

# Asset Management Plan

## City of Sault Ste. Marie

### Local Bridges

Updated November 2021



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## **PURPOSE**

The City of Sault Ste. Marie (The City) seeks to implement a cost-effective program of preventive maintenance to maximize the useful service life of the local bridges under its jurisdiction.

The City recognizes that limited funds are available for improving the bridge network. Preventive maintenance is a more effective use of these funds than the costly alternative of major rehabilitation or replacement, and we seek to identify those bridges that will benefit from a planned maintenance program.

## **GOAL**

The goal of the program is the preservation of the City bridge network.

## **OBJECTIVES**

The City objectives in implementing the preservation plan include:

- Establishing the current condition of the City's bridges
- Developing a "mix of fixes" that will:
  - Program regular scheduled maintenance actions to impede deterioration of bridges in good condition
  - Implement selective corrective repairs or rehabilitation to degraded bridge elements and to restore functionality
  - Identify and program those eligible bridges in need of replacement
- Identifying available funding sources, including:
  - Dedicated City resources
  - City's funding through Michigan's Local Bridge Program
  - Opportunities to obtain other funding
- Prioritizing the programmed actions within available funding limitations
- Maintaining 100% of its bridges or structures (including non NBI) in fair to good condition, with a goal of 88% in good condition.

## **PERFORMANCE MEASURE**

Several metrics will be used to assess the effectiveness of the preservation plan. The plan will monitor and report the annual change in the number of its bridges rated fair/good (5 or higher) and the annual change in the number of structurally deficient bridges.

## BRIDGE ASSETS

The City is responsible for 7 local bridges, plus 1 pre-cast concrete culvert at Seymour Creek and a pre-cast concrete tunnel at the snowmobile trail crossing under I-75. Detailed inventory data, condition ratings, and proposed preventive maintenance actions for each bridge are contained in the tables in Appendices A-1, A-2, and A-3.

The bridge inventory data was obtained from MDOT MiBRIDGE and other sources, and the 2021 condition data and maintenance actions are taken from the inspector's summary report (see Appendix B).

A summary and distribution of the bridge population is presented in the following tables:

Bridge Type	Number of Bridges				2021 Condition		
	Total	Struct. Defic	Posted	Closed	Poor	Fair	Good
Concrete – Arch—deck	1	0	0	0	0	0	1
Prestressed concrete – Box beam/girders—multiple	1	0	0	0	0	0	1
Steel – Arch—thru	1	0	0	0	0	1	0
Steel – Multistringer	4	0	0	0	0	2	2
Concrete Box Culvert	0	0	0	0	0	0	0
<b>Total SD/Posted/Closed</b>		<b>0</b>	<b>0</b>	<b>0</b>			
<b>Total</b>	<b>7</b>				<b>0</b>	<b>3</b>	<b>4</b>
<b>Percentage (%)</b>		<b>0%</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>43</b>	<b>57</b>

There are two structures within the City that are not included on the MiBridge inventory.

Bridge Type	Number of Bridges				2019 Condition		
	Total	Struct. Defic	Posted	Closed	Poor	Fair	Good
3-Sided Reinf Concrete Culvert – Seymour Creek	1	0	0	0	0	0	1
Reinf. Concrete Box Culvert – Snomo Tunnel	1	0	0	0	0	0	1
<b>Total SD/Posted/Closed</b>		<b>0</b>	<b>0</b>	<b>0</b>			
<b>Total</b>	<b>2</b>				<b>0</b>	<b>0</b>	<b>2</b>
<b>Percentage (%)</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>100</b>

## **CONDITION ANALYSIS**

Of the The City's 7 structures, two are arch structures (1 steel and 1 concrete), four are steel bridges, and 1 is a pre-stressed concrete bridge. The distribution of overall condition is: 3 (43%) are fair; and 4 (57%) are good. The City bridge inventory includes no structurally deficient bridges.

The non-inventory two structures, one 3-sided concrete culvert and one concrete box culvert are both in good condition. If added to the 7 structures above for a total of 9 structures, the distribution of the overall condition becomes: 3 (33%) are fair; 6 (67%) are good.

Statewide, MDOT's statistics for local agency bridges show that 14% are poor and severe, and 86% are good/fair. The City has 100% of its bridges in fair/good condition and is therefore well above the statewide conditions, due to its long-term commitment to preventive maintenance and rehabilitation of its bridges.

Some of the bridges require one-time preventive maintenance actions to repair defects and restore the structure to a higher condition rating. Most bridges are included in a scheduled maintenance plan with appropriate maintenance actions programmed for groups of bridges of similar material and type.

The City's objective in formulating this preservation plan is to maintain 100% of the agency's local bridges in fair to good condition and to increase the number of good bridges to 88%.

## **RISK MANAGEMENT**

The City recognizes that the potential risks associated with bridges generally fall into several categories:

- Personal injury and property damage resulting from a bridge collapse or partial failure;
- Loss of access to a region or individual properties resulting from bridge closures, restricted load postings, or extended outages for rehabilitation and repair activities; and
- Delays, congestion, and inconvenience due to serviceability issues, such as poor quality riding surface, loose or missing expansion joints, etc.

The City addresses these risks by implementing a regular bridge inspection program and a preservation program of preventive maintenance.

The City administers the biennial inspection of its bridges in accordance with NBIS and MDOT requirements. The inspection reports document the condition of The City's bridges and evaluates them in order to identify new defects and monitor advancing deterioration. The summary inspection report identifies items needing follow-up special inspection actions and recommends bridge-by-bridge maintenance activities.

The preservation program identifies actions in the operations and maintenance plan that are preventive or are responsive to specific bridge conditions. The actions are prioritized to correct critical structural safety and traffic issues first, then to address other needs based on the operational importance of each bridge and the long-term preservation of the network. The inspection results are used to modify and update the operations and maintenance plan annually.

## **PRESERVATION STRATEGY**

The City's preservation plan employs "mix of fixes" strategy made up of preventive maintenance and scheduled maintenance. The aim of this plan is to address the structures of critical concern by targeting elements rated as being in poor condition and to maintain the overall condition of the bridge network to good or fair condition.

The following is a list of definitions for the mix of fixes.

*Replacement* involves substantial changes to the existing structure, such as bridge deck replacement, superstructure replacement, or complete structure replacement, and is intended to improve critical or closed bridges to a good condition rating.

*Rehabilitation* is undertaken to extend the service life of existing bridges. The work will restore deficient bridges to a condition of structural or functional adequacy, and may include upgrading geometric features. Rehabilitation actions are intended to improve the poor or fair condition bridges to fair or good condition.

*Preventive maintenance* work will improve and extend the service life of fair bridges, and will be performed with the understanding that future rehabilitation or replacement projects will contain appropriate safety and geometric enhancements. Preventive maintenance projects are directed at limited bridge elements that are rated in fair condition with the intent of improving these elements to a good rating. Most preventive maintenance projects will be one-time actions in response to a condition state need. Routine preventive work will be performed by contracted agencies.

The replacement, rehabilitation, and preventive maintenance projects are generally eligible for funding under the local bridge program, and request for funding will be submitted with the City's annual applications.

The City's *scheduled maintenance* program is an integral part of the preservation plan, and is intended to extend the service life of fair and good structures by preserving the bridges in their current condition for a longer period of time. Scheduled maintenance is proactive and not necessarily condition driven. In-house maintenance crews will perform much of this work.

The "mix of fixes" strategy combines a regular program of scheduled maintenance with short-term preventive maintenance fixes. Implementing this balanced mixture, as described in the Operations and Maintenance Plan below, will increase the number of bridges improved each year and preserve the overall health of The City's bridge network.

## **IMPLEMENTATION OF THE STRATEGY**

The City's implementation of the preservation plan strategy begins with an annual review of the current condition of each of the agency's bridges using the NBI inspection data contained on the MDOT Bridge Safety Inspection Report and the inspector's work recommendations contained on MDOT's Bridge Inspection Report. The inspection inventory and condition data are consolidated in spreadsheet format for the City's bridges in Appendix A-1. The preservation strategy needs are determined for each bridge and the corresponding actions are identified and assembled on a spreadsheet, sorted by bridge material and type in Appendix A-2. Inspection follow-up actions include updating the SIA for each bridge.

The preservation actions are selected in accordance with criteria contained in the table below. These criteria are based on MDOT's Project Scoping Manual, which is intended to address MDOT's trunk line bridges. The City reviewed the criteria and has decided to utilize the same criteria to address its local bridge network. See Appendix A-3.

## **COST ESTIMATE**

The City computes the estimated cost of each typical preservation action using unit prices in the latest Bridge Repair Cost Estimate spreadsheet contained in MDOT's Local Bridge Program Call for Projects. The cost of items of varying complexity, such as maintenance of traffic, staged construction, scour counter-

measures, and so forth, are computed on a bridge-by-bridge basis. The cost estimates will be reviewed and updated annually and include only contracted work, not work by the City (in-house).

## **OPERATIONS AND MAINTENANCE PLAN—ANNUAL ACTIVITIES/5-YEAR PROGRAM**

A primary objective of The City's preservation plan is improvement of bridges rated fair (5 or 6) to a rating of good (7 or higher) within five years through a program of preventive maintenance and scheduled maintenance. The work has been prioritized by considering each individual bridge's needs, its importance, the present costs of improvements, and the impact (cost increase due to increased degradation) of deferral. The five-year program incorporates annual scheduled maintenance activities designed to preserve bridges currently rated fair (5) or higher with the objective of extending their useful service life. The bridge-by-bridge Maintenance Plan is presented in Appendix A-2.

## **PROJECT PRIORITIZATION CRITERIA**

The prioritization of projects considers the following factors;

- Condition
- Load Capacity
- Traffic Volume
- Emergency service response
- Detour length and user delay

Due to the relatively small inventory and variety of bridges the City does not use a scoring system to rate the projects. Instead they judge them primarily on the condition rating, the significance of the structure and the availability of funding to select projects for implementation.

## FIVE-YEAR ANNUAL COST PROJECTION

<b>Preservation Activity</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>Total</b>
<b>Reconstruction - NONE</b>						
<b>Replacement - NONE</b>						
<b>Rehabilitation - NONE</b>						
<b>Capital Preventive Maintenance</b>						
Johnstone St. (1678)				\$134,000		\$134,000
W. Portage Ave (1679)*				\$170,000		\$170,000
Spruce St. (1675)				\$324,000		\$324,000
Fort St. (1673)				\$22,000		\$22,000
Riverside Dr. (1676)				\$26,000		\$26,000
Bingham Ave. (1677)			\$20,000			\$20,000
<b>Scheduled Maintenance – Program using local in-house forces</b>						
Johnstone St. (1678)	x					
W. Portage Ave (1679)	x					
Spruce St. (1675)	x					
Fort St. (1673)	x					
Riverside Dr. (1676)	x					
Bingham Ave. (1677)	x					
Easterday Ave. (1674)	x					
4 <sup>th</sup> Ave. (No SN)	x					
Trail Tunnel (No SN)	x					
<b>ANNUAL TOTAL</b>	<b>\$0</b>	<b>\$0</b>	<b>\$20,000</b>	<b>\$676,000</b>	<b>\$0</b>	<b>\$696,000</b>

\*Work on West Portage to be coordinated with work on Ashmun and E. Portage bridges (owned by MDOT) due to their similar design.

## IDENTIFY FUNDING SOURCES

Projects for the preventive maintenance and scheduled maintenance of bridges, which were identified and selected, have been programmed and funded. The City applied for MDOT local-aid funding in 2012 and 2016 for purpose of the preventive maintenance of bridges 1675 Spruce Street, 1679 West Portage, 1673 Fort Street, and 1677 Bingham Avenue in the 2015 and 2019 funding years. The replacement, rehabilitation, preventive maintenance, and/or scheduled maintenance projects shown for an unknown funding year will be funded through sources like the MDOT local aid funding and/or a city appropriation of monies for bridge preservation. Other projects will be submitted for state and/or local funding in subsequent years. Projects submitted to the local aid program that are not selected for funding will be added to the agency's program. The scheduled maintenance and minor repairs will be performed by the agency's in-house maintenance forces and funded through the agency's annual operating budget.



# CITY OF SAULT STE. MARIE 2021 BRIDGE INSPECTION REPORT

## SUMMARY OF ADDITIONAL INSPECTION RECOMMENDATIONS

West Portage Ave over the Power Canal:

Update traffic analysis and determine percentage of commercial vehicles, perform detailed fatigue and fracture assessment based on field instrumentation and analyze intersecting welds for potential cracking.

4<sup>th</sup> Avenue over Seymour Creek:

1. Reinspect channel at time of year when it is observable.
2. Reinspect for scour at time of year when it is observable.

# CITY OF SAULT STE. MARIE 2021 BRIDGE INSPECTION REPORT

## EXECUTIVE SUMMARY

### General Recommendations

- Clean bridge joints.
- Clean/wash top of deck surface.
- Place sealant on concrete decks every 10 years.

### 1678 Johnstone Street over Power Canal

**Constructed:** 1979      **Preventative Maint:** 2025      **General Condition:** Fair(6)

**Description:** 284' Single span steel multi-stringer with concrete abutments. Deck sealant placed 2015.

**Recommendations:** Clean joints, replace cover plates at sidewalks, paint beam ends 10' each end of bridge, replace keeper bars at bearings, replace handhole screw and lighten loose anchor bolt cover on street lights.

In-house work: Clean top of deck surface, and replace handhole screw and lighten loose anchor bolt cover on street lights.

### 1679 W. Portage Ave. over Power Canal

**Constructed:** 1970      **Preventative Maint:** 2025      **General Condition:** Fair (5)

**Description:** 265' single span steel arch

**Recommendations:** Repair concrete seawall and scour countermeasures at both abutments, replace expansion joints, drain standing water in field splice in portal at SW corner, caulk field splices, cleaning sidewalks, clean and paint bearings, remove debris around bearings, replace watermain attached to bridge, update traffic analysis and analyze welds for potential cracking (design fee not included in estimate).

In-house work: Clean top of deck surface, drain water, remove debris around bearings, clean sidewalks, and replace watermain.

Future: Clean and Coat Steel on Arch, floor beams and girder connections including the bearings.

- 1675      **Spruce Street over Power Canal**  
**Constructed:** 1983      **Preventative Maint:** 2025      **General Condition:** Good (7)  
**Description:** 285' single span steel multi-stringer with concrete abutments.  
**Recommendations:** Clean (annually) and reseal joints, clean and coat girder ends and spot paint failures along girder length, replace missing anchor bolt covers on street lights, replace broken light base in SW quadrant, and clean abutment seats.  
In-House Work: Clean debris from deck drains (annually), replace bolt covers, clean joints, and top of deck surface.
- 1673      **Fort Street over Power Canal**  
**Constructed:** 2004      **Preventative Maint:** 2025      **General Condition:** Good (7)  
**Description:** 239' single span steel multi-stringer with concrete abutments.  
**Recommendations:** Remove riprap from bottom flanges of girder and regrade as needed to eliminate this conditions, raise (or grind down) the approach sidewalk in the SE quadrant for a smoother transition, add expansion joint cover plates, and clean joints.  
In-House Work: Adjust sidewalk, and clean joints (annually) and top of deck surface (annually).
- 1674      **Easterday Ave. over Ashmun Creek**  
**Constructed:** 1994      **Preventative Maint:** 2022      **General Condition:** Good (7)  
**Description:** 24' single span, 3-sided concrete arch.  
**Recommendations:** Cut brush at upstream and downstream ends (completed 2021).  
In-House Work: completed
- 1677      **Bingham Avenue over Power Canal**  
**Constructed:** 1976      **Preventative Maint:** 2024      **General Condition:** Good (5)  
**Description:** 224' single span steel multi-stringer with concrete abutments.  
**Recommendations:** Add heavy riprap at north abutment, raise (or grind down) the approach sidewalk in the NE quadrant for a smoother transition, place cover plates at north abutment, and clean deck joints and top of deck surface.  
In-House Work: Adjust sidewalk, and clean joints (annually) and top of deck surface (annually).
- 1676      **Riverside Drive over Mission Creek**  
**Constructed:** 2013      **Preventative Maint:** 2025      **General Condition:** Good (8)  
**Description:** 60' single span side-by-side concrete box beams on concrete abutments.  
**Recommendations:** Seal concrete deck or apply overlay.  
In-House Work: Clean top of deck surface (annually).
- NA      **4<sup>th</sup> Avenue over Seymour Creek**

**Constructed:** 2003      **Preventative Maint:** 2022      **General Condition:** Good (8)  
**Description:** 72' long, 16' span, 3-sided reinforced concrete culvert.  
**Recommendations:** Cut tree at south inlet and multiple trees at north outlet.  
In-House Work: tree cutting.

NA

Trail Tunnel under I-75

**Constructed:** 2001      **Preventative Maint:** NA      **General Condition:** Good (7)  
**Description:** 12' wide by 140' reinforced concrete box culvert.  
**Recommendations:** None

Appendix A-1  
Inspection Report Summary

Inventory Data														Inspection Findings										Appraisal							
Bridge Type	Structure Number	Bridge ID	Facility Carried	Features Intersected	Primary or Secondary Route	Structure Type Main Span (Item 43A - Material)	Structure Type Main Span (Item 43B)	Number of Main Span (Item 45)	Total Str Length (Item 49)	Year Built (Item 27)	Year Recon (Item 20G)	ADT	Year of ADT	Inspection Date	Operational Status (Item 41)	Deck Rating (Item 54)	Deck Bottom Rating (Item XX)	Superstr Rating (Item 59)	Substr Rating (Item 60)	Channel Rating (Item 61)	Culvert Rating (Item 62)	Surface Rating (Item 58B)	Paint Rtg	Exp Joint Rating (Item XX)	Other Joints	Structure Evaluation	Structurally Deficient	Sufficiency Rating	Section Loss	Scour Critical (Item 11B)	
Steel - Multiranger	1679	17460280001801	FORT STREET	POWER CANAL	Primary	3	2	1	239	2004		5883	2015	6/16/2021	A	7	8	7	8	8	N	7	7	N	8	G		92.4	3	9	
Concrete - Arch - Deck	1674	174602800017804	EASTERDAY AVE	ASHMUN CREEK	Primary	1	11	1	24	1994		8347	1997	6/9/2021	A	7	7	7	7	8	N	7	N	N		G		96.1	3	8	
Steel - Multiranger	1676	174602800017803	SPRUCE ST	POWER CANAL	Primary	3	2	1	284.8	1980		5995	2015	6/9/2021	A	7	7	7	7	8	N	7	5	6	7	G		89.5	2	8	
Restrained concrete - Box beam/indlers - multisp	1676	174602800012801	RIVERSIDE DRIVE	MISSION CREEK	Primary	5	5	1	60	2013		5071	2013	6/9/2021	A	8	8	8	8	8	N	8	N	N		G		97.6	3	8	
Steel - Multiranger	1677	174602800042806	BINGHAM AVE	POWER CANAL	Primary	3	2	1	224.8	1976		5966	1997	6/10/2021	A	8	7	7	5	6	N	7	7	6	N	F		91.8	3	5	
Steel - Multiranger	1678	174602800048802	JOHNSTONE ST	POWER CANAL	Primary	3	2	1	283.8	1979		3720	1997	6/10/2021	A	7	8	6	7	7	N	7	N	6	8	F		80.6	2	8	
Steel - Arch - thru	1678	174602800061801	WEST PORTAGE AVE	POWER CANAL	Primary	3	12	1	265	1970	1988	7617	2015	6/9/2021	A	7	7	5	8	6	N	6	5	4	8	F	Partial Dbs	64.1	2	8	

4th Avenue over Seymour and Trail Tunnel under I-75 not in inventory.  
See inspection reports.

Appendix A-2  
Maintenance Plan

Inventory Data										Proposed Preventive Maintenance										Proposed Scheduled Maintenance														
Bridge Type	Structure Number	Bridge ID	Facility Carried	Features Intersected	Structure Type Main Span (Item 43a - Material)	Structure Type Main Span (Item 43b)	Number of Main Span (Item 43)	Total Str Length (Item 43)	Total Str Width (Item 52)	Total Str (sq ft)	Repair/Replac on Deck	Repair/Replac on Steel Bearings	Complete Painting	Zone Painting	Epoxy Overlay	HMA Cap with Membrane	Concrete Deck Patching	Channel Improvements	Scour Counter Measures	Superstructure Washing	Concrete Surface Washing	Vegetation Control	Debris Removal	Clean Drainage System	Spot Painting	Repair/Replac on HMA Surface	Seal HMA Cracks/Joints	Seal Concrete Cracks/Joints	Minor Concrete Patching	Timber Repairs	Repair/Replac on Guardrails	Repair Approaches	Repair Slopes	Install Right-of-Way
Steel - Multispan	1673	174602800001801	FORT STREET	POWER CANAL	3	2	2	239	46.4	11090									x	x		x												
Concrete - Arch - deck	1674	174602800001904	EASTGATE AVE	ADAMSON CREEK	1	11	1	24	64.6	1550										x		x												
Steel - Multispan	1675	174602800017803	SPRUCE ST	POWER CANAL	3	2	1	384.8	42.3	12047				x							x		x											
Prestressed concrete - Box beam/girders - multiple	1676	174602800025805	RIVERSIDE DRIVE	MISSION CREEK	5	5	1	60	43.3	2598					x						x													
Steel - Multispan	1677	174602800042906	BINGHAM AVE	POWER CANAL	3	2	1	228.8	62.4	11943									x		x													
Steel - Multispan	1678	174602800048802	JOHNSTONE ST	POWER CANAL	3	2	1	283.8	42.3	12005	x	x		x						x			x											
Steel - Arch - thru	1679	174602800061801	WEST PORTAGE AVE	POWER CANAL	3	12	1	205	61.4	10271			x								x													

4th Avenue over Seymour and Trail Tunnel under I-75 not in inventory.  
See inspection reports.

2021 SUMMARY OF WORK RECOMMENDATIONS - CITY OF SAULT STE MARIE, MICHIGAN							
CITY/TOWN	BRIDGE ID	COUNTY	FEATURE ON	FEATURE UNDER	MAINTENANCE		
					PRIORITY	ITEM	COMMENTS
SAULT STE MARIE	1673	Chippewa	Fort Street	Power Canal	High	Slope Repair	Regrade slope at southwest corner so bottom girder is clear of riprap.
					Medium	Sidewalk Repair	Raise the approach sidewalk in southeast quadrant to provide a smooth transition.
					Medium	Other	Add expansion joint cover plates in all 4 quadrants. Clean sediment out of the approach expansion joints.
	1674	Chippewa	Easterday Avenue	Ashmun Creek	High	Brush Cut	Cut and remove brush at upstream and downstream ends.
	1675	Chippewa	Spruce Street	Power Canal	High	Remove debris	Clean construction debris from the east abutment seats, from around the bearings, and off of bottom flange of girders.
					High	Joint Repair	Clean joints at both abutments. Reseal joints where they leak.
					Low	Zone Paint	Clean and paint the girder ends and spot paint random areas of paint failure throughout.
					Low	Other	Replacement missing anchor bolt covers on the street lights. Replace broken light base in the Southwest quadrant. Clean out debris from deck drains.
	1676	Chippewa	Riverside Drive	Mission Creek	Low	Seal Cracks	Seal concrete deck or apply a polymer overlay.
					High	Other	Repair the damaged EAT in Southwest quadrant.
	1677	Chippewa	Bringham Avenue	Power Canal	High	Scour	Add heavy riprap in front of North abutment to prevent further erosion and undermining.
					Medium	Approach Repair	Mud jack or grind approach sidewalk n northeast quadrant to provide a smooth transition.
					Medium	Joint Repair	Clean debris from joints. Place joint cover plates on the east and west sides at the north approach.
	1678	Chippewa	Johnstone Street	Power Canal	High	Joint Repair	Clean joints. Replace cover plates over north joint at east and west sidewalks.
					High	Zone Paint	Clean and paint the end 10 feet of the beams.
					Low	Substr Repair	North abutment girder 5W East keeper bar should be replaced on the bearing.
					Low	Other	Replace missing handhole screw on the middle street light on the west side. Tighten loose anchor bolt cover of street light in northwest quadrant.
	1679	Chippewa	West Portage Avenue	Power Canal	Low	Channel Repair	Repair the failing concrete seawall and the eroded scour countermeasures in front of both abutments.
					High	Approach Repair	Approach guardrails should be repaired.
					High	Joint Repair	Expansion joints at the north and south abutments should be replaced.
High					Zone Paint	Clean and paint floor beam and girder connection along the east girder especially the top flange under the utility.	
Low					Full Paint	Clean and repaint entire bridge.	
Low					Bearing Repair	Clean and paint bearings. Remove debris from around bearings.	
High					Other	Drain standing water in field splice in portal at SW corner. The field splices in the portals should be caulked. Sidewalk and tie girder should be flushed including vertical pockets.	

Preservation Action	Bridge Selection Criteria	Expected Service Life
<b>Replacement</b>		
Total Replacement	- NBI Rating of 3 or less - <i>or</i> when cost of rehabilitation exceeds cost of replacement	70 years
Superstructure Replacement	- NBI Rating for superstructure of 4 or less - <i>or</i> when cost of rehabilitating superstructure and deck exceeds replacement cost	40 years
Deck Replacement <ul style="list-style-type: none"> <li>• Epoxy Coated Steel</li> <li>• Black Steel</li> </ul>	Use guidelines in MDOT's <i>Bridge Deck Preservation Matrix</i> - NBI Rating of 4 or for deck surface and deck bottom - <i>or</i> when deck replacement cost is competitive with rehabilitation	70 years 40 years
<b>Rehabilitation</b>		
Concrete Deck Overlays <ul style="list-style-type: none"> <li>• Deep</li> <li>• Shallow</li> <li>• HMA/Membrane</li> <li>• HMA Cap</li> </ul>	Guidelines in MDOT's <i>Bridge Deck Preservation Matrix</i> NBI Deck Rating <5 for surface and >5 for bottom NBI Deck Rating <5 for surface and >4 for bottom NBI Deck Rating <5 for surface and >4 for bottom NBI Deck Rating <5 for surface and <4 for bottom	25 years 12 years 8 years 3 years
Railing Retrofit/Replacement	- NBI Deck Rating greater than 5 - <i>or</i> Railing/Barrier rated less than 5 - <i>or</i> Safety Improvement is needed	
Steel Beam Repairs	- More than 25% section loss is present in an area of the beam that affects load carrying capacity - <i>or</i> in order to correct damage that impairs beam strength	
Prestressed Concrete Beam Repairs	- Repair ends of prestressed I-beams when more than 5% spalling is present - <i>or</i> repair areas to correct impact damage that impairs beam strength or exposes prestressing strands	
Repair/Replace Culvert	- NBI Rating of 4 or less for culvert or drainage outlet structure - <i>or</i> existence of open vertical cracks, signs of deformation, movement, or differential settlement	
Pin and Hanger Replacement	- NBI Rating for elements is 4 or lower; presence of excessive section loss, severe pack rust, or out-of-plane distortion	
Substructure Concrete Patching and Repair	- NBI Rating for abutments or piers is 5 or 4 and less than 30% of the surface is spalled and delaminated - <i>or</i> in response to inspector's work recommendation for substructure patching	

Preservation Action	Bridge Selection Criteria	Expected Service Life
<b>Preventive Maintenance</b>		
Repair/Replace Deck Joint	<ul style="list-style-type: none"> <li>- Include when doing deep or shallow overlays</li> <li>- <i>OR</i> NBI Rating for joint is 4 or lower</li> <li>- <i>OR</i> joint is leaking heavily</li> </ul>	
Repair/Replace Steel Bearing	<ul style="list-style-type: none"> <li>- NBI Rating for girders and deck is 5 or higher and rating for bearings is 4 or lower</li> </ul>	
Complete Painting	<ul style="list-style-type: none"> <li>- NBI Rating for paint condition is 3 or lower</li> <li>- <i>OR</i> in response to inspector's work recommendation for complete painting</li> </ul>	15 years
Zone Painting	<ul style="list-style-type: none"> <li>- NBI Rating for paint condition is 5 or 4</li> <li>- <i>OR</i> less than 15% of existing paint area has failed and remainder of paint system is in good or fair condition</li> </ul>	10 years
HMA Overlay Cap without Membrane	<ul style="list-style-type: none"> <li>- NBI Rating of 3 or less for deck surface and deck bottom; temporary holdover to improve ride quality for a bridge in the 5-year plan for rehab/replacement</li> </ul>	3 years
Concrete Deck Patching	<ul style="list-style-type: none"> <li>- Deck Surface Rating of 5, 6, or 7 with minor delamination and spalling</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	5 years
Channel Improvements	<ul style="list-style-type: none"> <li>- Removal of vegetation, debris, or sediment from channel and banks to improve channel flow</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	
Scour Countermeasures	<ul style="list-style-type: none"> <li>- Structure is categorized as scour critical and is not scheduled for replacement; NBI comments in abutment and pier ratings indicate presence of scour holes</li> </ul>	



Preservation Action	Bridge Selection Criteria	Expected Service Life
<b>Scheduled Maintenance</b>		
Superstructure Washing	<ul style="list-style-type: none"> <li>- When salt contaminated dirt and debris collected on superstructure is causing corrosion or deterioration by trapping moisture</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	2 years
Vegetation Control	<ul style="list-style-type: none"> <li>- When vegetation traps moisture on structural elements or is growing from joints or cracks</li> <li>- <i>OR</i> in response to inspector's work recommendation for brush cut</li> </ul>	1 year
Debris Removal	<ul style="list-style-type: none"> <li>- When vegetation, debris, or sediment accumulates on the structure or in the channel</li> <li>- <i>OR</i> in response to inspectors work recommendation</li> </ul>	1 year
Drainage System Clean-Out/Repair	<ul style="list-style-type: none"> <li>- When drainage system is clogged with debris or drainage elements are broken, deteriorated, or damaged</li> </ul>	2 years
Spot Painting	For zinc-based paint systems only <ul style="list-style-type: none"> <li>- In response to inspector's work recommendation</li> </ul>	5 years
Seal Concrete Cracks/Joints	<ul style="list-style-type: none"> <li>- Concrete is in good or fair condition, and cracks extend to the depth of the reinforcement</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	5 years
Repair/Replace HMA Surface	<ul style="list-style-type: none"> <li>- HMA surface is in poor condition</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	
Seal HMA Cracks/Joints	<ul style="list-style-type: none"> <li>- HMA surface is in good or fair condition, and cracks extend to the surface of the underlying slab or sub course</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	
Minor Concrete Patching	<ul style="list-style-type: none"> <li>- Repair minor delaminations and spalling</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	
Timber Repairs	<ul style="list-style-type: none"> <li>- NBI Rating of 4 or less for timber members</li> <li>- <i>OR</i> to repair extensive rot, checking, or insect infestation</li> </ul>	
Repair/Replace Guard Rail	<ul style="list-style-type: none"> <li>- Guard rail missing or damaged</li> <li>- <i>OR</i> safety improvement is needed</li> </ul>	
Repave Approaches	<ul style="list-style-type: none"> <li>- HMA is in poor condition</li> <li>- <i>OR</i> in response to inspector's work recommendation</li> </ul>	
Repair Slopes	<ul style="list-style-type: none"> <li>- NBI Rating is 5 or lower</li> <li>- <i>OR</i> when slope is degraded or sloughed</li> <li>- <i>OR</i> slope paving has significant areas of distress, failure, or has settled</li> </ul>	
Install Riprap	To protect surface when erosion threatens the stability of side slopes of channel banks	