

Culvert Scope Inspection Form

I. Project Information

Job Number:		Control Section:		PR Number:	
Route:		CS BMP:		PR BMP:	
		CS EMP:		PR EMP:	
Template:		Length:		Length:	
Location:					
Proposed Fix:					

II. Culvert Information

STA:		Culvert Size:		Shape:	
Location:		Culvert Length:			
Bound:		Culvert Material:			
Existing End Section Treatment:		Lt		Rt	
Existing Offset:		Lt		Rt	
Inspected By:		Date:			

III. Culvert Inspection Details (see instructions)

A. Culvert Structure

Culvert lining:	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
What is the condition of culvert inside?				
Cracking:	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Spalling:	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Abrasion:	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Corrosion:	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Are there any joint gaps or open seams?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Is this a box culvert?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Are there cracks vertical or horizontal on any of the sides/walls?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Is there undermining of the footing of a three sided culvert?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Are any footings of three sided culverts exposed?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Has the culvert been extended?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Condition of oldest portion:				
Extension joint condition:				
Is extension pipe smaller than original pipe:	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Is there a line of sight along the crown and spring line?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Is the culvert shape deflected?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Is water seeping along the outside of the culvert (piping)?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Should the culvert be video inspected during design?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No

Culvert Scope Inspection Form

B. Culvert Inlet and Outlet

Inlet or outlet damaged:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Headwall undermining:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are there any constrictions or obstructions at the culvert inlet/outlet?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are there erosion control measures ?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Condition of the erosion control measures at the inlet:		
Condition of the erosion control measures at the outlet:		
Condition of the erosion control measures behind the wingwalls:		
Is the culvert perched?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is there evidence of high water above the top of the culvert?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

C. Channel Information (River, Stream, Creeks and Tributaries)

Existing River, Stream, Creek and Tributary (if no, skip to next section)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Existing Federally Regulated Waterway (Navigable Waterway)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
ie: Includes the rivers, streams, creeks, tributaries and wetlands that are connected to navigable waterways and are contiguous to the Great Lakes. These segments are typically under the jurisdiction of the Army Corps of Engineers and the US Coast Guard.		

Existing cold water trout stream?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Obstructions in the channel?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Are there stream side inlets?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Condition: <input type="text"/>
Is there any sheet piling?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Is it constricting the stream? <input type="checkbox"/> Yes <input type="checkbox"/> No
Check upstream and downstream culvert sizes compared to MDOT's culvert.			
Upstream culvert is:	<input type="text"/>	MDOT's:	Upstream Size: <input type="text"/>
Downstream culvert is:	<input type="text"/>	MDOT's:	Downstream Size: <input type="text"/>
Channel bank stability:	<input type="text"/>		
Does the culvert align with the stream channel?			
Vertically align?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Horizontally align?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Culvert Scope Inspection Form Instructions

Determining if a culvert should be replaced, repaired, maintained or studied in greater depth will involve documenting the existing culverts condition. In addition, the inspection and/or proposal of culvert work will be dependant on the proposed project work type, funding template, strategies and overall proposed project fix (i.e. CPM projects do not generally address items outside the shoulder). The Culvert Scope Inspection Form as well as the Road Scoping Report and Details Worksheet are set up to guide the scoper through the process. The Culvert Scope Inspection Form should be filled out for every culvert 36" in diameter to less than 10' in width that will have work being proposed on them.

III.A. Check Culvert Structure

- Has the culvert capacity been reduced by a lining?
 - If the culvert has been lined and is showing failure or capacity is an issue, it could be considered for replacement.
- What is the condition of the culvert inside?
 - Is there evidence of cracking, spalling or corrosion?
 - Does the culvert have any joints, gaps or open seams (i.e. sediment passing through holes in the culvert and sediment entering the pipe could develop voids under the pavement)?
 - If sediment is passing through the culvert, this could result in sinkholes above the culvert and possible pavement or sink holes/failure. The culvert should be analyzed for options, such as repair, lining or replacement.
- Is this a box culvert?
 - Are there cracks vertical or horizontal on the side/walls of the box culverts?
 - Cracks that run the entire height or width of a section may indicate movement of footings or undermining of footings. Undermining may not be visible if it occurred during a storm event and sediment has filled back the undermining scour hole. If footings are undermined the structure may need to be replaced. If footings are exposed, scour counter measures may need to be installed.
- Has the culvert been extended?
 - If so, what is the condition of the oldest part of the culvert? What is the condition of the joint between the old and new culvert? If the joint at the extension point allows sediment to enter the pipe, voids can form above the joint. The culvert extension and one original section of pipe may need to be replaced, to form a tight joint. If a pipe has been extended with a smaller size pipe or a square culvert with a round culvert with less span or rise, the extension should be removed and replaced with an extension that matches the size of the original pipe.
- Is there a line of sight along the crown (the highest interior elevation of the culvert) and spring line (*define*) of the culvert, from inlet to outlet?
 - If not, then the culvert could have been installed incorrectly, deflection may have occurred or sediment/debris may have built up. If any of these situations exist, maintenance, culvert clean out or replacement may be required.
- Has the culvert shape deflected?
 - Did this deflection cause the horizontal diameter to be greater than the vertical diameter?
 - Deflection is more likely to occur in flexible pipe materials like steel, aluminum and plastic. If the deflection is enough to cause inward buckling, the culvert may need to be replaced, depending on the template used to scope the road work.
- Is water seeping along the outside of the culvert (piping)?
 - A pipe shaped tube can be formed in the soil under or beside the culvert, from displaced soil seeping into the pipe and creating a void. This may lead to other structural problems including culvert and roadway settlement or wash out during a large storm event. Culvert repair or replacement is recommended to prevent further structural damage.
- Should the culvert be video inspected during design?
 - Video inspection can be done to assess the condition of the culvert's interior. Video taping/inspecting may typically be done during the design phase, but can be helpful during scoping and estimating of a project. The video inspecting may be obtained during the scoping phase if there is an identified need or if there was one done previously as a result of an ongoing maintenance issue.

Culvert Scope Inspection Form Instructions - Cont.

III.B. Evaluate Inlet and Outlet of Culvert

- Is the inlet or outlet of the culvert damaged?
 - Damage could be caused from erosion, floating debris, buoyancy, mowing equipment, vehicle impact or etc. If the damage reduces the hydraulic opening area, shifted the alignment of the inlet/outlet significantly or opened a culvert joint, the portion of damaged culvert may need to be realigned, repaired (re-set and joint resealed) or replaced, in addition to the inlet or outlet work.
- Has undermining occurred at the end sections or headwalls?
 - Depending on the condition of the end section or headwalls, undermining can be repaired with a sheet pile cutoff wall, flowable fill, placing riprap to prevent further undercutting caused scour or repairing the slope/embankment.
- Are there any constrictions or obstructions at the culvert inlet/outlet?
 - If the stream velocity increases dramatically through the culvert or the stream width is substantially wider than the culvert, this may be a sign of an undersized culvert. Hydraulic evaluation of the culvert should be completed during the design phase to determine if it has sufficient capacity.
- Are there erosion control measures?
 - What kind of erosion control measures are at culvert inlet and outlet? Is there evidence of erosion or scour? Is there erosion or scour behind wing walls? Erosion control measures should be implemented if problems exist. Erosion control can be achieved by establishing vegetation, placing riprap, installing drainage structures or spillways.
- Is the culvert perched above the stream bed?
 - This is similar to undermining, it can also be caused by installing a culvert at too high of an elevation. Perched culverts may have plunge pools, at the down stream end (outlet). Perched culverts (inlet) may elevate upstream flood elevations. If road embankment is unstable, stabilization techniques should be employed (contact your supervisor for additional assistance).
- Is there evidence of high water above the top of the culvert?
 - Look for sloughing of banks due to continual saturation, deposited floating debris and staining.

III.C Channel Information (River, Stream, Creeks and Tributaries).

- Are there any obstructions in the channel such as vegetation, fallen trees, encroaching fences, utility poles, etc?
 - Do the obstructions appear to impact hydraulic capacity? If downstream obstructions are limiting the hydraulic capacity, this may cause flooding. If there are obstructions in the MDOT Right of Way, contact the maintenance coordinator. If these obstructions are outside of the MDOT Right of Way, contact your supervisor for further assistance (coordination with a maintaining agency may be needed).
- Are there stream side inlets?
 - Examples of stream side inlets are storm sewers, downspouts, under drains and ditches? If these inlets cause stream scour, erosion control measure may be important.
- Is there any sheet piling? Is it constricting the stream?
 - Sheet pile may be cut off at grade to prevent channel obstruction.
- Check upstream and downstream culvert sizes compared to MDOT's culvert.
- Check for bank stability.
 - This is done by looking for overhanging trees or shrubs falling in towards the channel, exposed roots and/or undercutting erosion along the bank. Although the channel can be braided and meandering, yet stable and not cause structural culvert problems. Treatment options could include re-establishment or relocation of the stream, placing riprap or engineered treatment on the affected slopes and/or proposed maintenance methods.
- Does the culvert align with the stream channel?
 - If the stream and culvert do not vertically align, there may be perched culvert and/or undermining issues.
 - Additionally, one or both ends of a culvert may be lower than the channel. Culverts may be designed with soil in the bottom so they can convey water effectively or if there are wildlife benefits. This is not a problem and does not need to be corrected. Problems may occur when one end of the culvert is too low, which may reduce flow. There are two solutions to this problem, lower the channel or raise the culvert.
 - If the stream and culvert do not horizontally align, the stream frequently runs along the road embankment and may threaten the embankment stability. Solutions could include an engineered stabilized (i.e. riprap) embankment slope or to install the culvert with a skew to the roadway, that aligns with the stream