical: Sediment blocks more than ½ the inlet/outlet opening (and not designed that way for aquatic organism passage).

Flared End Section

Poor: Significant cracks, piping or undermining affects >50% of section. End crushed or separated from barrel.

Critical: Deterioration is significantly affecting performance and/or causing embankment/ roadway damage.

Invert Deterioration

Poor: Perforations visible and/or connection hardware failing (metal). Heavy abrasion and scaling with exposed steel reinforcement (concrete). Heavy abrasion or scour damage (plastic). Displaced mortar and/or blocks, holes in invert area (masonry)

Critical: Holes or section loss with extensive voids beneath invert and/or embankment/ roadway damage. Holes and gaps with extensive infiltration of soil, bedding or backfill material (masonry).

Bouyancy or Crushing

Poor: Light to moderate denting or deformation of inlet and/or outlet end of fl exible pipe culvert. The invert of the inlet is at the streambed elevation (no uplift).

Critical: Invert of inlet bent upward above streambed or mitered edges crumpled inward.

Cross-Section Deformation

Poor: Significant perceptible deformation. Deformation with accompanying longitudinal cracking (concrete).

Critical: Excessive deformation resulting in significant reduction of available flow area, and/or extensive infiltration of soil, voids, structural failure or embankment/roadway damage.

Structural Integrity of Barrel

Poor: *Concrete:* Open cracks >1/8" wide with voids and significant infiltration of soil and/or leakage of water. Heavy rust staining and/or exposed steel reinforcement in sides and top of barrel.
Masonry: Missing and/or displaced blocks
Plastic: Several splits, tears and cracks >6" long. Significant deformation of liner or wall buckling.

Critical: Cracks, tears, splits, bulges, holes or section loss have led to extensive infiltration of soil, structural failure, voids and embankment/ roadway damage.

Joints and Seams

Poor: Open or displaced with significant infiltration of soil and/or leakage of water and voids visible. Missing mortar or displaced blocks (masonry).

Critical: Open or displaced with significant infiltration of soil and accompanying embankment/roadway damage.

Footings

Poor: Top portion of footing exposed, but no cracking or breaking off of flakes or chips.

Critical: Footing exposed with signs of cracking or breaking off of flakes or chips. Bottom of footing exposed and/or undercut.

Headwall/Wingwalls

Poor: Cracking or breaking off of flakes or chips affecting >50% of area and/or exposed steel reinforcement. Gap >4" between barrel and wall. Footing exposed and undermined.

Critical: Partially or totally collapsed with damage to embankment/roadway.

Armoring

Poor: Significant displacements, undermining or deterioration affecting the performance of the culvert structure.

Critical: Partially or totally failed, significantly affecting performance and/ or causing embankment/roadway damage or undermining of the culvert barrel or footings.

Apron

Poor: Significant cracking affects >50% of apron. Significant piping or undermining.

Critical: Partially or totally collapsed, significantly affecting performance and/or causing embankment/roadway damage.

Embankment Piping

Poor: Slight pavement cracking above the culvert, perhaps with a noticeable bump/ depression when driving, but no evidence of holes in the embankment or soil infiltration in the culvert barrel.

Critical: Partially or totally failed, significantly affecting performance and/or causing embankment/roadway damage or undermining of the culvert barrel or footings.

GLOSSARY

Appurtenance	Structures, such as aprons, flared end structures, headwalls and wingwalls, that give support to the culvert end or header.
Apron	Erosion protection at the inlet or outlet consisting of rip rap or concrete.
Armoring	Artificial surfacing of a channel bed, bank, or embankment slope to resist scour or erosion.
Bridge	Deck supported by abutments (or stream banks). It may have more than one cell or section separated by one or more piers.
Buoyancy	Water exerting upward pressure on the culvert.
Buried Stream	Segment of stream that flows within a pipe extending well beyond the road crossing. The planned crossing site does not include an inlet and/or outlet, likely because a stream previously in this location has been rerouted, probably underground.
Cascade	The outlet of the structure is raised above the stream bottom at the outlet such that water flows very steeply downward across rock or other hard material when flowing from the structure.
Channel Alignment	Indicates the alignment of the crossing structure relative to the stream at the inlet. Compare the crossing centerline to a centerline of the stream where it enters the crossing.
Corrosion	Deterioration and rusting of metal through oxidation.
Crossing Code	A unique ID for each crossing in the database provided by the assigning authority (NAACC xycode).
Culvert	A culvert consists of a structure buried under some amount of fill. Culverts can be made of stone, brick or masonry.
Delamination	Splitting or separating of concrete or asphalt in the culvert.
Flush	The end of the culvert is not recessed nor does it extend beyond the headwall.
Ford	A ford is a shallow, open stream crossing, in which vehicles pass through the water. Fords may be armored to decrease erosion, and may include pipes to allow flow through the ford (vented ford).
Free Fall	The outlet of the structure is above the stream bottom such that water drops vertically when flowing out of the structure.
Free Fall onto Cascade	The outlet of the structure is raised above the stream bottom at the outlet such that water drops vertically onto a steep area of rock or other hard material, then flows very steeply downward until it reaches the stream.
Headwall	A structure at either end of the culvert whose purpose is to hold back the embankment, retain the culvert and prevent erosion.
Inlet	The in-flow end of the culvert.
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.
Lead Observer	Person responsible for data collection and data quality.
Leaching	Water that is penetrating through the culvert and traveling along the outside of the barrel.
Local ID	Identification code assigned by local agency or organization.
Location	Description that will allow another person to locate the culvert using only the supplied information.
Mitered to Slope	The end of the culvert is cut at an angle to match that of the topography.
Multiple Culvert	Two or more adjacent culverts at a single crossing.
No Crossing	A crossing that exists on a map that does not exist in the field.
No Upstream Channel	Areas where water crosses a road through a culvert but no road-stream crossing occurs because there is no channel up-gradient of the road. This can occur at the very headwaters of a stream or where a road crosses a wetland that lacks a stream channel (at least on the up-gradient side).
Outlet	The out-flow end of the culvert.
Overtopping	When the amount of flowing water exceeds the capacity of the culvert and flows over the road surface.
Perched	When the outlet is above the level of the stream bottom causing water leaving the culvert to form a waterfall or cascade.
Recessed	The end of the culvert does not protrude through the headwall, nor is it flush with the headwall.
Removed Crossing	A crossing apparently existed previously at the site but has been removed, so the stream now flows through the site with no provision for vehicles to cross over it.
Scaling	Loss of concrete in thin, plate-like pieces, lamina, or flakes that peel off from a surface due to freeze/thaw.
Scour	Removal of sediment such as sand and gravel from a channel bed or bank caused by swiftly moving water.
Soil Infiltration	Soil entering a culvert through a joint or hole.
Spalling	Breaking or splitting off of surface concrete in chips or bits.
Stream Grade	Elevation at which the water flows.
Substrate/Water Width	The widest width of the water or substrate within a culvert, whichever is wider.
Structural (Longitudinal) Alignment	Pertaining to the horizontal or vertical alignment of the pipe. (Note: do not confuse this with constructed pipe bends).
Wingwall	A short section of wall connected to the side of a headwall used as a retaining wall and to stabilize abutment and guide stream into culvert.