Culvert Inventory and Inspection Manual

May 2006

New York State Department of Transportation

GEORGE E. PATAKI, Governor
THOMAS J. MADISON, JR., Commissioner
FOREWORD

In order to serve, protect and preserve the health, safety and welfare of the public, New York State Department of Transportation policy requires the inspection of all large culverts owned, operated, or maintained by the Department, that also carry public highway traffic.

This document replaces the *Culvert Inventory and Inspection Manual - December 1991 (Draft)* issued by the New York State Department of Transportation Structures Division. This manual explains the requirements for general culvert inspections.

GARY R. MCVOY, Ph. D.

_DIRECTOR OF OFFICE OF_  
OPERATIONS MANAGEMENT
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INTRODUCTION
Introduction

The policy regarding the New York State Department of Transportation’s Culvert Inventory and Inspection Program is detailed in the memo dated February 20, 1990 to then Executive Deputy Commissioner P. W. Taylor. This policy states that the Office of Operations Management (formerly known as the Highway Maintenance Division) will be responsible for the administration of the Culvert Inventory and Inspection Program as well as the overall maintenance of the database system (Culverts Inventory and Inspection System - CIIS) used to manage the culvert inventory and inspection information. The inventory and inspection information contained in this database will be used to guide culvert maintenance and replacement programs.

The policy further states that inspection is required for all “Large Culverts” - defined as a culvert having an opening measured perpendicular to the centerline of the culvert greater than or equal to 5 feet (1.53 m), including multiple pipe structures where the clear distance between pipes is less than half of the smaller pipe diameter (See “Glossary of Culvert Terms”). Note: Structures having an opening measured along the centerline of the roadway greater than 20 feet (6.1 m), including multiple pipe structures where the clear distance between pipes is less than half of the smaller pipe diameter, are categorized as Bridges and are inventoried and inspected under New York State's Bridge Inventory and Inspection Program.

This manual is a guide to performing culvert inspections in New York State. It provides instruction for properly coding each inventory item and rating each inspection item. Please refer to the NYSDOT Culvert Inspection Field Guide (published January 2006) for photos of example conditions and corresponding recommended inspection ratings. The inventory and inspection data to be collected and documented will be obtained from the "as-built" culvert plans, department maps, and field investigations of the structure.

Culverts eligible to be included in CIIS must meet the definition of a "culvert" as described in this manual and must either carry a public highway or cross over a public highway or cross over a navigable waterway.
Glossary of Culvert Terms

Culvert - A structure, including supports, erected over a depression or an obstruction such as water, highway, or railway and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the centerline of the roadway less than or equal to 20 feet (6.1 m) between copings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes, pipes or pipe arches.

Large Culvert - A culvert having an opening measured perpendicular to the centerline of the culvert greater than or equal to 5 feet (1.53 m) or multiple pipes meeting the criteria below:

QUALIFYING MULTIPLE PIPE CULVERTS AS LARGE CULVERTS

Referring to the diagram below: Multiple pipe culverts qualify as a single, large, multi-span culvert if (1) “A” is greater than or equal to 5 feet (1.53 m) and (2) “C” is less than ½ of “B”. “A”, “B” and “C” are measured at the greatest opening perpendicular to the centerline of the culvert. Measurement “A” is the Total Span. Measurement “D” is the Maximum Span.
**Inventory Culvert** - A culvert currently included in the Culvert Inventory Database, on the basis that it presently carries a public highway, or that it presently carries moving loads over a public highway or waterway. Any culvert that recently satisfied one of those warrants, but is now closed or collapsed, shall also be considered an inventory culvert until it is declared abandoned or physically removed.

**Closed Culvert** - A culvert that once satisfied the inventory culvert definition, but which, for any reason except collapse, is now temporarily closed, by the installation of barricades, to all traffic, or to the primary usage of the culvert. Closed culverts may carry pedestrian traffic. Closed culverts shall be declared abandoned when no serious effort has been undertaken by the owner to reopen the culvert to traffic within a period of five years after closing to vehicular traffic or one year after closing to pedestrian traffic. Closed culverts are inspected on a regular basis just like those which are open to traffic.

**Collapsed Culvert** - A culvert that once satisfied the inventory culvert definition, but is now closed due to a collapse that prevents the passage of any moving loads. The collapse was the result of structural or foundation failure, an accident, or an act of God. Culverts shall be declared abandoned when no serious effort has been undertaken by the owner to restore structural integrity and physical continuity and to reopen the culvert to all traffic within a period of three years after collapse.

**Abandoned Culvert** - A culvert that once satisfied the inventory culvert definition, but which is now permanently closed and no longer carries any moving loads; a culvert declared abandoned, administratively or judicially, and which must also be barricaded to the passage of all traffic (including pedestrians) by the installation of permanently placed obstacles. Until physically removed, an abandoned culvert will be included in the Inactive Culvert Inventory file. An abandoned culvert is no longer inspected.
The following is a list of previously designated alpha Routes with their assigned numeric coding to be used.

<table>
<thead>
<tr>
<th>CODING FOR ALPHA ROUTES</th>
<th>NAME</th>
<th>ALPHA ABBREVIATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>981P</td>
<td>Bear Mountain State Parkway</td>
<td>BMP</td>
</tr>
<tr>
<td>907A</td>
<td>Belt System - Cross Island Parkway</td>
<td>BCIP</td>
</tr>
<tr>
<td>907B</td>
<td>Belt System - Laurelton Parkway</td>
<td>BLP</td>
</tr>
<tr>
<td>907C</td>
<td>Belt System - Shore Parkway</td>
<td>BSHP</td>
</tr>
<tr>
<td>907D</td>
<td>Belt System - Southern Parkway</td>
<td>BSOP</td>
</tr>
<tr>
<td>907E</td>
<td>Bethpage State Parkway</td>
<td>BSP</td>
</tr>
<tr>
<td>907F</td>
<td>Bronx Pelham Parkway</td>
<td>BPP</td>
</tr>
<tr>
<td>907G</td>
<td>Bronx River Parkway (Outside NYC)</td>
<td>BRP</td>
</tr>
<tr>
<td>907H</td>
<td>Bronx River Parkway (In NYC)</td>
<td>BRPC</td>
</tr>
<tr>
<td>907J</td>
<td>Cross Bay Parkway</td>
<td>CBP</td>
</tr>
<tr>
<td>907K</td>
<td>Cross County Parkway</td>
<td>CCP</td>
</tr>
<tr>
<td>907L</td>
<td>Franklin D. Roosevelt Drive</td>
<td>FDRD</td>
</tr>
<tr>
<td>1390</td>
<td>Genesee Expressway</td>
<td>GNE</td>
</tr>
<tr>
<td>907M/278I</td>
<td>Grand Central Parkway</td>
<td>GCP</td>
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<td>907P</td>
<td>Harlem River Drive</td>
<td>HRD</td>
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<td>908M</td>
<td>Heckscher State Parkway / Combined with Southern State Parkway</td>
<td>HSP/907T</td>
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<td>907V</td>
<td>Henry Hudson Parkway</td>
<td>HHP</td>
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<td>Hutchinson River Parkway (Outside NYC)</td>
<td>HRP</td>
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<td>908A</td>
<td>Hutchinson River Parkway (In NYC)</td>
<td>HRPC</td>
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<tr>
<td>908B</td>
<td>Interborough (Jackie Robinson) Parkway</td>
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### Special Highway Route Numbers for Selected Parkways and Expressways (continued)

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<tr>
<td>947A</td>
<td>Lake Ontario State Parkway</td>
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<td>987A</td>
<td>Lake Welch Parkway</td>
<td>LWP</td>
</tr>
<tr>
<td>908C</td>
<td>Loop Parkway</td>
<td>LP</td>
</tr>
<tr>
<td>908D</td>
<td>Marine Parkway</td>
<td>MAP</td>
</tr>
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<td>908E</td>
<td>Meadowbrook State Parkway</td>
<td>MSP</td>
</tr>
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<td>908F</td>
<td>Mosholu Parkway</td>
<td>MP</td>
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<td>908G</td>
<td>Northern State Parkway</td>
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</tr>
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<td>908H</td>
<td>Ocean Parkway (Kings Co.)</td>
<td>OCP</td>
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<td>987C</td>
<td>Palisades Interstate Parkway</td>
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<td>917A</td>
<td>Prospect Mountain State Parkway</td>
<td>PMSP</td>
</tr>
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<td>908J</td>
<td>Robert Moses Causeway</td>
<td>RMC</td>
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<tr>
<td>957A</td>
<td>Robert Moses State Parkway</td>
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<td>958A</td>
<td>Robert Moses State Parkway Spur</td>
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<td>987E</td>
<td>Seven Lakes Parkway</td>
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<td>908L</td>
<td>Shore Front Drive</td>
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<tr>
<td>957B</td>
<td>South Parkway</td>
<td>SP</td>
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<tr>
<td>908M</td>
<td>Southern State Parkway</td>
<td>SSP</td>
</tr>
<tr>
<td>RTE 17</td>
<td>Southern Tier Expressway</td>
<td>STE</td>
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### Special Highway Route Numbers
for Selected Parkways and Expressways
(continued)

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<th>CODING FOR ALPHA ROUTES</th>
<th>NAME</th>
<th>ALPHA ABBREVIATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>908K</td>
<td>Sunken Meadow Parkway/Combined with Sagtikos State Parkway</td>
<td>SMSP/908P</td>
</tr>
<tr>
<td>987G</td>
<td>Taconic State Parkway</td>
<td>TSP</td>
</tr>
<tr>
<td>908T</td>
<td>Wantagh State Parkway</td>
<td>WSP</td>
</tr>
<tr>
<td>957C</td>
<td>West River Parkway</td>
<td>WRP</td>
</tr>
<tr>
<td>908V</td>
<td>Woodhaven Boulevard / Not a Pkwy., not NYS jurisdiction</td>
<td>WB</td>
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<tr>
<td>917B</td>
<td>W.W. Veterans Memorial Highway (Whiteface)</td>
<td>VMH</td>
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<tr>
<td>440</td>
<td>West Shore Expressway / New Part of NY 440</td>
<td>WSE-908W</td>
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<tr>
<td>908E</td>
<td>Meadowbrook Causeway / Combined with Meadowbrook Parkway</td>
<td>MC-909A</td>
</tr>
<tr>
<td>908T</td>
<td>Wantagh Causeway / Combined with Wantagh Parkway</td>
<td>WC-909B</td>
</tr>
<tr>
<td>957D</td>
<td>Joseph Davis State Parkway</td>
<td>JDSP</td>
</tr>
<tr>
<td>957E</td>
<td>Lewiston State Parkway</td>
<td>LSP</td>
</tr>
<tr>
<td>909C</td>
<td>Richmond Parkway</td>
<td>RP</td>
</tr>
<tr>
<td>909D</td>
<td>Ocean Parkway (Nassau &amp; Suffolk Counties)</td>
<td>OP</td>
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</tbody>
</table>
Culvert Inventory and Inspection System (CIIS)

The Culverts Inventory and Inspection System (CIIS) includes culvert inventory attributes and culvert inspection information and can be accessed from a link on the NYSDOT IntraDOT. From the NYSDOT IntraDOT Home page click the “Applications” tab and then scroll down to “Transportation Maintenance Division”. For instructions regarding the utilization of CIIS see Culverts Inventory and Inspection System User’s Manual at the same location.

A new function has been introduced in CIIS since the most recent CIIS User’s Manual update. Culvert data extracts are now available. The “Reports” module has a “Data Extract” button that leads to a filter screen to run a query. The report from this query returns data in an Excel spreadsheet that can be exported for ad-hoc queries. The columns at the end of the spreadsheet represent the culvert inspection ratings. The headings of these columns are titled with codes (e.g. CATCRIT 11). Each code corresponds to a specific inspection item. The code key is shown below:

<table>
<thead>
<tr>
<th>Category ID</th>
<th>Criteria ID</th>
<th>catcrit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>catcrit11</td>
<td>Culvert General Recommendation</td>
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<td>2</td>
<td>1</td>
<td>catcrit21</td>
<td>Roadway Pavement</td>
</tr>
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<td>2</td>
<td>2</td>
<td>catcrit22</td>
<td>Roadway Shoulders</td>
</tr>
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<td>2</td>
<td>3</td>
<td>catcrit23</td>
<td>Roadway Guide Railing</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>catcrit24</td>
<td>Roadway Settlement</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>catcrit25</td>
<td>Roadway Embankment</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>catcrit26</td>
<td>Roadway General Recommendation</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>catcrit31</td>
<td>Structure Abutment and Pier</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>catcrit32</td>
<td>Structure Span</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>catcrit33</td>
<td>Structure Headwall</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>catcrit34</td>
<td>Structure Wingwall</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>catcrit35</td>
<td>Structure End Treatment</td>
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<td>3</td>
<td>6</td>
<td>catcrit36</td>
<td>Structure General Recommendation</td>
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<td>4</td>
<td>1</td>
<td>catcrit41</td>
<td>Channel Opening</td>
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<td>4</td>
<td>2</td>
<td>catcrit42</td>
<td>Channel Alignment</td>
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<td>3</td>
<td>catcrit43</td>
<td>Channel Scour</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>catcrit44</td>
<td>Channel Silt Debris, Vegetative Growth</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>catcrit45</td>
<td>Channel Standing Water</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>catcrit46</td>
<td>Channel General Recommendation</td>
</tr>
</tbody>
</table>
Culvert Data Collection and Entry

Inventory and inspection data are collected during field inspections and subsequently entered into the Culvert Inventory and Inspection System (CIIS). The Inventory and Inspection Reports produced by CIIS appear on the following pages. The remainder of this manual is divided into the INVENTORY SECTION and the INSPECTION SECTION and they provide instructions for properly coding each inventory item and rating each inspection item.

CULVERT INVENTORY - If the culvert has been previously inventoried it is recommended that a printout of the current Inventory Report be used to verify the accuracy of the data. Updates or additions to existing culvert inventory information can be noted on this printout or a new blank form and subsequently entered into CIIS.

CULVERT INSPECTION - If the culvert has been previously inspected it is recommended that a printout of the Most Recent Inspection Report be used to determine whether conditions have changed since the previous inspection. The new inspection ratings can be noted on this printout or a new blank form and subsequently entered into CIIS.
Specific Culvert Inventory Report

Program: CULV004.rdf

NYSDOT Culvert Inventory and Inspection System
Specific Culvert Inventory Report

Date: Page: 1

CIN:

Region: Residency: County:
Route: Reference Marker: UTM Y Coordinate:
UTM X Coordinate: Orig Contract:
Year Built:

Feature Crossed:

Description:

TMS Material: Number of Spans: Abutment Type:
TMS Protective Coating: Max Span: Abutment Skew:
TMS Design Type: Total Span: Abutment Height:

Depth of Cover:

Out to Out Length:

Number of Lanes:

Posted Load:

Stream Bed Material:

Guide Rail:

Date Posted:

Bank Protection:

Cutoff Wall:

End Treatment Type:

SPDES Outfall:

(Culvert Extension Type)

Receiving Waters:

Maint Resp:

Owner:

Special Access:

Special Access Comments:

Inventory Comments:

Work History:

Year Comment

***END OF REPORT***
Specific Culvert Inspection Report - Most Recent Inspection

Program: CULV005.rdf

NYSDOT Culvert Inventory and Inspection System
Specific Culvert Inspection Report
Most Recent Inspection

CIN: Inspection Date:
Region: Residency:
Route: Reference Marker:
Inspector: Consultant Inspector Code:
Was there Standing Water (Concealed Invert)?
Comments:

Inspection Ratings:

Roadway Items:

Pavement:
Comments:

Shoulders:
Comments:

Guide Railing:
Comments:

Settlement:
Comments:

Embankment:
Comments:

General Recommendation:
Comments:

Structure Items:

Abutment and Pier:
Comments:

Span Barrel:
Comments:

Headwall:
Comments:

Wingwall:
Comments:

End Treatment:
Comments:

General Recommendation:
Comments:

(Continued)
CIN: (Continued)

Channel Items:

Opening:
  Comments:

Alignment:
  Comments:

Scour/Erosion:
  Comments:

Silt, Debris, Vegetative Growth:
  Comments:

General Recommendation:
  Comments:

Culvert:

Culvert General Recommendation:
  Comments:

Additional Comments:

***END OF REPORT***
INVENTORY
SECTION
Culvert Replacement

When an existing culvert structure is removed and replaced, adhere to the following procedure for inventorying the new culvert during its initial inspection:

Retain original CIN.

Update the “Year Built” field.

Update the “Original Contract Number” field.

Update the “Description” field.

Under the “Inventory Comments” field, enter the description of the replaced culvert and the new culvert. Also enter the “Year Built” and “Original Contract Number” of the replaced culvert.

**Example:** “Previously existing 2 span steel pipe culvert, 5'D & 3'D, has been replaced with a one span concrete box culvert, 8'H x 8'W. The replaced culvert was built in 1935 under contract number 365-C.”

Update all remaining fields with data from the new culvert as appropriate.

Update “Work History” field. Enter the year the new culvert was built and describe all the work completed.

INVENTORY ITEM: Culvert Identification Number (CIN)

PROCEDURE:
Each culvert is identified by a unique culvert identification number (CIN).

CODING: The CIN for a culvert inventoried since March 2005 is generated by CIIS and consists of numeric characters only. The characters of this CIN do not have any correlation with the geographic location of the culvert.

The CIN for a culvert inventoried prior to March 2005 is a seven character designation assigned to each individual culvert by the NYSDOT Regional Transportation Maintenance Residency responsible for inspection. The first position of this CIN accepts only the alpha character "C". The second character represents the Region where the culvert is geographically located. The third character represents the Residency that it geographically belongs to. The remaining four characters, fourth through seventh, are assigned by the Residency responsible for the culvert's inspection. See example below:

EXAMPLE: The CIN on the culvert is C724398 and is coded:

```
CIN: C 7 2 4 3 9 8
```

- Unique four digit code assigned by Residency
- Residency Number
- Region Number
- Denotes Culvert (cannot be changed)
INVENTORY ITEM: Region

PROCEDURE:
Record the NYSDOT Region where the culvert is located.

CODING:
01 - Albany
02 - Utica
03 - Syracuse
04 - Rochester
05 - Buffalo
06 - Hornell
07 - Watertown
08 - Poughkeepsie
09 - Binghamton
10 - Long Island
11 - New York City
INVENTORY ITEM: Residency

PROCEDURE:
Record the NYSDOT Regional Transportation Maintenance Residency responsible for the culvert's inspection. Non-numeric coding.

CODING:

<table>
<thead>
<tr>
<th>Region 01</th>
<th>Region 02</th>
<th>Region 03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albany</td>
<td>Fulton-Montgomery</td>
<td>Cayuga-Seneca</td>
</tr>
<tr>
<td>Essex</td>
<td>Hamilton</td>
<td>Cortland-Tompkins</td>
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<tr>
<td>Greene</td>
<td>Herkimer</td>
<td>Onondaga East</td>
</tr>
<tr>
<td>Rensselaer</td>
<td>Oneida East</td>
<td>Onondaga West</td>
</tr>
<tr>
<td>Saratoga</td>
<td>Oneida West Madison</td>
<td>Oswego</td>
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<td>Schenectady</td>
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<tr>
<th>Region 04</th>
<th>Region 05</th>
<th>Region 06</th>
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</thead>
<tbody>
<tr>
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<td>Cattaraugus</td>
<td>Allegany East-Steuben West</td>
</tr>
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<td>Livingston</td>
<td>Chautauqua</td>
<td>Allegany West</td>
</tr>
<tr>
<td>Monroe East</td>
<td>Erie North</td>
<td>Chemung West-Steuben East</td>
</tr>
<tr>
<td>Monroe West</td>
<td>Erie South</td>
<td>Schuyler-Yates</td>
</tr>
<tr>
<td>Wayne-Ontario</td>
<td>Niagara</td>
<td>Tioga-Chemung East</td>
</tr>
<tr>
<td>Wyoming</td>
<td>Region 5 Sign Shop</td>
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<th>Region 08</th>
<th>Region 09</th>
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<tbody>
<tr>
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<td>Columbia</td>
<td>Broome</td>
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<td>Franklin</td>
<td>Dutchess North</td>
<td>Chenango</td>
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<tr>
<td>Jefferson</td>
<td>Dutchess South-Putnam</td>
<td>Delaware South</td>
</tr>
<tr>
<td>Lewis</td>
<td>Orange East</td>
<td>Otsego</td>
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<tr>
<td>Saint Lawrence</td>
<td>Orange West</td>
<td>Schoharie-Delaware North</td>
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<td></td>
<td>Rockland</td>
<td>Sullivan</td>
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<td>Westchester North</td>
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<td>Westchester South</td>
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<th>Region 11</th>
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<tr>
<td>Nassau Central</td>
<td>Not Applicable</td>
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<tr>
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<tr>
<td>Suffolk Central</td>
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<td>Suffolk East</td>
<td></td>
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<tr>
<td>Suffolk West</td>
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</tbody>
</table>
INVENTORY ITEM: County

PROCEDURE:
Record the New York state county where the culvert is located.
Non-numeric coding.

CODING:

<table>
<thead>
<tr>
<th>Region 01</th>
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<th>Region 03</th>
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<td></td>
<td>Westchester</td>
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</tr>
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<td>Nassau</td>
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<tr>
<td>Suffolk</td>
<td>Kings</td>
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<td></td>
<td>New York</td>
</tr>
<tr>
<td></td>
<td>Queens</td>
</tr>
<tr>
<td></td>
<td>Richmond</td>
</tr>
</tbody>
</table>
INVENTORY ITEM: Route

PROCEDURE:
Record the Interstate, US or State Touring Route number of the feature carried by the culvert.

CODING: Accepts alpha and numeric characters. The first 3 positions of this field will contain the numeric characters of the route number with leading spaces. The 4th position is reserved for an alpha character if applicable.

EXAMPLES:  
787I  
202  
9W
INVENTORY ITEM: Reference Marker

PROCEDURE:
Record the posted route reference marker located nearest to the culvert.

CODING: Accepts alpha and numeric characters. The route number comprises the first 4 characters of this 12 character field.

EXAMPLES:
5 16131002
87115091127
89016011020
INVENTORY ITEM: **Year Built**

**PROCEDURE:**
Record the year the culvert was originally constructed.

For replacement culverts record the year the contract was accepted or the culvert was opened to traffic, whichever is earlier.

**CODING:** This field is comprised of 4 numeric characters.

**EXAMPLE:** 2003
INVENTORY ITEM: Original Contract Number

PROCEDURE:
Record the contract number under which the culvert was originally constructed.

CODING:   Accepts all standard keyboard characters.

EXAMPLES:  365-C
            1685
            D003412
            RC66-70
INVENTORY ITEM: UTM X and Y Coordinates

PROCEDURE:
Record the UTM coordinates when the GPS location data is available. Only one set of coordinates can be entered. Coordinates should be taken over the center of the main span on the shoulder of the roadway at the inlet end.

CODING: Accepts numeric characters only.
The UTM coordinates should be entered in the format “XXXXXXXX.XX”
INVENTORY ITEM: Description

PROCEDURE:
Provide a brief description of the culvert.

CODING: Accepts all standard keyboard characters.

EXAMPLES: One span concrete box culvert. 6'H x 10'W.
Two span steel pipe culvert. 5'D & 3'D.
INVENTORY ITEM:  Feature Crossed

PROCEDURE:  
Record the feature crossed by the culvert.

CODING:  Accepts all standard keyboard characters.

EXAMPLES:  Fox Creek  
Unknown Stream  
Cattle Pass  
Bicycle/Pedestrian Trail
INVENTORY ITEM: Inventory Comments

PROCEDURE:
Record any comments pertaining to the inventory of the culvert.

CODING:
Accepts all standard keyboard characters.

EXAMPLES:
“Previously existing 2 span steel pipe culvert, 5'D & 3'D, has been replaced with a one span concrete box culvert, 8'H x 8'W. The replaced culvert was built in 1935 under contract number 365-C.”

“Culvert has a corrugated steel extension on the east end and a reinforced concrete extension on the west end.”
INVENTORY ITEM: Type Maximum Span (TMS) Material

PROCEDURE:
Record the type of material used for the maximum span’s primary member.

CODING:
1 - Steel
2 - Weathering Steel (Use even if the weathering steel is painted.)
3 - Special Steel (Includes any steel other than A7, A36, A441, A572 or A588.)
4 - Hybrid Steel Section (e.g., One type of steel for web, another type for the flanges.)
5 - Corrugated Steel
6 - Wrought or Cast Iron
7 - Aluminum
8 - Timber
9 - Masonry
A - Concrete, Unreinforced
B - Concrete, Reinforced
C - Concrete, Unknown (Reinforcement cannot be determined.)
D - Prestressed Concrete, Post-Tensioned
E - Prestressed Concrete, Pre-Tensioned
F - Prestressed Concrete, Unknown (Method of prestressing is unknown.)
G - Polyethylene, Smooth Interior
H - Polyethylene, Corrugated Interior
I - Polyvinyl Chloride
X - Other (Not listed above.)
? - Needs to be Defined
INVENTORY ITEM:  Type Maximum Span (TMS) Protective Coating

PROCEDURE:  
Record the type of protective coating used on the maximum span.

CODING:  
1 - Paint, Lead Based  
2 - Paint, Not Lead Based  
3 - Paint, Unknown (Not known if lead is present in the paint.)  
4 - Unpainted (No coating - e.g., weathering steel, non-coated concrete structures.)  
5 - Galvanized  
6 - Bituminous-Based Coating  
7 - Concrete Coated (Primary members concrete encased or coated with concrete spray.)  
8 - Polymer  
9 - Polymer with Paved Invert (Bituminous)  
10 - Paved Invert (Bituminous)  
11 - Paved Invert (Concrete)  
12 - Aluminum Coated  
13 - Galvanized with Paved Invert  
14 - Galvanized and Fully Paved  
15 - Galvanized and Polymer Coated  
16 - Galvanized and Polymer Coated with Paved Invert  
X - Other (Not listed above.)  
? - Needs to be Defined
**INVENTORY ITEM:** Type Maximum Span (TMS) Design Type

**PROCEDURE:**
Record the “design type” category of the maximum span.

**CODING:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Slab (Solid reinforced concrete slab functioning as deck and wearing surface.)</td>
</tr>
<tr>
<td>02</td>
<td>Slab, Voided (Adjacent, reinforced concrete beams. Cast-in-place deck/wear surf.)</td>
</tr>
<tr>
<td>09</td>
<td>Rolled Beam, Multi-Girder</td>
</tr>
<tr>
<td>10</td>
<td>Rolled Beam, Floorbeam System-Deck</td>
</tr>
<tr>
<td>11</td>
<td>Rolled Beam, Floorbeam System-Thru</td>
</tr>
<tr>
<td>12</td>
<td>Rolled Beam, Jack Arch (Arched stay-in-place forms support deck/wear surf.)</td>
</tr>
<tr>
<td>22</td>
<td>Arch, Thru (Hangers support deck and transfer load from the deck to the arch.)</td>
</tr>
<tr>
<td>25</td>
<td>Arch, Deck-Filled Spandrel (Roadway supported by fill retained by spandrel walls.)</td>
</tr>
<tr>
<td>26</td>
<td>Arch, Metal Plate Pipe (Curved steel plates on concrete substructures.)</td>
</tr>
<tr>
<td>27</td>
<td>Frame (Steel, Concrete Non-Arch) (Rigid frame whose “legs” act as piers.)</td>
</tr>
<tr>
<td>28</td>
<td>Frame with Floorbeam System (Deck carried by floorbeams supported by frame.)</td>
</tr>
<tr>
<td>40</td>
<td>Single Box Culvert (Rectangular concrete box cross-section with floor.)</td>
</tr>
<tr>
<td>43</td>
<td>Multiple Box Culvert (Multiple, adjacent, rectangular concrete boxes with floor.)</td>
</tr>
<tr>
<td>45</td>
<td>Continuous Box Culvert (Single unit with multiple openings with floor.)</td>
</tr>
<tr>
<td>50</td>
<td>Circular Pipe Culvert</td>
</tr>
<tr>
<td>51</td>
<td>Vertically Elongated Ellipse Pipe Culvert</td>
</tr>
<tr>
<td>52</td>
<td>Horizontally Elongated Ellipse Pipe Culvert</td>
</tr>
<tr>
<td>53</td>
<td>Underpass Pipe Culvert</td>
</tr>
<tr>
<td>54</td>
<td>“Pear” Shape Pipe Culvert</td>
</tr>
<tr>
<td>55</td>
<td>Arch, Metal Plate Non-Pipe</td>
</tr>
<tr>
<td>56</td>
<td>High Profile Arch</td>
</tr>
<tr>
<td>57</td>
<td>Low Profile Arch</td>
</tr>
<tr>
<td>UU</td>
<td>Unknown</td>
</tr>
<tr>
<td>XX</td>
<td>Other (Not listed above.)</td>
</tr>
<tr>
<td>?</td>
<td>Needs to be Defined</td>
</tr>
</tbody>
</table>
INVENTORY ITEM: **Number of Spans**

**PROCEDURE:**
Record the number of spans for the culvert. The number of spans is the number of openings.

**QUALIFYING MULTIPLE PIPE CULVERTS AS LARGE CULVERTS**

Referring to the diagram below: Multiple pipe culverts qualify as a single, large, multi-span culvert if (1) “A” is greater than or equal to 5 feet (1.53 m) **and** (2) “C” is less than ½ of “B”. “A”, “B” and “C” are measured at the greatest opening perpendicular to the centerline of the culvert. Measurement “A” is the Total Span. Measurement “D” is the Maximum Span.

**CODING:** Accepts numeric characters only.
INVENTORY ITEM: Max Span

PROCEDURE:
Record the length of the longest span (largest opening) in the culvert to the nearest tenth of a foot. The length of span is defined as the distance measured perpendicular to the centerline of the culvert, not to the centerline of the roadway.

For single span pipe culverts, the max span is the diameter of the pipe.

Box culverts are measured from inside wall to inside wall.

Elliptical pipes are measured at the widest opening.

Arches are measured at the spring line.

For multi-span culverts, the max span is the largest horizontal dimension.

QUALIFYING MULTIPLE PIPE CULVERTS AS LARGE CULVERTS

Referring to the diagram below: Multiple pipe culverts qualify as a single, large, multi-span culvert if (1) “A” is greater than or equal to 5 feet (1.53 m) and (2) “C” is less than ½ of “B”. “A”, “B” and “C” are measured at the greatest opening perpendicular to the centerline of the culvert. Measurement “A” is the Total Span. Measurement “D” is the Maximum Span.

CODING: Accepts numeric characters only.
INVENTORY ITEM: **Total Span**

**PROCEDURE:**
Record the total span of the culvert to the nearest tenth of a foot. If total span exceeds 20' (6.1 m), the structure is to be classified as a bridge and the Regional Structures group is to be notified.

This measurement is the sum of all the culvert’s span lengths and the horizontal distances (measured perpendicular to the centerline of the culvert) of any separations between spans (dimension “A” in the diagram below).

**QUALIFYING MULTIPLE PIPE CULVERTS AS LARGE CULVERTS**

Referring to the diagram below: Multiple pipe culverts qualify as a single, large, multi-span culvert if (1) “A” is greater than or equal to 5 feet (1.53 m) and (2) “C” is less than ½ of “B”. “A”, “B” and “C” are measured at the greatest opening perpendicular to the centerline of the culvert. Measurement “A” is the Total Span. Measurement “D” is the Maximum Span.

**CODING:** Accepts numeric characters only.
INVENTORY ITEM: Abutment Type

PROCEDURE:
Record the type of abutment in service. If more than one type exists, enter one type here and note the other in the comments field.

CODING:
0 - Other (Use this to code concrete box culverts & rigid frames.)
1 - None (Use this to code metal pipe culverts and circular concrete pipe culverts.)
2 - Stub Cantilever (Backwall has a vertical face on the fill side. Superstructure beams are supported on individual pedestals extending up from the footing.)
3 - Integral (Abutment composed of concrete cap beam supported by a single row of piles. Superstructure beams are framed into the cap beam.)
4 - Solid Cantilever (Backwall has a vertical face on the fill side. Superstructure beams are supported on a continuous bridge seat. Individual pedestals on top of the bridge seat are optional.)
5 - Jointless (This code is no longer used.)
6 - Solid, Gravity (Backwall has a tapered face on the fill side. Ability to resist loads is derived from its large size and weight.)
7 - Solid, Counterfort (Bracket-like elements project from the backwall on the fill side.)
8 - Abutmentless (This code is no longer used.)
9 - Stub on Reinforced Earth Wall (Stub cantilever abutment supported on a mechanically stabilized earth retaining wall.)
INVENTORY ITEM: Abutment Skew

PROCEDURE:
Record the skew angle of the culvert to the nearest degree.

The skew angle is defined as the angle between a perpendicular (radial line on a curve) constructed to the centerline of the roadway and a line through the centerline of the culvert. Enter the most extreme skew for non-parallel abutments.

CODING: Accepts numeric characters only.
INVENTORY ITEM: **Abutment Height**

**PROCEDURE:**
 Record the abutment height to the nearest tenth of a foot.

If there is no abutment, as in the case of pipe or pipe-arch type culverts, code the abutment height with the rise (vertical height) of the maximum span.

The abutment height for non-pipe type culverts is a vertical measurement along the abutment face.

For abutments with variable heights, enter an average.

**CODING:** Accepts numeric characters only.
INVENTORY ITEM: Depth of Cover

PROCEDURE:
Record the total depth of cover over the culvert to the nearest foot using an averaged value. Provide notice in the comment section if significant variations exist.

CODING: Accepts numeric characters only.
INVENTORY ITEM: **Out to Out Length**

**PROCEDURE:**
Record the out to out length of the culvert, to the nearest tenth of a foot.

For pipe culverts, box culverts, or other culvert structures under fill, this measurement is the entire culvert centerline length.

For box culverts where traffic runs directly on the top slab (or wearing surface), this measurement is the distance between the fascias.

**CODING:** Accepts numeric characters only.
INVENTORY ITEM: **Posted Load**

**PROCEDURE:**
Record whether the culvert is load-posted, load-restricted or closed.

**CODING:** Accepts only characters “N” (No) or “Y” (Yes).
INVENTORY ITEM: Date Posted

PROCEDURE: Record the date on which the posting, restriction or closure was applied to the culvert.

CODING: Accepts only numeric characters. Enter the date in the format “MM/DD/YYYY”.

EXAMPLE: 01/27/2004
INVENTORY ITEM: Stream Bed Material

PROCEDURE:
Record the most predominant stream bed material in the area of the culvert.

CODING:
0 - Other
1 - No Waterway
2 - Bed Rock
3 - Large Stone
4 - Gravel
5 - Sand
6 - Silt
7 - Clay
INVENTORY ITEM: Bank Protection

PROCEDURE: Record the type of bank protection used along the waterway in the vicinity of the culvert.

If there is no waterway at the culvert site, code this item with "01".

CODING:
00 - Other (Not listed below.)
01 - No Bank Protection
02 - Rip-Rap, Dry
03 - Rip-Rap, Grouted
04 - Block
05 - Timber
06 - Granular Fill
07 - Cribbing, Concrete
08 - Cribbing, Steel
09 - Steel Sheet ing
10 - Sod
11 - Gabions
12 - Stone Filling
13 - Concrete
INVENTORY ITEM: **End Treatment Type (Culvert Extensions)**

PROCEDURE:

Culverts may have been extended to provide for roadway widening projects or other needs. Record the type of material used to extend the original culvert. The material may or may not be the same as the original culvert. Use the “Inventory Comments” field to denote additional information such as whether only one end has been extended or if each end was extended with different materials.

CODING:

1 - Steel
2 - Weathering Steel (Use even if the weathering steel is painted.)
3 - Special Steel (Includes any steel other than A7, A36, A441, A572 or A588.)
4 - Hybrid Steel Section (e.g., One type of steel for web, another type for the flanges.)
5 - Corrugated Steel
6 - Wrought or Cast Iron
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D - Prestressed Concrete, Post-Tensioned
E - Prestressed Concrete, Pre-Tensioned
F - Prestressed Concrete, Unknown (Method of prestressing is unknown.)
G - Polyethylene, Smooth Interior
H - Polyethylene, Corrugated Interior
I - Polyvinyl Chloride
N - None (Designates culvert has not been extended.)
X - Others (Not listed above.)
INVENTORY ITEM: **Number of Lanes**

**PROCEDURE:**

Record the total number of full width traffic lanes carried by the culvert.

Full width traffic lanes are defined as those carrying through traffic and any ramp or merge lanes that are continuous for the entire length of the culvert. Parking lanes are not to be considered.

If the culvert does not carry a highway, enter a zero for this item.

If the culvert carries both a highway and a railroad, input only the number of lanes on the highway.

**CODING:** Accepts numeric characters only.
INVENTORY ITEM: Guide Rail

PROCEDURE:
Record the type of culvert guide rail in service. For more specific information regarding guide rail type and conformance, see Bridge Inventory manual (Record Code 03).

CODING:
00 - Other (Not listed below.)
01 - None
02 - Steel, conforming to current AASHTO specs.
03 - Steel, not conforming to current AASHTO specs.
04 - Aluminum, conforming to current AASHTO specs.
05 - Aluminum, not conforming to current AASHTO specs.
06 - Cable
07 - Concrete (including safety shapes and parapets)
08 - Link Fence
09 - Steel, Balustrade
10 - Concrete, Balustrade
11 - Pipe
12 - Timber
13 - Weathering Steel Box Beam
14 - Weathering Steel W-Beam
INVENTORY ITEM: Cutoff Wall

PROCEDURE: Record whether a cutoff wall is present. These structures are placed at the inlet and/or outlet of a culvert to anchor the culvert and prevent undercutting.

CODING: Accepts only characters “N” or “Y”. If unknown, leave blank.

N - Cutoff wall is not present
Y - Cutoff wall is present
INVENTORY ITEM: SPDES Outfall

PROCEDURE:
Record whether or not the culvert falls into the SPDES Outfall category. If it does then the Environmental Analysis Bureau guidelines apply.

The SPDES Outfall is any point where a Municipal Separated Storm Sewer System (MS4) discharges to either a “Waters of the US” or another MS4. “Waters of the US” are defined as perennial streams, seasonal streams, wetlands, lakes and ponds. Typical highway drainage ditches will not normally be included in this definition even if periodic ponding of water occurs. Rare exceptions will occur when a stream or wetland has been altered to serve as a drainage ditch.

Pipe or box culverts that carry streams under a highway, cross culverts that convey drainage from ditch to ditch or culverts that discharge to uplands or groundwater do not fall into the SPDES Outfall category.

Contact the Regional Environmental Coordinator if additional information is necessary.

CODING: Accepts only characters “N” or “Y”.

N - Does Not Fall Under EAB (Environmental Analysis Bureau) Scope
Y - EAB (Environmental Analysis Bureau) Guidelines Apply
INVENTORY ITEM: Receiving Waters

PROCEDURE:
Record the description of the receiving waters.

Only applicable if “SPDES Outfall” item is coded “Y”. Otherwise leave blank.

Contact the Regional Environmental Coordinator if additional information is necessary.

CODING: Accepts all standard keyboard characters.
INVENTORY ITEM: Special Access

PROCEDURE: Record whether special access is required to inspect the culvert. This requirement can be due to safety concerns, confined space, necessary access equipment, traffic control, etc.

CODING: Accepts only characters “N” or “Y”.

N - No special access required.
Y - Special access required.
INVENTORY ITEM: Special Access Comments

PROCEDURE:
Describe any special access requirements for the culvert.

CODING: Accepts all standard keyboard characters.

EXAMPLES:
Culvert qualifies as a confined space due to its extreme length.
Under bridge inspection unit (UBIU) necessary for inspection access.
Traffic control required.
INVENTORY ITEM: Maintenance Responsibility

PROCEDURE:
Record the agency responsible for the maintenance of the culvert. This is the party required by law, agreement, or common consent, to provide and/or to pay for continuing culvert repair activities such as invert paving, ditch cleaning, bank protection placement, pavement or wearing surface restoration, etc. If tangible evidence of such responsibility is not available, it shall be assumed that the agency actually conducting such activities is responsible.

The entry for maintenance responsibility shall not be considered necessarily legally binding on the party identified and a court decision may be required.

CODING:
10 - NY State Department of Transportation
11 - Retired (State - Waterways Maintenance)
12 - State (Subcontracted to another party)
2A - Genesee State Parks and Recreation Commission
2B - Interstate Bridge Commission
2C - NYS Dept of Environmental Conservation
2D - Lake Champlain Bridge Commission
2E - Lake George Park Commission
2F - Long Island State Parks & Recreation Commission
2G - Metropolitan Transportation Authority
2H - Monroe County Water Authority
2I - Niagara Falls Bridge Commission
2J - Niagara Frontier State Park Commission
2K - NY State Bridge Authority
2L - NY State Thruway Authority
2M - Ogdensburg Bridge and Port Authority
2N - Palisades Interstate Park Commission
2P - NYS Power Authority
2Q - Seaway International Bridge Authority
2R - Retired (Taconic State Park Commission)
2S - Thousand Islands Bridge Authority
2T - Transit Authority
2U - MTA Tunnels & Bridges (aka Triborough Bridge and Tunnel Authority)
2V - Tri-State Transportation Commission
2W - Port Authority of NY and NJ (formerly Port of New York Authority)
20 - State - Other
21 - Authority or Commission - Other
22 - Allegany State Park Authority
23 - Nassau County Bridge Authority
INVENTORY ITEM: Maintenance Responsibility  
(continued)

CODING: (continued)

24 - Peace Bridge Authority (aka Buffalo and Ft. Erie Public Bridge Authority)
25 - Capital District State Park Commission
26 - Central NY State Park Commission
27 - City of NY State Park Commission
28 - East Hudson Parkway Authority
29 - Finger Lakes Parks and Recreation Commission
30 - County
40 - Town
41 - Village
42 - City
43 - NYC Department of Water Supply, Gas and Electric
50 - Federal (Other than those listed below)
51 - Bureau of Indian Affairs
52 - U.S. Forest Service
53 - National Park Service
54 - Bureau of Land Management
55 - Bureau of Reclamation
56 - Military Reservation/Corps of Engineers
60 - Railroad
61 - Long Island Railroad
62 - Retired (used to be Conrail - converted to 60)
70 - Private-Industrial
71 - Private-Utility
72 - Other
99 - One Agency
INVENTORY ITEM: **Owner**

**PROCEDURE:**

Record the agency responsible for the non-federal share of the cost of replacement or rehabilitation of the culvert.

Since ownership cannot normally be proven by the existence of a deed or other form of entitlement, the culvert owner shall be automatically assumed to be the agency identified as holding maintenance responsibility. A different entry should be made only if proof, such as legislation or written agreement, indicates that the assumption would be incorrect.

The entry for owner shall not be considered necessarily legally binding on the party identified and a court decision may be required.

**CODING:**

10 - NY State Department of Transportation  
11 - Retired (State - Waterways Maintenance)  
12 - State (Subcontracted to another party)  
2A - Genesee State Parks and Recreation Commission  
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INVENTORY ITEM: **Owner**
(continued)

**CODING:** (continued)

- 24 - Peace Bridge Authority (aka Buffalo and Ft. Erie Public Bridge Authority)
- 25 - Capital District State Park Commission
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- 62 - Retired (used to be Conrail - converted to 60)
- 70 - Private-Industrial
- 71 - Private-Utility
- 72 - Other
- 99 - One Agency
INVENTORY ITEM: **Work History**

**PROCEDURE:**
Record any construction or maintenance activities performed on the culvert since the previous inspection.

**CODING:**
Year - (4 numeric characters).
Description of work completed - (accepts all standard keyboard characters).

**EXAMPLES:**
2005
- Approach ditches cleaned.
- Culvert replaced.
- Debris cleared from opening.
- New steel box beam guide rail installed.
- Rip-rap bank protection placed.
- New asphalt overlay.
- Invert paved.
INSPECTION SECTION
**Inspection Frequency**

The frequency of inspection required for each culvert is determined by the overall General Recommendation given as a result of the inspection.

- An Annual Inspection (an inspection performed every year) is required if the General Recommendation is 1 or 2.

- A Biennial Inspection (an inspection performed every 2nd year) is required if the General Recommendation is 3 or 4.

- A Quadrennial Inspection (an inspection performed every 4th year) is required if the General Recommendation is 5, 6 or 7.
**Inspection Procedure**

Review available information such as plans, inventory printout and most recent inspection printout to become familiar with the culvert.

Compare the existing inventory information with the actual conditions observed in the field. Make notes to update the appropriate inventory items.

Inspect the culvert. Please refer to the *NYSDOT Culvert Inspection Field Guide* (published January 2006) for photos of example conditions and corresponding recommended inspection ratings. Provide inspection ratings for each item on the “Specific Culvert Inspection Report”. In general, inspecting and rating the items in the order that they appear on the report form will be most convenient. Take digital photos of deficient elements. Take routine measurements of metal pipe culverts to monitor deformations.

**Is There Standing Water (Concealed Invert)?** This field on the inspection form is used to indicate if water (flowing or stationary), sediment, or other obstacles interfere with the inspector’s view of the invert. Use “Y” to indicate the invert is concealed and cannot be viewed. Use “N” to indicate the invert is not concealed and can be viewed. If “Y”, use the comments field to describe the conditions.

Conditions posing a clear and present danger or those which, if left unattended for an extended period, would likely become a clear and present danger, shall be reported immediately to the Resident Engineer, Regional Culvert Administrator, Regional Bridge Management Engineer and Regional Structures Engineer.

Submit inventory updates and inspection ratings to the appropriate party for entry into CIIS.
**Numerical Rating Scale**

Use the following scale for rating individual inspection items:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Condition and/or existence unknown.</td>
</tr>
<tr>
<td>8</td>
<td>Not applicable. Used to rate an item the culvert does not have.</td>
</tr>
<tr>
<td>7</td>
<td>New condition. No deterioration.</td>
</tr>
<tr>
<td>6</td>
<td>Used to shade between ratings of 5 and 7.</td>
</tr>
<tr>
<td>5</td>
<td>Minor deterioration but functioning as originally designed.</td>
</tr>
<tr>
<td>4</td>
<td>Used to shade between ratings of 3 and 5. Functioning as originally designed.</td>
</tr>
<tr>
<td>3</td>
<td>Serious deterioration or <strong>not</strong> functioning as originally designed.</td>
</tr>
<tr>
<td>2</td>
<td>Used to shade between ratings of 1 and 3.</td>
</tr>
<tr>
<td>1</td>
<td>Totally deteriorated or in failed condition. Potentially hazardous.</td>
</tr>
</tbody>
</table>

This scale is used to rate the condition of the culvert compared with its original design capacity, not compliance to current standards. In other words, items should not be down-rated if condition is good but design and configurations are out of compliance with current standards. The following elements are exceptions: Channel Alignment, Channel Opening and General Recommendation for Culvert. Channel Alignment and Channel Opening are rated on site specific performance requirements. General Recommendation is the assessment of the overall culvert condition. For specific rating instruction, refer to the respective items in this section.

It is essential that the inspector use this rating scale in a manner consistent with the criteria established in this manual. Meaningful statewide assessment of culvert conditions is possible only through consistent use of the rating scale.

Normally, a rating of 9 is used only if the rated element is concealed from view and there are no secondary indications of problems and it is not possible to gain access for inspection. STRUCTURE items (e.g. Span Barrel, Abutment & Pier) may only be rated 9 rarely, such as completely enclosed vaults or cells with no means of entry. A rating of 9 for any item must be thoroughly explained under “Comments”.
Numerical Rating Scale
(continued)

Temporary repairs of deteriorated elements, such as pipe culverts shored up with timber to prevent further deformations or wingwalls with steel supports to prevent tipping, are not considered in determining the rating. The item should be rated as though the temporary repair was not there. Presence of a temporary repair should be noted under “Comments”. A permanent repair constructed of the same materials and configuration as the original is considered in the item’s rating.

When rating ROADWAY items (Pavement, Shoulders, Guide Railing, Settlement, Embankment), the limits of the highway to be considered are determined by the combination of structure design, location, and the roadway carried, at the discretion of the inspector.

If a culvert is under construction while still carrying traffic, inspect the portion that is actually carrying traffic. The inspection can be postponed to a later date if the construction is near completion. Add a note indicating the nature of the work underway under “Comments” under the GENERAL RECOMMENDATION FOR CULVERT item. Return to complete the inspection once construction is complete.
ROADWAY ITEMS: Pavement

What To Rate

Rate the roadway pavement over the culvert and the joint between the abutment header and approach pavement if applicable. Also include transverse pavement relief joint between the concrete approach slab and concrete highway pavement if applicable.

What To Look For

Check for:
- Pavement and joint riding quality - smoothness or roughness.
- Cracking, delamination and spalling of concrete pavement.
- Cracking, rutting, potholes and general disintegration of bituminous pavement.
- Wearing surface worn smooth. Polished aggregate can be slippery when wet.
- Joint leakage indicated by wetness of abutment backwall or pier.
- Deterioration of joint seal.
- Loose armor angles. Detect broken anchors by tapping with hammer.
- Rutting, potholes or loss of crown on gravel roadway.
- Loss of gravel near structure resulting in exposed vertical edge of deck.
- Cracking and loss of individual bricks or cobblestones of brick roadway.
- Grooves in wheel paths that may trap water and lead to hydroplaning.

Rating Examples

7 No cracks or deterioration. Only minor surface wear.

5 A few minor, tight cracks. No more than 2 or 3 small, isolated, spalled or rutted areas. Moderate surface wear with good riding quality.

3 Significant ravelling/spalling or potholes affecting 25% or more of any single lane. Well-worn wearing surface with polished aggregate. Longitudinal joint separation. Heavy cracking. Rutting in wheel paths. Heavy leakage under joints. Poor riding quality.

1 Extremely poor riding quality.
ROADWAY ITEMS: Shoulders

What To Rate

Rate this item similar to the Pavement item. Rate the shoulder pavement over the culvert and the joint between the abutment header and approach pavement if applicable. Also include transverse pavement relief joint between the concrete approach slab and concrete highway pavement if applicable.

What To Look For

Check for:
- Shoulder pavement and joint riding quality - smoothness or roughness.
- Cracking, delamination and spalling of concrete pavement.
- Cracking, rutting, potholes and general disintegration of bituminous pavement.
- Joint leakage indicated by wetness of abutment backwall or pier.
- Deterioration of joint seal.
- Build up of debris.
- Loose armor angles. Detect broken anchors by tapping with hammer.
- Rutting or potholes on gravel roadway.
- Loss of gravel near structure resulting in exposed vertical edge of deck.
- Cracking and loss of individual bricks or cobblestones of brick roadway.

Rating Examples

7 No cracks or deterioration. Only minor surface wear.

5 A few minor, tight cracks. No more than 2 or 3 small, isolated, spalled or rutted areas. Moderate surface wear with good riding quality. Minor buildup of debris along curb line.

3 Significant ravelling/spalling or many potholes. Longitudinal joint separation. Heavy cracking. Heavy leakage under joints. Poor riding quality. Significant buildup of debris along curb line.

1 Extremely poor riding quality.
ROADWAY ITEMS: Guide Railing

What To Rate

Rate the guide railing system above the culvert and the median barrier if applicable.

What To Look For

The primary objective of any guide rail/barrier system is to minimize the consequence of a vehicle leaving the roadway. Look for the ability of the system to function as originally designed. Do not rate the adequacy of the system to meet current design standards.

Check for:

- Impact damage to rails and posts.
- Missing bolts at posts and splices.
- Excessive sagging or bending of rails.
- Posts bent out of plumb.
- Any loss of post anchorage.
- Continuity of guide rail at transition sections where applicable.
- Correct lapping of corrugated beam rail sections. Blunt ends should be pointing away from oncoming traffic.
- Deterioration of members, section loss, wood rot, cracking, etc.
- Hazardous protrusions extending from damaged rail toward oncoming traffic.

Rating Examples

8 No guide railing in place and no evidence that it ever existed. Railing has been removed because it was determined to be unnecessary.

7 No deterioration or misalignment.

5 Some minor deterioration of the posts and/or rails, but all components are still in their original position and functioning as originally designed.

3 Major deterioration, impact damage, serious misalignment or significant looseness in the connections has weakened the railing system well below the original design.

1 Severe impact damage or deterioration has rendered the railing system totally ineffective. This includes railings that are missing because of impact or deterioration.

Note: Rails that have an ineffective height due to multiple overlays should be rated 3 or lower.
ROADWAY ITEMS: Settlement

What To Rate

This item is intended to rate the smoothness of transition from the approach roadway to a “bridge-type” structure (i.e. a structure with a bridge deck and a joint between the deck and approach roadway). It is also intended to rate the transition from one type of approach pavement to another (e.g. asphalt approach pavement meets concrete approach slab). Pavement heave that results in the approach pavement being higher than the structure’s deck should be rated under this item. For culverts buried under cover, rate this item focusing on roadway depressions or any indications of a lack of pavement support. This rating should include travel lanes and shoulders.

What To Look For

Check riding quality of the transition by driving over the structure. A smooth transition will minimize impact and vibration forces that contribute to deck and wearing surface deterioration. Look for cracking and breaking of concrete approach slabs that might be due to settlement of the subgrade. Asphalt patches use to ramp a difference in elevation between the approach and structure should be rated as to their ability to reduce the impact caused by difference in elevation. Observe vehicles entering and exiting the structure for any excessive vertical movement or bounce. Sight along the approach pavement markings, which may highlight a dip or settlement. A straight edge laid across the structure abutment longitudinally over the approach pavement is useful in observing settlement. Observe shoulder settlement with respect to the approach pavement and/or structure abutment backwall header or approach slab.

Rating Examples

7 Smooth transition. No difference in elevation between approach pavement and deck. No pavement cracking. No depressions.

5 Minor difference in elevation between approach pavement and deck. Subtly noticeable when driving over. Minor, localized depressions in pavement exist.

3 Difference in elevation between approach pavement and deck produces significant impact on the structure. Vehicles bounce noticeably. Major or widespread depressions in pavement exist.

1 Major difference in elevation between approach pavement and deck causing severe impact on the structure and creating a major obstacle to vehicular traffic. Sinkhole exists creating hazardous situation.
ROADWAY ITEMS: Embankment

What To Rate

Rate the roadway embankment for settlement and/or sloughing of the side slopes. Do not include settlement of approach pavement or subgrade under this item.

What To Look For

Stability of the embankment is the main consideration. Settlement and/or sloughing resulting in a convex appearance of the side slope or abrupt changes in the side slope suggest failures. Check for soil cracks perpendicular to the slope indicating imminent failure. Guide rail posts out of plumb and leaning outward, down the slope, may indicate embankment settlement or slope failure. Vertical displacement of guide rail and posts may also indicate slope deficiencies.

Rating Examples

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>No signs of distress.</td>
</tr>
<tr>
<td>5</td>
<td>Some settlement may be occurring or the presence of a few soil cracks perpendicular to the slope may indicate minor shifting of embankment. Embankment shift causing guide rail posts to lean slightly out of plumb.</td>
</tr>
<tr>
<td>3</td>
<td>Sloughing indicates soil shear failure, but not in close proximity to the roadway. Embankment shift causing guide rail posts to be undermined and lean significantly out of plumb.</td>
</tr>
<tr>
<td>1</td>
<td>Severe sloughing is causing significant loss of embankment support for the roadway and guide rail system.</td>
</tr>
</tbody>
</table>

A rating of 8 will very rarely occur. Even for a roadway in an earth or rock cut, there will be some depth of embankment fill.

A 9 rating should be used only when the embankment cannot be visually or physically inspected, as when extremely dense embankment vegetation prevents the inspector from determining its condition. This rating requires an explanation under “Comments”.

ROADWAY ITEMS: General Recommendation

What To Rate

Rate the roadway’s overall condition and functional capability. This recommendation will reflect the scoring of the individual roadway items but it does not necessarily have to match the lowest of these ratings.

Rating

7  New condition.
6  Used to shade between ratings of 5 and 7.
5  Minor deterioration but functioning as originally designed.
4  Used to shade between ratings of 3 and 5. Functioning as originally designed.
3  Serious deterioration or not functioning as originally designed.
2  Used to shade between ratings of 1 and 3.
1  Totally deteriorated or in failed condition.
STRUCTURE ITEMS: Abutment & Pier

What To Rate

CONCRETE BOX CULVERTS & RIGID FRAMES:
Rate the vertical components and floor (if applicable) under this item. The ceiling slab will be rated under “Span Barrel”.

METAL PIPE CULVERTS & CIRCULAR CONCRETE PIPE CULVERTS:
Rate this item 8 (not applicable).

GIRDER/BEAM CULVERTS:
Rate bearings, pedestals and seats, cap beams, columns, stems, footings, piles and erosion/scour under this item.

What To Look For

CONCRETE BOX CULVERTS & RIGID FRAMES:
Check for:
• Vertical and/or horizontal misalignment.
• Differential movement or settlement at joints between sections.
• Joint separation and leakage.
• Cracks, spalls and delamination. Note location and magnitude. Tap with hammer.

GIRDER/BEAM CULVERTS:
These culverts may be comprised of many more elements than box culverts or pipe culverts. This manual provides a general guideline for their inspection. For more in-depth inspection guidance for specific elements, see “State of New York, Department of Transportation, BRIDGE INSPECTION MANUAL, 1997”.

Consider the following elements when rating this item. These elements are all fairly equal with respect to relative importance and should have equal influence on the rating for this item:
• Bearings - Check for proper position (expanded, contracted) relative to the ambient temperature. Check for sheared bolts, cracked welds, debris buildup or corrosion. Verify masonry plates are anchored and not “walking”. Look for distortion of elastomer for elastomeric bearings.
• Pedestals and Seats - Check for deterioration such as cracking (indication of frozen bearing), spalling or corrosion.
• Cap Beams - Check for deterioration such as cracking, spalling or corrosion and for debris buildup on top of cap beam.
• Columns - Check for tilting, settlement and deterioration such as cracking, spalling or corrosion.
• Stems - Check for deterioration such as cracking, spalling and section loss. Check for evidence of vertical, horizontal or lateral movement (indications could be evidenced by curb line displacement or rail distortion).
STRUCTURE ITEMS: Abutment & Pier
(continued)

- Footings - When exposed, check for signs of deterioration such as cracking and spalling. If not exposed, check for evidence of settlement or movement such as surface cracks in pavement or soil.
- Piles - Check for deterioration if visible.
- Erosion/Scour - Check for loss of embankment material. Check for loss of streambed material near a substructure.

Rating Examples

CONCRETE BOX CULVERTS & RIGID FRAMES:
7 Like-new condition. No signs of misalignment.
3 Heavy mapcracking with efflorescence. Widespread areas spalled with rebar exposed. Major separation at joint between sections. Heavy leakage. Extreme differential movement or settlement.
1 Deterioration, differential movement or settlement is so severe that failure has occurred or is imminent.

METAL PIPE CULVERTS & CIRCULAR CONCRETE PIPE CULVERTS:
8 Not Applicable

GIRDER/BEAM CULVERTS:
7 All elements in like-new condition. Bearings in proper position for ambient temperature. No debris on pedestals or bearings or top of cap beam. Footing, if visible, functioning properly, and in like-new condition. No evidence of erosion or scour.
5 Bearings have minor deterioration but still allow movement. Bearing position is reasonably close to proper for the ambient temperature. Pedestals have minor cracks or spalls not involving the area under the bearing. Cap beam has minor deterioration and/or has a minor amount of debris on top. Columns have minor cracking or section loss that does not exceed 25% of the column surface area. Stem has minor deterioration covering less than 25% of the surface area with little or no signs of movement. Footing has minor cracking or spalling. Minor erosion or scour has occurred evidenced by displacement of block paving or exposure of the top of the substructure footing.
STRUCTURE ITEMS: Abutment & Pier
(continued)

3  Serious deterioration or deformation of bearings. Bearings in improper position or frozen. Pedestals heavily mapcracked and spalled resulting in loss of bearing area. Cap beam has serious deterioration such as spalling with exposed rebar or significant section loss in high stress areas. Significant buildup of wet debris on top of cap beam. Columns have significant deterioration characterized by widespread cracking, spalling with exposed rebar, or significant section loss. Stem has widespread mapcracking, efflorescence and spalling. There is evidence of significant substructure movement. Footing has significant cracking or heavy spalling. Significant erosion or scour has occurred evidenced by the undermining of a substantial length of footing, but piles are present and show only minor deterioration.

1  Bearing completely disintegrated or failed. Bearing extended in a position such that it no longer provides support. Deterioration of pedestal, cap beam, column or substructure, or substructure movement, is so severe that failure has occurred or is imminent. Footing deteriorated to such an extent that it can no longer transfer load from the substructure to the subgrade material or piles. Erosion or scour has progressed to the point where substructure failure has occurred or is imminent. Footings without piles or with severely deteriorated piles are extensively undermined.
STRUCTURE ITEMS:  **Span Barrel**

**What To Rate**

**CONCRETE BOX CULVERTS & RIGID FRAMES & CIRCULAR CONCRETE PIPE CULVERTS:**
Rate the ceiling slab under this item for box culverts and rigid frames. The vertical components and floor (if applicable) will be rated under “Abutment & Pier”. Rate the entire barrel under this item for circular concrete pipe culverts.

**METAL PIPE CULVERTS:**
Rate the entire barrel under this item. Also consider the surrounding soil in this rating since it contributes to the strength and stability of the pipe.

**GIRDER/BEAM CULVERTS:**
Rate the primary members (e.g. steel girders, concrete beams, slabs etc), structural deck and secondary members (e.g. diaphragms, bracing, etc) under this item.

**What To Look For**

**CONCRETE BOX CULVERTS & RIGID FRAMES & CIRCULAR CONCRETE PIPE CULVERTS:**
Check for:

- Vertical and/or horizontal misalignment.
- Differential movement or settlement at joints between sections.
- Joint separation and leakage.
- Cracks, spalls and delamination. Note location and magnitude. Tap with hammer.

**METAL PIPE CULVERTS:**
It is recommended that cross-section measurements be taken at locations spaced close enough to ensure that future deformations can be detected and monitored from one inspection to the next. The dimensions AD, BE, AF, FE and CF (see diagram on following page) should be recorded at intervals not greater than 50 feet, but no fewer than 3 locations. The stations should be permanently marked. The reference points (A, B, C, D and E) are defined by the actual locations of the bolt rows and the bolts should be permanently marked. Measurements should be taken to the center of the bolt ends. If the measurements are taken to a location other than the center of the bolt ends, then a precise description and sketch of these locations should be provided. If there is no line of bolts at “C”, measure to the corrugation peak at the highest point of the cross-section and provide a note and sketch explaining this.

Forms should be created for recording the information described above. A system should be established to ensure that these forms be stored so as to be available to be used during subsequent inspections. These forms should include the CIN, inspection date, a sketch of the cross-section (and precise measurement locations if applicable), comments section and a table for recording the measurements taken and the stations. See “Sample Forms” section.
TYPICAL METAL CULVERT CROSS-SECTION DIMENSIONS

A, B, C, D and E are bolt lines. If no bolt line exists at C, measure to the corrugation peak at the highest point of the cross-section and provide a note and sketch explaining this. F is located by dropping a vertical from C.

Consider the following factors when rating this item. The relative importance of each factor is subject to the judgement of the inspector, depending on observed behavior and site conditions:

• Upper arc drop - This refers to the flattening effect of vertical loads on the upper arc of the culvert. Percent of upper arc drop (change of measured dimension CF from original baseline value) is defined as:
  
  $$\frac{(CF_{original} - CF_{measured})}{CF_{original}} \times 100$$

• Localized deflection (shape) - This reflects the extent of shape irregularities. Measurements AD and BE may be useful in quantifying the degree of localized deflection.

• Leaning - This is a shift of the vertical centerline to an inclined position. Percent leaning is defined as:
  
  $$\frac{(AF - FE)}{AE} \times 100$$

• Barrel condition - Inspect for section loss by corrosion or abrasion. Section loss above the lower quarter points is much more critical to the stability of the culvert than similar loss in the invert. If there is excessive section loss, note the location(s) and provide a recommendation for further investigation as appropriate. Document the water level in the pipe at the time of the inspection (e.g. 1/4 full, 1/2 full) and whether it appears the water level remains constant throughout the year or varies. This will help in judging the extent of the corrosion.
STRUCTURE ITEMS: Span Barrel
(continued)

- Seam condition - Check for tightness of joints between plates and between longitudinal sections. Note broken, loose, rusty or missing bolts. Look for signs of leakage through joints. Check for cracks, paying particular attention to bolt locations. The areas requiring the closest scrutiny are bolt locations at haunches and quarter points. Mark the end of cracks and document their length and location so comparisons can be made to determine their change or growth.
- Backfill - Examine the surrounding soil’s ability to support the pipe. Consider this factor especially when there is evidence that barrel dimensions are undergoing significant dynamic changes.

GIRDER/BEAM CULVERTS:
These culverts may be comprised of many more elements than box culverts or pipe culverts. This manual provides a general guideline for their inspection. For more in-depth inspection guidance for specific elements, see “State of New York, Department of Transportation, BRIDGE INSPECTION MANUAL, 1997”.

Consider the following elements when rating this item. The primary members are the most important elements with respect to the load carrying capacity of the structure and should be given maximum weight when rating this item. The primary members are followed in order of importance by the structural deck, then the secondary members. A low rating is justified where a deficiency for even one primary member component is so critical as to significantly reduce the structure’s load carrying capacity. The structural deck is the member or members transmitting load from the wearing surface to the primary members. Secondary members brace or stiffen individual primary members against buckling, provide lateral or torsional rigidity to the primary system, or hold components of a primary member in proper relative position. They do not resist traffic loads:
- Steel Girders (primary) - Check for corrosion and section loss of webs in high shear areas, and flanges in high moment areas. Check for distortions caused by heavy loads, section loss or impact damage. Check for weld cracks in any tension or stress reversal area.
- Concrete Beams (primary) - Examine alignment and profile of concrete beams for damage due to impact, overstressing or substructure movement. Look for spalling and cracked concrete near bearing areas. Diagonal cracking at ends of beams is serious.
- Slabs (primary) - Check for deterioration such as cracking, efflorescence, spalling and rebar exposure.
- Structural Deck - Look for signs of deck leakage (rust stains on girders, dampness, mapcracking and efflorescence). Look for cracks, spalls, or broken or loose grates.
- Diaphragms & Bracing (secondary) - Check for deterioration such as cracking, spalling, and section loss due to corrosion. Look for impact damage and improper alignment.
STRUCTURE ITEMS: Span Barrel
(continued)

Rating Examples

CONCRETE BOX CULVERTS & RIGID FRAMES & CIRCULAR CONCRETE PIPE CULVERTS:

7  Like-new condition. No signs of misalignment.


3  Heavy mapcracking with efflorescence. Widespread areas spalled with rebar exposed. Major separation at joint between sections. Heavy leakage. Extreme differential movement or settlement.

1  Deterioration, differential movement or settlement is so severe that failure has occurred or is imminent.

METAL PIPE CULVERTS:

7  Like-new condition. Barrel has smooth appearance with symmetrical curvature. Seams are tight.

5  Upper arc drop is 15% to 20%. Curvature is generally smooth but with some slightly non-symmetrical sections. Leaning factor is 4% to 12% for spans <12' (3.66 m) in length, 2.5% to 7% for spans > 12' (3.66 m) in length. Superficial to light corrosion present with no pitting. Minor cracks exist at a few bolt holes.

3  Upper arc drop is 20% to 25%. The structure has significant distortion and deflection. Leaning factor is 12% to 20% for spans <12' (3.66 m) in length, 7% to 12% for spans > 12' (3.66 m) in length. Severe isolated corrosion and pitting exist. Widespread moderate section loss is evident and/or areas of perforations exist. Significant cracking along seam. Soil infiltration has caused considerable barrel deflection.

1  Upper arc drop is greater than 30%. The structure has extreme distortion and deflection. Structure is partially collapsed. Leaning factor is >20% for spans <12' (3.66 m) in length, >12% for spans > 12' (3.66 m) in length. Severe corrosion and pitting is widespread. Severe section loss exists throughout. Condition is potentially hazardous. Cracks exist all along the seams. Backfill has pushed into the structure.
STRUCTURE ITEMS: Span Barrel
(continued)

GIRDER/BEAM CULVERTS:

7 Primary members and secondary members are in like-new condition. No signs of vertical or horizontal misalignment. Deck is in like-new condition.

5 Steel girders have localized section loss, or minor impact damage with no base metal cracks. Prestressed concrete beams have little or no leakage between adjoining members and only a few wearing surface cracks. Concrete slab has minor spalling, delamination or dampness. Only localized areas of deck leakage. Isolated, broken welds on steel grating. Sleepers may have minor section loss. Secondary members have minor impact damage and/or negligible section loss. Secondary members have isolated, minor to moderate, surface spalling or cracking.

3 Steel girders have serious section loss or serious impact damage with base metal cracks. Isolated prestressed concrete beams have diagonal cracking at ends of beams, or flexural cracks, indicating loss of strength in those members. Concrete slab has extensive spalling, cracking, delamination or rebar exposure. Deck leakage is widespread. Many broken welds on steel grating. Sleepers significantly corroded. Secondary members have serious deterioration and/or deformation, and functional capacity is limited.

1 Steel girders have critical base metal cracking, severe section loss in high stress areas, or severe impact damage to several adjacent members. Many prestressed concrete beams have diagonal cracking at ends of beams, or flexural cracks, indicating that much of the original load carrying capacity of the structure is lost. Vertical deflection (sagging) of prestressed concrete beams is evident. Severe deterioration to concrete slab has rendered the primary member system potentially ineffective. Deck has very heavy spalling or efflorescence. Deck has a punch through or is saturated to the point that concrete is rubble. Steel grating has large areas of missing bars. Secondary members rendered completely ineffective by deterioration or impact damage.
STRUCTURE ITEMS: **Headwall**

**What To Rate**

These structures are placed at the inlet and/or outlet of the culvert to protect embankment slopes and, in some cases, support the guide rail. Rate their condition, their ability to retain embankment material that interacts with the culvert, and their ability to support the guide rail if applicable. This rating should represent the condition of the worst headwall.

**What To Look For**

Check for deterioration of the headwall material. Check for headwall movement and associated effects on the embankment or guide rail.

**Rating Examples**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>No headwalls exist.</td>
</tr>
<tr>
<td>7</td>
<td>Headwalls in like-new condition.</td>
</tr>
<tr>
<td>5</td>
<td>Minor deterioration of headwall material. No headwall movement.</td>
</tr>
<tr>
<td>3</td>
<td>Extensive deterioration of headwall material. Headwall is leaning or rotated out of original position and embankment or guide railing is affected.</td>
</tr>
<tr>
<td>1</td>
<td>Headwall is severely deteriorated. Movement is so severe that the headwall no longer supports the embankment or guide rail.</td>
</tr>
</tbody>
</table>
STRUCTURE ITEMS: Wingwall

What To Rate

Rate the condition of the wingwalls at the inlet and outlet of the culvert and their ability to retain the embankment. This rating should not be an average of the wingwalls’ conditions, rather it should represent the condition of the worst wingwall.

What To Look For

Check for deterioration of the wingwall material such as mapcracking, spalling, loss of mortar or stones, corrosion/section loss or timber rot. Check for wingwall settlement and/or lateral movement by inspecting the vertical joints between the wingwalls and the abutment stem for displacement, and by inspecting the walls for evidence of tipping.

Rating Examples

8  No wingwalls exist.

7  Wingwalls in like-new condition. No deterioration, settlement or lateral movement.

5  Slight wingwall settlement or movement. Isolated areas of minor deterioration.

3  Significant wingwall settlement or movement is evident. Extensive, widespread deterioration.

1  Deterioration, settlement or lateral movement is so severe that failure of the wingwall has occurred or is imminent.
STRUCTURE ITEMS: **End Treatment**

**What To Rate**

Rate the section of the structure built to extend the original culvert under this item. Follow the same guidance provided under the **Span Barrel** item. Consider both inlet and outlet ends and rate the worst condition under this item.

**What To Look For**

Follow the same guidance provided under the **Span Barrel** item.

**Rating Examples**

Follow the same guidance provided under the **Span Barrel** item.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>No end treatment.</td>
</tr>
<tr>
<td>7</td>
<td>Follow the same guidance provided under the <strong>Span Barrel</strong> item.</td>
</tr>
<tr>
<td>5</td>
<td>Follow the same guidance provided under the <strong>Span Barrel</strong> item.</td>
</tr>
<tr>
<td>3</td>
<td>Follow the same guidance provided under the <strong>Span Barrel</strong> item.</td>
</tr>
<tr>
<td>1</td>
<td>Follow the same guidance provided under the <strong>Span Barrel</strong> item.</td>
</tr>
</tbody>
</table>
STRUCTURE ITEMS: General Recommendation

What To Rate

Rate the structure’s overall condition and functional capability. This recommendation will reflect the scoring of the individual structure items but it does not necessarily have to match the lowest of these ratings.

Rating

7  New condition.
6  Used to shade between ratings of 5 and 7.
5  Minor deterioration but functioning as originally designed.
4  Used to shade between ratings of 3 and 5. Functioning as originally designed.
3  Serious deterioration or not functioning as originally designed.
2  Used to shade between ratings of 1 and 3.
1  Totally deteriorated or in failed condition.
CHANNEL ITEMS: Opening

What To Rate

Rate the adequacy of the waterway opening at the structure. Consider the extent to which flow is restricted through the opening. The waterway opening is not evaluated on a comparison to the original design. This item should be downrated if there is evidence that the opening is insufficient for high flow conditions even if the alignment is good and the opening is unobstructed.

What To Look For

Check for accumulation of silt, debris or vegetative growth that may restrict flow through the opening. Compare the opening at the structure with previous inspections. Check for evidence of the opening being insufficient for high flow conditions such as the accumulation of debris on the embankment around the culvert opening or on the tops of the girder bottom flanges.

Rating Examples

8  Not applicable.

7  Waterway opening is clear with no evidence of restrictions.

5  Waterway opening has minor obstructions. No more than 25% of the opening is restricted.

3  Waterway opening has significant obstructions. Approximately 50% of the opening is restricted. There is evidence that the opening is insufficient for high flow conditions.

1  Waterway opening is severely obstructed. More than 75% of the opening is restricted.
CHANNEL ITEMS: Alignment

What To Rate

Rate the alignment of the stream channel at the culvert site in terms of skew angle where the stream approaches the structure. The scale used for rating stream alignment evaluates the alignment in terms of the approach to, and flow through, the structure. The alignment is not evaluated in comparison with the original design.

What To Look For

Check the stream skew angle as it approaches the structure. Consider both normal and flood flows. The flow should approach and pass through the waterway opening parallel to the pipes or to the faces of the piers and abutments. Check for shifts in direction of flow from previous inspections and from original plans if available. Note any change in direction of approach of the stream and any change in the angle where the stream hits the structure.

Rating Examples

8 Not applicable.

7 The stream approaches and flows through the waterway opening parallel to the pipes or to the faces of the piers and abutments.

5 The stream approaches and flows through the waterway opening in a direction other than parallel, but with no evidence of scour, siltation, or other problems caused by this alignment.

3 The stream approaches and flows through the waterway opening in a direction other than parallel, and flow may be hitting the structure. There is evidence of scour, siltation, or other problems caused by this alignment.

1 The stream approaches and flows through the waterway opening in a direction other than parallel, and flow may be hitting the structure. The foundation is significantly undermined.
CHANNEL ITEMS: Scour/Erosion

What To Rate

Rate scour/erosion of the streambed and channel banks. Consider the condition in the vicinity of the structure and its impact on the structure. Also consider the conditions upstream and downstream from the structure, but maximum weight should be given to any conditions impacting the structure when rating this item.

What To Look For

Check for footing exposure and structure undermining. Check for cutting of channel banks and exposed root systems of bank vegetation. Check for changes in channel dimensions. Consider how fast the observed scour/erosion is occurring by comparing new stream channel documentation with previous records. The more rapid the rate of erosion, the lower the rating.

Rating Examples

8  Not applicable.
7  There are no indications of scour/erosion.
5  General streambed degradation has occurred over decades but does not affect the culvert. Minor scour/erosion is occurring at banks away from the culvert, but is not causing problems at the culvert.
3  Streambed degradation has occurred over a period of less than ten years characterized by exposure and extensive undermining of the footing or extensive undermining of the culvert pipe. Scour/erosion of the banks is beginning to encroach upon the culvert with the potential for serious problems, especially during flood conditions.
1  Streambed degradation has occurred over a period of three years or less characterized by severe undermining of the footing or culvert pipe resulting in movement and instability of the structure. Major loss of material to the channel banks or streambed causing severe channel misalignment resulting in movement and instability of the structure.
CHANNEL ITEMS: Silt, Debris, Vegetative Growth

What To Rate

Rate the magnitude of the accumulation of siltation, debris or vegetative growth and its impact on the waterway opening at the structure.

What To Look For

Check for the accumulation of sand, gravel, tree limbs, vegetation, etc that may restrict flow through the opening.

Rating Examples

8  Not applicable.
7  No silt, debris or vegetative growth present in channel. Opening is clear.
5  Minor, isolated accumulation of silt, debris or vegetative growth. Little to no impact on the waterway opening.
3  Major accumulation of silt, debris or vegetative growth. Flow through the waterway opening is significantly restricted.
1  Very heavy accumulation of silt, debris or vegetative growth. Flow through the waterway opening is completely or almost completely blocked.
CHANNEL ITEMS: **General Recommendation**

**What To Rate**

Rate the channel’s overall condition and functional capability. This recommendation will reflect the scoring of the individual channel items but it does not necessarily have to match the lowest of these ratings.

**Rating**

8  Not applicable.

7  Water flow is not impeded by stream alignment or culvert opening. No evidence of flooding. No erosion or scour.

6  Used to shade between ratings of 5 and 7.

5  Increased flows (50-year rainstorm) are restricted by stream alignment and/or culvert opening. There is some flooding. Minor erosion or scour.

4  Used to shade between ratings of 3 and 5.

3  Normal flows are restricted by stream alignment and/or culvert opening. There is significant flooding. Significant erosion or scour.

2  Used to shade between ratings of 1 and 3.

1  Normal flows are severely restricted by stream alignment and/or culvert opening. There is extensive flooding. Severe erosion or scour.
GENERAL RECOMMENDATION FOR CULVERT

This rating is the inspector’s assessment of the overall condition of the culvert. Give maximum weight to items of most importance such as span barrel, abutment & pier, scour, etc. Items of less importance have less influence in determining the general recommendation. The general recommendation should not be lower than the lowest rating given to any individual item. Ratings of 8 (not applicable) and 9 (unknown) are never acceptable for the general recommendation.

In addition to considering the relative importance of the items to determine the General Recommendation, consult the following narrative descriptions:

7 Culvert is in like-new condition with no deterioration. No work needed other than routine maintenance.

6 Only minor deterioration is present. May require very minor repairs to pavement, guide rail, shoulders, etc.

5 Span barrel and abutment & pier are in good condition. Load capacity is not reduced. Headwalls and wingwalls may require minor repairs. May require removal of light vegetation growth around culvert openings. Scour may have exposed, but not undermined, footings.

4 Span barrel and/or abutment & pier have moderate deterioration but do not yet need extensive reconditioning. Load capacity is not substantially reduced. Headwalls and wingwalls may require significant repair work. Pavement may require replacement with the addition of backfill material to correct minor roadway settlement problems yet the structure shows no signs of deformation. There may be some minor substructure undermining. Minor channel work may be required.

3 Span barrel and/or abutment & pier have considerable deterioration. Steel members have considerable section loss. Slight deformation or settlement of the structure may exist. Concrete members are spalled with rebar exposure over large portions of their surface area. The culvert may no longer be able to support original design loads. Load posting may be needed. Extensive footing undermining may have occurred. Extensive work on the culvert is required. Replacement could be considered a better long term option.
GENERAL RECOMMENDATION FOR CULVERT
(continued)

2 Span barrel and/or abutment & pier are extensively deteriorated. Replacement of the structure may be necessary due to serious deformation and/or settlement. Short-term, remedial action such as pavement replacement or installation of additional backfill material may be required. The culvert can no longer safely carry original design loads. The culvert may still be open to traffic but with a posted load restriction. Temporary shoring or bracing may be necessary. Replacement of headwalls and/or wingwalls may be required. Water flow may be greatly restricted by constriction or obstruction of the culvert opening. Scour and undermining may be extensive enough to threaten the stability of the culvert.

1 Deterioration is so extensive that partial or total collapse is imminent. There is little or no live load capacity and the structure may be closed to traffic. For the culvert to remain open to traffic, substantially reduced load posting and temporary shoring are necessary. Structure may be in danger of failing due to extensive undermining.
CIN _____________

NYS DEPT OF TRANSPORTATION
CULVERT INSPECTION REPORT
SHEET ____ of ____

Inspector: ____________________ Inspection Date: ____________

Feature Carried: __________________________________________
Feature Crossed: __________________________________________

METAL PIPE CROSS-SECTIONS (feet)

NORTH

Stations 0+00 -

YEAR| NOTES:
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94
CIN _______________  NYS DEPT OF TRANSPORTATION
CULVERT INSPECTION REPORT
SHEET ____ of ____

Inspector: ____________________  Inspection Date: __________

Feature Carried: ____________________________________________

Feature Crossed: ____________________________________________

**METAL PIPE CROSS-SECTION READINGS (feet)**

<table>
<thead>
<tr>
<th>STA</th>
<th>READINGS</th>
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<tbody>
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