

Uxbridge, Massachusetts
Evaluation Report
Project Number: 7533
June 2021

BRIDGE / CULVERT MANAGEMENT PLAN



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BRIDGE / CULVERT MANAGEMENT PLAN

Prepared by: BETA GROUP, INC.
Prepared for: Town of Uxbridge

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EXECUTIVE SUMMARY

The twenty-one structures that were evaluated as part of this program have been prioritized 1 through 21, with 1 being of highest priority. Below is a brief summary of our recommendations for each structure. A more comprehensive assessment of each structure can be found within the body of this report. In general, the first seventeen structures were found to have varying levels of structural and safety deficiencies. The remaining four structures have very minor deficiencies and therefore require little attention at the present time.

Five town-owned bridges were not evaluated as part of this program because they were either recently replaced or are in the design phase of a repair program at the time of this writing.

The term "AASHTO Sufficiency Rating" will be referred to for some of the bridges in this report. The Massachusetts Department of Transportation (MassDOT) uses the American Association of State Highway and Transportation Officials (AASHTO) Sufficiency Rating as a tool to help establish whether a bridge is in need of repair. The Sufficiency Rating is defined as a rating calculated from a formula that is a function of the structural adequacy and safety, functional obsolescence, and serviceability of a bridge. MassDOT generally considers a bridge with an AASHTO Sufficiency Rating below 50 to be in need of repair. The sufficiency ratings are listed in the top left column of the NBIS Reports found in the attachments for each bridge with a span length greater than 10 feet (i.e. AASHTO=28.0).

Inspection intervals for bridge structures are every two years. Bridges that have spans exceeding 10' are inspected by MassDOT in accordance with the National Bridge Inspection Standards (NBIS). Although not required by the NBIS, MassDOT has begun performing bi-annual inspections on bridges with span lengths between 10' and 20'. Not every bridge within this span range has been added to the inspection program at this time, however. The municipality is responsible for inspecting bridges not included in the NBIS inspection program.

At a minimum, all bridges/culverts in this report should be inspected every two years. In the body of this report, BETA has recommended that several structures be monitored at more frequent intervals.

The priority rankings of the bridges/culverts presented herein are based upon the structures' current conditions. If repairs are made to any structure, consideration should be given to adjustment of that structure's priority ranking accordingly.

Priority 1 – Elm Street over Cold Spring Brook

Elm Street Bridge (Br. No. U-02-033) is a two-span concrete slab structure that spans across Cold Spring Brook. This structure is in poor condition with advanced concrete deterioration and section loss to the superstructure and substructure. There are many areas of concrete spalling with exposed rebar, scaling, and delamination. This bridge is currently not posted. BETA recommends a replacement of this culvert due to the overall condition of the existing concrete and age of the structure.

Priority 2 – Hollis Street over Meadow Brook

Hollis Street culvert is a three-sided concrete box culvert spanning over Meadow Brook. This structure is in poor condition with advanced deterioration and section loss to concrete substructure elements. The roadway surface is in fair condition, while the bridge rail is in very poor condition. The narrow roadway width and substandard safety barrier are significant safety hazards to pedestrians and motorists. The structure is functionally obsolete due to the roadway width and bridge railing. As a result of the functionality and condition of the structure, BETA recommends a complete replacement of the structure. Improved roadway alignment, sidewalks, and MassDOT approved guardrail should be incorporated into the design of the new structure. This bridge is currently posted for 5 tons.

Priority 3 – Rockmeadow Road Ext. over Rock Meadow Brook

This structure (Br. No. U-02-034) is a corrugated metal pipe which carries Rockmeadow Road Ext. over Rock Meadow Brook. The walls of the corrugated pipe are in fair condition, but the pipe floor is in critical condition with advanced deterioration and up to 100% section loss. The existing guardrail exhibits severe deterioration and is not crash tested. Based on our field observations BETA recommends this structure be fully replaced with a 3-sided C.I.P. concrete box. Additionally, the guardrail should be replaced and the road widened to meet MassDOT standards.

Priority 4 – West Street over Scadden Brook

West Street Bridge consists of two adjacent concrete slab superstructures spanning Scadden Brook. One is founded on a concrete substructure and the other on a stone masonry substructure. The concrete structure is in fair condition, while the stone masonry structure is in poor condition. The stone masonry abutments are experiencing advanced scour and undermining. The bridge railing has collision damage and corroded posts.

Based on the active scour affecting the abutments, condition of the wingwalls, and various modifications required to incorporate a standard bridge railing system, BETA recommends a complete replacement of the structure in the long term. Interim repairs are recommended, with a high priority placed on filling in the scour holes.

Priority 5 – South Street over Bacon Brook

South Street Bridge (Br. No. U-02-066) is a 24" thick concrete slab structure spanning Bacon Brook which is founded on concrete abutments. This structure appears to be in fair condition overall, although the wingwalls are in poor condition. Condition of the concrete wingwalls have worsened. This bridge is not currently posted and based on our field observations appears to be performing adequately. The existing chain link fence should be replaced with a crash tested guardrail on both sides. Additionally, BETA recommends a replacement of all the wingwalls and repairs to the rest of the superstructure and substructure.

Priority 6 – West Street over Laurel Brook

West Street Bridge is a concrete arch structure spanning Laurel Brook. The majority of the structure is in fair condition with some problems noted. However, the concrete bridge rail and southwest wingwall are in poor condition. By observation, it is possible the concrete is experiencing Alkali-Silica-Reaction (ASR). Further investigation should be done to confirm this. This bridge is currently not posted. Based on our field observations the structure appears to be performing adequately. BETA recommends high priority repairs to the areas of concrete section loss and fill behind the southwest wingwall to protect the roadway. BETA also recommends a long-term replacement of this structure.

Priority 7 – Hartford Avenue East over Blackstone Canal

Hartford Avenue East Bridge (Br. No. U-02-019) is a stone masonry arch structure crossing the Blackstone Canal. Construction of this structure can be dated circa 1870. This structure is mainly in fair condition, but requires masonry repairs to most bridge components. BETA recommends that this structure be repaired accordingly.

Priority 8 – Hecla Street over West River

The Hecla Street Bridge (Br. No. U-02-014) is a stone masonry arch structure spanning the West River. This structure is in fair condition but does have some major deficiencies. The structure is posted for a 14 ton weight limit. A design has been completed for rehabilitation of the structure. Given the scope of work included in the repairs, BETA recommends the town move forward with the completed design.

Priority 9 – Henry Street over West River

Henry Street Bridge (Br. No. U-02-015) is a prestressed concrete deck beam bridge crossing the West River. This structure is in fair condition with several deficiencies noted. There are many cracks and voids at the abutments and minor scour at the aprons. Additionally, joint deterioration was noted of the superstructure shear keys. This bridge is currently not posted. Based on the most recent rating report and our field observations, the structure appears to be performing adequately. BETA recommends this structure be repaired.

Priority 10 – Hartford Avenue East over Mumford River

Hartford Avenue East Bridge (Br. No. U-02-020) was built circa 1955 and is a steel multi-beam bridge crossing the Mumford River. The substructure is in fair condition, while the superstructure is in fair-to-poor condition. The concrete deck has cracking throughout, and the steel superstructure is exhibiting advanced paint failure and heavy rusting. BETA recommends a long-term replacement of the superstructure and repairs to the substructure.

Priority 11 – Depot Street over Mumford River

The Depot Street Bridge (Br. No. U-02-008) is a precast box beam bridge which spans the Mumford River. This structure is generally in fair condition with the prestressed deck beams exhibiting excessive cracking. All beams exhibit cracking at the ends, extending

approximately 2' out from the abutments. The box beam shear keys are exhibiting signs of failure, which could be due to advanced deterioration of the wearing surface above. Based on our inspection findings BETA recommends the wearing surface be removed and replaced with a new superpave wearing surface and membrane waterproofing. Additionally, the shear keys and back rods should be repaired during this work. It is also recommended that the cracking of the beams be closely monitored during any future inspections.

Priority 12 – Mill Street over Emerson Brook

Mill Street Bridge (Br. No. U-02-002) is a mortared stone masonry arch structure spanning Emerson Brook. Construction of this arch is dated circa 1850. This bridge is in fair condition with some problems noted. The masonry arch and abutments are exhibiting typical signs of deterioration given its age. This bridge is currently not posted. Based on our field observations the structure appears to be performing adequately. BETA recommends repairs to the structure, particularly scour protection at the north abutment in order to extend the life of the structure.

Priority 13 – Elmwood Avenue over Aldrich Brook

Elmwood Avenue Bridge is an 18" thick concrete slab spanning Aldrich Brook, which is founded on stone masonry abutments. This structure is in fair condition with minor deficiencies noted. Only minor problems were found with the slab, abutments, and wingwalls except for the northwest wingwall. The northwest wingwall is partially collapsed and displaced. Additionally, lack of bridge railing and approach guardrail poses a significant safety hazard to pedestrians and motorists. This structure is currently not posted.

Priority 14 – Hazel Street over Cold Spring

Hazel Street Bridge is a stone masonry arch structure spanning Cold Spring. This structure is in fair condition with several deficiencies noted. There are numerous areas of missing and displaced stones throughout. Based on our field observations and the structure's apparent age, BETA recommends a complete replacement of the structure in the long term. Alternatively, slip-lining with a corrugated metal pipe/arch is also recommended if proven technically feasible. BETA recommends repairs to the structure in the interim if replacement is not feasible.

Priority 15 – Laurel Street over Laurel Brook

Laurel Street Bridge is a stone masonry arch structure spanning Laurel Brook. This bridge is currently not posted and is in fair condition with few problems noted. Random voids and areas of missing pointing were typically found in the stone arch, abutments, and wingwalls. Most notably, the northeast wingwall supporting Laurel Street exhibits significant lateral displacement. Based on our field observations the structure appears to be performing adequately. This structure is in overall fair condition and requires only

minor masonry repairs. BETA recommends the northeast wingwall be replaced and the remaining elements of the superstructure and substructure be repaired.

Priority 16 – Hartford Avenue East over Mumford Tail Race

A concrete box culvert carries Hartford Avenue East over Mumford Tail Race. The culvert is in good condition. The training walls typically exhibit voids and displacement. Additionally, there is a void under the sidewalk at the northwest corner. BETA recommends filling in the sidewalk void and training wall voids to protect the roadway surface. BETA also recommends removing debris at the culvert entrances.

Priority 17 – Rivulet Street over Rivulet Brook

The Rivulet Street Bridge consists of several separate, adjacent structures, which span Rivulet Brook. In addition to carrying Rivulet Street over Rivulet Brook, the structure also travels west under Foam Concepts at 44 Rivulet Street. For the purpose of this report, inspection was performed on the portion of culverts located within the public right-of-way only. Under Rivulet Street, the culvert is comprised of a stone masonry arch structure to the west and a concrete box culvert to the east. Both structures are in fair-to-good condition and BETA recommends minor repairs.

Priority 18 – Hartford Avenue East over Blackstone River

The Hartford Avenue East Bridge (Br. No. U-02-018) is a stone masonry arch structure spanning the Blackstone River. The overall condition of the stone arch structure is good. Based on our inspection findings, only minor repairs are required. BETA recommends that all missing/loose stones be replaced and masonry joints be repointed as required. Minor concrete repairs are also recommended to the bridge railing and parapet.

Priority 19 – Blackstone Street over Meadow Brook

The Blackstone Street Bridge (Br. No. U-02-037) is a stone masonry arch structure lined with a corrugated metal pipe. The structure carries Blackstone Street over Meadow Brook and is in good condition with few minor problems noted. Minor concrete and masonry repairs are recommended to extend the anticipated service life of the structure. This bridge is currently posted with no record of rating calculations on file with MassDOT. BETA also recommends the existing wearing surface be replaced to prevent water infiltration through the structure.

Priority 20 – Hartford Avenue East over West River

The structure (Br. No. U-02-017) is a double-barreled concrete box culvert carrying Hartford Avenue East over the West River. The culvert is in good condition with only minor repairs recommended.

Priority 21 – River Road over Ironstone Brook

The River Road Bridge (Br. No. U-02-030) is a steel folded plate girder superstructure founded on new concrete abutments constructed in 2011. The structure is in good condition, and BETA has no repairs recommended at this time.

Not Ranked – Hartford Avenue East over Canal

The Hartford Avenue East Bridge (Br. No. U-02-028) was recently replaced and was not evaluated as part of this study.

Not Ranked – Marywood Street over Drabbletail Brook

The Marywood Street Bridge was recently replaced and was not evaluated as part of this study.

Not Ranked – Ironstone Road over Ironstone Bridge

The Ironstone Road Bridge (Br. No. U-02-003) is in the design phase of a repair program as of this writing and was not evaluated as part of this study.

Not Ranked – Carney Street over Drabbletail Brook

The Carney Street Bridge is in the design phase of a repair program as of this writing and was not evaluated as part of this study.

Not Ranked – Aldrich Street over Aldrich Brook

The Aldrich Street Bridge (Br. No. U-02-038) is in the design phase of a repair program as of this writing and was not evaluated as part of this study.

SUMMARY OF INFORMATION

A tabular summary of the relevant bridge/culvert information is shown on the next page followed by the associated costs for the recommended bridge replacement, rehabilitation, or repair.

Recommendations and associated costs for construction and design services have been presented for each individual bridge/culvert in the assigned priority. The Town may elect to reorganize the priority based on available funds and on the possible evolution of each bridge/culvert with respect to worsening conditions or a change in the bridge/culvert serviceability.

We have included a more detailed Summary of Bridge Conditions and a Summary of the Cost Estimates for all the proposed work on the following pages. It should be noted that the design fees presented herein assume that public consensus will allow for an efficient straightforward design process. The assumption that all roads shall be closed to both vehicular and pedestrian traffic during construction operations has also been made for the purpose of this report.

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Uxbridge Bridges

Table of Information

Priority	Bridge Number	BIN	Carries	Intersects	Construction Type	Span Length (ft)	Overall Width (ft)	Year Built	Posted Rating	Owner-ship	Chapter 90 Eligible	Plans Available	Historic Structure	Load Rated	AASHTO Sufficiency Rating	Date of latest available MassDOT Inspection
1	U-02-033	6X7	Elm Street	Cold Spring Brook	2-Span Concrete Slab on Concrete Abutments	18'-10" (Overall)	40	1930	-	Town	Yes	No	No	-	31.4	October 8, 2020
2	-	-	Hollis Street	Meadow Brook	3-Sided Box Culvert	9.83	15.5	-	5 Tons	Town	Yes	No	No	-	-	-
3	U-02-034	6X3	Rock Meadow Road	Rockmeadow Brook	Corrugated Metal Pipe Arch	13	52.5	1956	10, 15, & 23 Tons	Town	Yes	No	No	February 1, 2019	67.9	April 2, 2019
4	-	-	West Street	Scadden Brook	Concrete Slab on Stone Masonry & Concrete Abutments	9.75	31.1	-	-	Town	Yes	No	No	-	-	-
5	U-02-066	6XB	South Street	Bacon Brook	Concrete Slab on Concrete Abutments	11.42	22	1940	-	Town	Yes	No	No	-	18.8	June 19, 2019
6	-	-	West Street	Laurel Brook	Concrete Arch on Concrete Abutments	12	20	-	-	Town	Yes	No	No	-	-	-
7	U-02-019	1DK	Hartford Avenue East	Blackstone Canal	Stone Masonry Arch on Stone Masonry Abutments	60	24	1870	-	Town	Yes	No	See Note 1	April 1, 2010	63.5	October 9, 2020
8	U-02-014	1J3	Hecla Street	West River	Stone Masonry Arch on Stone Masonry Abutments	32	24	1930	14 Tons	Town	Yes	No	See Note 1	December 1, 2014	78.9	June 16, 2020
9	U-02-015	1J4	Henry Street	West River	Prestressed Deck Beams on Stone Masonry Abutments	31.1	20	1930 / 1965	-	Town	Yes	No	No	October 1, 2019	76.9	June 17, 2020
10	U-02-020	1DM	Hartford Avenue East	Mumford River	Steel Multi-Beam on Concrete Abutments	43	38.5	1955	-	Town	Yes	Yes	No	July 27, 1993	50.4	December 20, 2018
11	U-02-008	1J2	Depot Street	Mumford River	Prestressed Box Beams on Concrete Abutments	75	36	1994	-	Town	Yes	Yes	No	February 1, 1996	59.6	September 6, 2019
12	U-02-002	6X5	Mill Street	Emerson Brook	Stone Masonry Arch on Stone Masonry Abutments	10	21.5	1850	-	Town	Yes	No	See Note 1	-	23.9	March 1, 2019
13	-	-	Elmwood Avenue	Aldrich Brook	Concrete Slab on Stone Masonry Abutments	9.42	21.3	-	-	Town	Yes	No	No	-	-	-
14	-	-	Hazel Street	Cold Spring	Stone Masonry Arch on Stone Masonry Abutments	10	25	-	-	Town	Yes	No	See Note 1	-	-	-
15	-	-	Laurel Street	Laurel Brook	Stone Masonry Arch on Stone Masonry Abutments	12	20.5	-	-	Town	Yes	No	See Note 1	-	-	-
16	-	-	Hartford Avenue East	Mumford Tail Race	Concrete Box Culvert	8	52	-	-	Town	Yes	No	No	-	-	-
17	-	-	Rivulet Street	Rivulet Brook	Concrete Box Culvert & Masonry Arch on Masonry Abutments	15.5	64	-	-	Town	Yes	No	See Note 1	-	-	-
18	U-02-018	1DL	Hartford Avenue East	Blackstone River	Stone Masonry Arch on Stone Masonry Abutments	39	24	1900 / 1960	-	Town	Yes	Yes	See Note 1	September 1, 2012	77.1	October 9, 2020
19	U-02-037	6X8	Blackstone Street	Meadow Brook	Masonry Arch Lined w/ Corr. Metal Pipe on Masonry Abutments	10	50.5	1938	20,36, & 52 Tons	Town	Yes	Yes	See Note 1	-	33.4	April 11, 2018
20	U-02-017	6X6	Hartford Avenue East	West River	Dual Precast Box Culverts	18 (Overall)	105	1990	-	Town	Yes	No	No	February 1, 2018	96.8	June 16, 2020
21	U-02-030	BAM	River Road	Ironstone Brook	Steel Folded Plate Girder on Concrete Abutments	46	50	2011	-	Town	Yes	Yes	No	October 1, 2017	92.6	March 1, 2019

NOTES:

1. Structure is not listed on the National Register of Historic Places or MassDOT Historic Bridge Inventory but deemed historic by the Uxbridge Historic District Commission.

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BUDGETARY COST ESTIMATE SUMMARY

Priority		Carries	Intersects	Recommended Action	Replacement Cost	Replacement Engineering	Replacement Total	Interim / Repairs	Interim / Repairs Engineering	Interim / Repairs Total
1	U-02-033	Elm Street	Cold Spring Brook	Replacement	\$ 1,250,000	\$ 315,000	\$ 1,565,000	\$ -	\$ -	\$ -
2	-	Hollis Street	Meadow Brook	Replacement/Widening	\$ 585,000	\$ 150,000	\$ 735,000	\$ -	\$ -	\$ -
3	U-02-034	Rock Meadow Road	Rockmeadow Brook	Replacement	\$ 635,000	\$ 160,000	\$ 795,000	\$ -	\$ -	\$ -
4	-	West Street	Scadden Brook	Short Term Repairs/Long Term Replacement	\$ 640,000	\$ 160,000	\$ 800,000	\$ 32,000	\$ 8,000	\$ 40,000
5	U-02-066	South Street	Bacon Brook	Rehabilitate	\$ -	\$ -	\$ -	\$ 140,000	\$ 35,000	\$ 175,000
6	-	West Street	Laurel Brook	Short Term Repairs/Long Term Replacement	\$ 585,000	\$ 150,000	\$ 735,000	\$ 25,000	\$ 10,000	\$ 35,000
7	U-02-019	Hartford Avenue East	Blackstone Canal	Repairs	\$ -	\$ -	\$ -	\$ 160,000	\$ 40,000	\$ 200,000
8*	U-02-014	Hecla Street	West River	Rehabilitate	\$ -	\$ -	\$ -	\$ 865,000	\$ 220,000	\$ 1,085,000
9	U-02-015	Henry Street	West River	Repairs	\$ -	\$ -	\$ -	\$ 110,000	\$ 30,000	\$ 140,000
10	U-02-020	Hartford Avenue East	Mumford River	Substructure Repairs/Superstructure Replacement	\$ 1,005,000	\$ 255,000	\$ 1,260,000	\$ 100,000	\$ 25,000	\$ 125,000
11	U-02-008	Depot Street	Mumford River	Repairs	\$ -	\$ -	\$ -	\$ 60,000	\$ 15,000	\$ 75,000
12	U-02-002	Mill Street	Emerson Brook	Repairs	\$ -	\$ -	\$ -	\$ 180,000	\$ 45,000	\$ 225,000
13	-	Elmwood Avenue	Aldrich Brook	Rehabilitate	\$ -	\$ -	\$ -	\$ 85,000	\$ 25,000	\$ 110,000
14	-	Hazel Street	Cold Spring	Short Term Repairs/Long Term Replacement	\$ 125,000	\$ 35,000	\$ 160,000	\$ 20,000	\$ 5,000	\$ 25,000
15	-	Laurel Street	Laurel Brook	Rehabilitate	\$ -	\$ -	\$ -	\$ 70,000	\$ 20,000	\$ 90,000
16	-	Hartford Avenue East	Mumford Tail Race	Repairs	\$ -	\$ -	\$ -	\$ 25,000	\$ 10,000	\$ 35,000
17	-	Rivulet Street	Rivulet Brook	Repairs	\$ -	\$ -	\$ -	\$ 110,000	\$ 30,000	\$ 140,000
18	U-02-018	Hartford Avenue East	Blackstone River	Repairs	\$ -	\$ -	\$ -	\$ 85,000	\$ 25,000	\$ 110,000
19	U-02-037	Blackstone Street	Meadow Brook	Repairs	\$ -	\$ -	\$ -	\$ 40,000	\$ 10,000	\$ 50,000
20	U-02-017	Hartford Avenue East	West River	Repairs	\$ -	\$ -	\$ -	\$ 10,000	\$ 5,000	\$ 15,000
21	U-02-030	River Road	Ironstone Brook	NA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Totals					\$ 4,825,000	\$ 1,225,000	\$ 6,050,000	\$ 2,117,000	\$ 558,000	\$ 2,675,000

* Currently under contract by MassDOT to be repaired

** Currently under construction by MassDOT to be replaced

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BACKGROUND

The Town of Uxbridge is responsible for the maintenance of municipal bridge and culvert structures within The Town limits. The Town has selected twenty-one of these structures based on evidence of varying degrees of deterioration for inclusion in a bridge management plan. The priority, street and body of water that the bridge crosses and the MassDOT bridge identification numbers are listed in the table below. Five structures that were included in the previous edition of this Plan were not evaluated as part of this edition because they were either recently replaced or are in the design phase of a repair program at the time of this writing. These five structures have been added to the end of the table for tracking purposes.

Priority	Bridge Description	Bridge No.
1	Elm Street over Cold Spring Brook	U-02-033
2	Hollis Street over Meadow Brook	NA
3	Rockmeadow Road over Rock Meadow Brook	U-02-034
4	West Street over Scadden Brook	NA
5	South Street over Bacon Brook	U-02-066
6	West Street over Laurel Brook	NA
7	Hartford Avenue East over Blackstone Canal	U-02-019
8	Hecla Street over West River	U-02-014
9	Henry Street over West River	U-02-015
10	Hartford Avenue East over Mumford River	U-02-020
11	Depot Street over Mumford River	U-02-008
12	Mill Street over Emerson Brook	U-02-002
13	Elmwood Avenue over Aldrich Brook	NA
14	Hazel Street over Cold Spring	NA
15	Laurel Street over Laurel Brook	NA
16	Hartford Avenue East over Mumford Tail Race	NA
17	Rivulet Street over Rivulet Brook	NA
18	Hartford Avenue East over Blackstone River	U-02-018
19	Blackstone Street over Meadow Brook	U-02-037
20	Hartford Avenue East over West River	U-02-017
21	River Road over Ironstone Brook	U-02-030
N/A	Hartford Avenue East over Canal	U-02-028
N/A	Marywood Street over Drabbletail Brook	
N/A	Ironstone Road over Ironstone Brook	U-02-003
N/A	Carney Street over Drabbletail Brook	
N/A	Aldrich Street over Aldrich Brook	U-02-038

The Federal Highway Administration (FHWA) considers structures with a span of 20' or less to be culverts and are not included in the bi-annual inspection program, thus are not part of the National Bridge Inventory (NBI). AASHTO considers a culvert to be a drainage structure beneath a roadway embankment. For this report, the terms "bridge" and "culvert" will be considered interchangeable.

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OBJECTIVE

The objective of this plan has been to provide The Town of Uxbridge with sufficient technical information for each bridge to assist in the development of an overall improvement strategy and a remedial engineering plan for all twenty-one structures. This has been accomplished by assisting the Town in prioritizing the needs for each individual bridge structure and recommending additional engineering services, outlining required repairs and maintenance schedules, and developing associated budgetary-type estimates of probable construction costs and design fees. This management tool will allow The Town to continue to operate and further maintain these twenty-one existing bridge facilities in a manner consistent with currently accepted bridge engineering practices.

The Town has several options available for funding bridge repair or replacement projects.

Option 1 – The Town may engage the services of an engineer/designer to prepare contract drawings and then submit a request to MassDOT that the bridge project be funded. The project will be considered for funding when highway funding becomes available.

Option 2 – The Town may engage the services of an engineer/designer to prepare contract drawings and then fund the project using Town based funding. The Town may then request reimbursement of the construction costs using funds allocated to Towns according to Massachusetts General Laws Chapter 90 Section 34 (Chapter 90). Projects funded by the Transportation Bond Issues are subject to a Memorandum of Agreement issued by MassDOT and must adhere to all current MassDOT guidelines and specifications. Also, Chapter 90 construction projects must comply with applicable legal requirements for the letting of public construction contracts, such as: pre-qualification of the contractor, the employment of minorities, and the payment of prevailing wage rates.

Option 3 – The Town may engage the services of an engineer/designer to prepare contract drawings and then fund the project using Town based funding and not request reimbursement.

Option 4 – For bridges with span lengths between 10' and 20', the Town may apply for funding through MassDOT's Municipal Small Bridge Program. This is reimbursement program that provides grants up to \$500,000 for the design and construction of repairs and replacement of bridges within this span range. Although the program is currently active, the Department is not accepting new applications. It is undetermined when applications will be re-opened for submittal.

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PROJECT APPROACH

For this report, BETA obtained and performed a thorough review of available historical information and previous inspection reports for the twenty-one bridges. As previously mentioned, all relevant information on these structures has been included as attachments to this Management Plan.

Upon review of all available information, a team of BETA engineers visited each bridge. The engineers made observations of existing conditions and obtained relevant bridge dimensions required for engineering analysis and cost estimating. BETA's field services have been based on the Manual for Condition Evaluation of Bridges published by AASHTO and the Bridge Inspectors Reference Manual published by FHWA.

Development of the Management Plan included a recommended prioritization for addressing identified deficiencies at each of the twenty-one bridge structures. Recommended actions typically range from further long-term inspections; to ongoing monitoring of conditions; to design and replacement of the entire bridge structure. The specific actions recommended and a preliminary estimate of associated engineering (and permitting) costs have been included for each bridge.

The Management Plan serves as a management tool and should be regularly updated. It must be noted that the reported conditions of the bridges in this report are based on observation of field conditions at the time of inspection along with plans and data available to the inspection team. The condition of each bridge depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of each bridge will continue to represent its condition in the future. Only through continued care and inspection can unsafe conditions be detected. BETA's report, including the bridge inspection reports and Management Plan, was prepared for the sole use of The Town of Uxbridge.

For ease of use of this report, each bridge has been individually assessed with an individual cost estimate. Completed comprehensive assessment and engineering approaches for all twenty-one bridges have also been provided. A summary of costs has been developed and presented at the beginning of the report. The cost estimates presented in this report are to be considered as guides for budgetary purposes only. Design fees and construction costs are subject to the final scope of work, results of additional engineering studies, and the overall project limits.

Based on a review of available data and field reconnaissance, a tabular summary of observed and historical conditions for each bridge has been provided within the Executive Summary for this report. When available, this summary contains the following information: bridge size and type, date of original construction, posted capacity, and historic status.

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Elm Street over Cold Spring Brook
(Bridge No. U-02-033)

Priority 1

AVAILABLE INFORMATION

Elm Street is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a two-span concrete slab on concrete abutments and center pier. The date of construction of the structure is circa 1930. The structure has an out-to-out width of 40'-0" and two equal spans of 9'-0" for a total length of 18'-10". The hydraulic opening of each span is approximately 4'-6" high by 9'-0" wide. The brook was flowing eastward with a depth of 12" deep at the west side and 6" on the east side at the time of inspection. The depth of fill over the structure is approximately 24".

The roadway width over the structure is approximately 25'-4", it consists of an asphaltic wearing surface and 5'-0" sidewalks on either side. There are residential and commercial driveways at both the north and south approaches and an intersection with Rivulet Street approximately 250' south of the structure.

Utilities carried by the structure include overhead wires that run along the east side of the street, and sewer manholes at the north approach, south approach, and southeast embankment (Photo 21). However, it was unclear whether the sewer crosses above or below the culvert. Two catch basins are also present at the north approach and drain to outfalls located in the north abutment.

The safety barrier consists of concrete bridge rail that is mounted directly to the top of the headwall. There is no approach guardrail.

There were no posted signs noted at either approach.

FINDINGS

The overall condition of the structure is poor with numerous deficiencies noted. The concrete walls, roof, and headwalls are all experiencing advanced deterioration.

The concrete slab is in poor condition. The underside of the slab has several longitudinal cracks up to 1/8" thick with efflorescence in both spans (Photo 12). There are also large areas of severe scaling at midspan with exposed aggregate and several exposed rebar.

The headwalls are in poor condition and typically exhibit severe scaling with exposed coarse aggregate at both fascias, including the base of the bridge rails. The exposed steel reinforcement at these locations is experiencing section loss of up to 100% in some areas (Photos 2 and 4).

Substructure elements are also in poor condition. The abutments show moderate-to-heavy scaling up to 6" above the water line. Spalling and delamination is also typical at all four abutment corners (Photo 18). The center wall pier is in poor-to-critical condition with full length severe scaling and 3" deep spalls up to 2' above the waterline. The pier ends at both openings are experiencing advanced concrete deterioration with 100% section loss of exposed steel reinforcement (Photos 5 and 6).

All four wingwall surfaces also exhibit 100% delamination with areas of heavy vegetation. Additionally, the northwest training wall which is located directly adjacent to a residential building has collapsed (Photo 16).

Waterway debris was present throughout and heaviest at the upstream opening, adjacent to the center pier (Photo 20).

The roadway over the culvert and at both approaches is in fair condition, with some cracking present and a small pothole on the west side over the culvert. The sidewalks on both sides are also in fair condition. The concrete bridge rails are in poor condition, and typically exhibit scaling and spalling throughout.

RECOMMENDATIONS

BETA recommends a complete replacement of the structure based on the condition of the concrete slab, headwalls, railing bases, abutments, center pier, and wingwalls. Interim concrete repairs are not recommended due to the extent of deterioration. Also, advanced deterioration of the headwalls at all bridge railing bases has compromised the railing's capacity to keep vehicular traffic on the roadway.

The level of deterioration to the superstructure and substructure would deem concrete repairs impractical at this point. BETA recommends a full replacement with a new concrete box or prestress deck beam structure. A detailed type study analysis can be done prior to design, to determine which type of structure to use.

Until the structure is replaced, inspections should be conducted at intervals not exceeding 12 months. Inspections should target all concrete elements and ensure further deterioration does not warrant a more aggressive replacement timetable.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	\$1,250,000
Engineering:	<u>\$315,000</u>
Total:	\$1,565,000

Attachments

Locus Map

Inspection Photos

MassDOT Culvert & Special Member Inspection Report Dated October 8, 2020

National Bridge Inventory Sheet Dated April 15, 2021

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 HIGHWAY, LINCOLN, RI 02865
 P: 401.333.2382
 F: 401.333.9225

BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

ELM STREET
 OVER
 COLDER BROOK

BRIDGE NO.
 U-02-033

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Photo 1 Looking West: East Culvert Elevation



Photo 2 Looking West: East Headwall



Photo 3 Looking East: West Culvert Elevation



Photo 4 Looking East: West Headwall



Photo 5 Looking South: Center Pier



Photo 6 Looking North: Center Pier



Photo 7 Looking Northwest: Center Pier



Photo 8 Looking West: North Span



Photo 9 Looking West: South Span



Photo 10 Looking Northeast: North Abutment Wall



Photo 11 Looking Southwest: South Abutment Wall



Photo 12 Looking East: Culvert Roof, North Span



Photo 13 Looking North: Northeast Wingwall



Photo 14 Looking South: Southeast Wingwall



Photo 15 Looking North: Northwest Wingwall



Photo 16 Looking Northwest: Northwest Training Wall



Photo 17 Looking South: Southwest Wingwall



Photo 18 Looking South: Southwest Abutment Corner



Photo 19 Looking North: Abrasion at Water Line



Photo 20 Looking West: Debris at West Entrance



Photo 21 Looking East: Sewer Manhole on Southeast Embankment



Photo 22 Looking South: North Approach



Photo 23 Looking North: South Approach



Photo 24 Looking Southeast: East Railing



Photo 25 Looking Southwest: West Railing

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2-DIST
03B.I.N.
6X7STRUCTURES INSPECTION FIELD REPORT
CULVERT & SPECIAL MEMBER INSPECTIONBR. DEPT. NO.
U-02-033

CITY/TOWN UXBRIDGE	8-STRUCTURE NO. U02033-6X7-MUN-BRI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE OCT 8, 2020
07-FACILITY CARRIED HWY ELM ST	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1930	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER COLD SPRING BROOK	26-FUNCTIONAL CLASS Urban Local	DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 119 : Concrete Culvert	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER T. Toloczko	
107-DECK TYPE N : Not applicable	WEATHER Clear	TEMP. (air) 15°C	TEAM MEMBERS D. SIMKHOVICH	

TYPE OF CULVERT:

SHAPE:	RECTANGULAR
MATERIAL:	CONCRETE
COATING:	NONE

BARRELS: (In Meters)

SIZE:	2.80Wx1.50H	NUMBER:	2
-------	-------------	---------	---

DEPTH OF COVER (To the nearest tenth of a meter)

E	W
0.3	0.3

CURB REVEAL

(In millimeters)	130	120
------------------	-----	-----

ITEM 62 CULVERT & RETAINING WALLS

4

I62 (Dive Report):

N

I62 (This Report):

4

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		Dive This Rpt.	DEF			
1. Roof	N	4	S-A	7. Protective Coating	N	N	-	13. Member Alignment	N	7	-
2. Floor	N	H	-	8. Embankment	N	N	-	14. Deformation	N	N	-
3. Walls	N	4	S-A	9. Wearing Surface	N	6	M-P	15. Scour	N	7	-
4. Headwall	N	4	S-P	10. Railing	N	5	S-P	16. Settlement	N	7	-
5. Wingwall	N	5	S-P	11. Sidewalks	N	7	-	17.	N	N	-
6. Pipe	N	N	-	12. Utilities	N	X	-	18.	N	N	-

UNDERMINING (Y/N) If YES please explain **N**

COLLISION DAMAGE: **Please explain**
None (X) Minor () Moderate () Severe ()

LOAD VIBRATION: **Please explain**
None (X) Minor () Moderate () Severe ()

ITEM 61 CHANNEL & CHANNEL PROTECTION

4

STREAM FLOW VELOCITY:

Tidal () High () Moderate () Low (X)

APPROACH CONDITION

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		
1. Channel Scour	N	7	-	5. Utilities	N	X	-
2. Embankment Erosion	N	4	-	6. Rip-Rap/Slope Protection	N	7	-
3. Debris	N	5	M-P	7. Aggradation	N	7	-
4. Vegetation	N	6	M-P				

ITEM 61 (Dive Report): **N**

ITEM 61 (This Report): **4**

93b- U/W INSP DATE: **00/00/0000**

	DEF
a. Appr. Pavement Condition	6 M-P
b. Appr. Roadway Settlement	8 -
c. Appr. Sidewalk Settlement	8 -
d.	N -

WEIGHT POSTING

Not Applicable ☒ X

Actual Posting

H	3	3S2	Single
N	N	N	N

Recommended Posting

N	N	N	N
---	---	---	---

Waived Date: **00/00/0000** EJDMT Date: **00/00/0000**

Signs In Place
(Y=Yes, N=No, NR=Not Required)

Legibility/
Visibility

	At bridge	Advance	
N	S	N	S

ITEM 36 TRAFFIC SAFETY

ACCESSIBILITY (Y/N/P):

TOTAL HOURS **8**

	36	COND	DEF	Needed	Used	Needed	Used
A. Bridge Railing	0	5	S-P	Ladder	N	N	Other:
B. Transitions	N	N	-	Boat	N	N	N
C. Approach Guardrail	0	2	S-A	Waders	Y	Y	
D. Approach Guardrail Ends	0	2	S-A				

PLANS (Y/N): **N**

(V.C.R.) (Y/N): **N**

TAPE#: _____

RATING

Rating Report (Y/N): **N**Date: **00/00/0000**

Inspection data at time of existing rating
I 62: - Date: **00/00/0000**

Recommend for Rating or Rerating (Y/N): **N**

REASON: _____

If YES please give priority:

HIGH () MEDIUM () LOW ()

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

2-DIST
03B.I.N.
6X7**STRUCTURES INSPECTION FIELD REPORT**
CULVERT & SPECIAL MEMBER INSPECTIONBR. DEPT. NO.
U-02-033

CITY/TOWN UXBRIDGE		8-STRUCTURE NO. U02033-6X7-MUN-BRI		11-Kilo. POINT 000.000	90-ROUTINE INSP. DATE Oct 8, 2020	93*-SPEC. MEMB. INSP. DATE Oct 8, 2020
07-FACILITY CARRIED HWY ELM ST		MEMORIAL NAME/LOCAL NAME		27-YR BUILT 1930	106-YR REBUILT 0000	*YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER COLD SPRING BROOK		26-FUNCTIONAL CLASS Urban Local		DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 119 : Concrete Culvert		22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER T. Toloczko		
107-DECK TYPE N : Not applicable		WEATHER Clear	TEMP. (air) 15°C	TEAM MEMBERS D. SIMKHOVICH		

WEIGHT POSTING		<i>Not Applicable</i> <input checked="" type="checkbox"/>		At bridge		Advance		PLANS (Y/N): N	
		H	3	3S2	Single	N	S	N	S
Actual Posting		N	N	N	N				
Recommended Posting		N	N	N	N				
Waived Date: 00/00/0000		EJDMT Date: 00/00/0000		Signs In Place (Y=Yes, N=No, NR=Not Required) Legibility/Visibility				(V.C.R.) (Y/N): N	
								TAPE#: _____	

RATING		Rating Report (Y/N): N		Date: ----	Recommend for Rating or Rerating (Y/N): N	If YES please give priority: HIGH () MEDIUM () LOW ()	
Inspection data at time of existing rating I 58: - I 59: - I 60: - I 62: - Date: 00/00/0000					REASON: _____		

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION		INV. RATING OF MEMBER FROM RATING ANALYSIS			Deficiencies
					PREVIOUS	PRESENT	H-20	3	3S2	
					(0-9)	(0-9)				
A	Item 62.1 - Roof	N		See remarks in comments section.	4	4	Not Rated			S-A
B	Item 62.3 - Walls	N		See remarks in comments section.	4	4	Not Rated			S-A
C										
D										
E										

List of field tests performed:	I-58	I-59	I-60	I-62	
	(Overall Previous Condition)	-	-	-	4
	(Overall Current Condition)	-	-	-	4

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN**N=NOT APPLICABLE****H=HIDDEN/INACCESSIBLE****R=REMOVED**

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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REMARKS, PHOTOS & SKETCHES

BRIDGE ORIENTATION

According to the map, the approaches are south and north and the elevations are west and east. This is a 2 span cast in place concrete box culvert. The spans are numbered from south to north and the three walls are labeled south, center and north. The brook flows from west to east.

ITEM 62 - CULVERT

Item 62.1 - Roof

Both ends of the roof and both headwalls have heavy scaling and concrete deterioration throughout, up to full length x full height x 6" deep with exposed rusted rebar. **See photos 1 & 2.**

The deterioration extends into the underside of the roof up to 2' at the east end of span #1.

Span #1 near the center has a 6' diameter area of poor consolidation with three exposed rusted longitudinal rebars. **See photo 3.**

The remainder of the roof has hairline longitudinal cracking with efflorescence in many areas throughout.

Item 62.2 - Floor

The floor is mostly hidden by approximately 6" of gravel in line with the channel bed.

CONDITION RATING GUIDE

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	Use if structure is not a culvert.
G	9	EXCELLENT	No deficiencies.
G	8	VERY GOOD	No noticeable or noteworthy differences which affect the condition of the culvert. Insignificant scrape marks caused by drift.
G	7	GOOD	Shrinkage cracks, light scaling, and insignificant spalling, which does not expose reinforcing steel. Insignificant damage caused by drift with not misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
F	6	SATISFACTORY	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
F	5	FAIR	Moderate to major deterioration, or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
P	4	POOR	Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joints permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.
P	3	SERIOUS	Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls, nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls, or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Bridge closed. Corrective action may put back in light service.
	0	FAILED	Bridge closed. Replacement necessary.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - (Examples include but are not limited to: Spalled concrete, minor to moderate corrosion to steel culverts, minor settlement or misalignment, minor scouring, minor damage to guardrail, etc.)

S= Severe/Major Deficiency - (Examples include but are not limited to: Large spalls, wide cracks, moderate to major deterioration in concrete, considerable settlement, considerable scouring or undermining, extensive corrosion and deflection in steel culverts, etc.)

C-S= Critical Deficiency - A deficiency in a structural component or element of a bridge that poses an extreme hazard or unsafe condition to the public. (Follow-up Critical Deficiency Report must be submitted separately)

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) stay at the bridge until the District Maintenance crew or the responsible Agency crew(if not a State bridge) show up and corrective action is taken.]

A = ASAP- [Action will be taken by the District Maintenance Engineer or the Responsible Agency (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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REMARKS

Item 62.3 - Walls

Center wall:

Both ends have severe scaling and concrete deterioration, full height x up to 18" long (on the west side) x up to full width with exposed rusted rebar with up to 100% section loss. **See photos 4 & 5.**

The bottom beyond the aforementioned spalls has spalling approximately 2' high x up to 3" deep, extending on both sides up to 6' from the east end and 12' from the west end.

The remainder of the center wall has moderate to heavy abrasion up to 3" deep along the bottom 6" of both sides with exposed rusted rebar.

The center wall has an original section of approximately 12", which is now reduced to as little as 7.5" at 11' from the east end.

South wall:

The west end has a 2' long x up to full height x 3" deep area of spalling and scaling. The east end has an 8' long x up to full height x 3" deep area of spalling and scaling. Both spalls have exposed rusted rebar with up to 100% section loss. **See photo 6.**

North wall:

The east end has a 3' long x up to full height x 3" deep area of spalling and scaling. Near the east end below the drain outlet there is a 1' high x 18" wide x 2" deep area of spalling and scaling. The west end has heavy scale up to 1' wide x 3' high x 1" deep with exposed rusted rebar and an adjacent 2' x 2' delamination. **See photos 7 & 8.**

Item 62.4 - Headwall

Both headwall tops (rail bases) have heavy scale throughout, up to 4" deep with exposed rusted rebar, and heavy vegetation growth. **See photos 9 & 10.** See Item 62.1.

Item 62.5 - Wingwall

The southwest wingwall has heavy scale throughout and a 2' high x 3' wide x 3" deep spall with exposed rusted rebar at the interface with the south wall. **See photo 11.**

The northeast wingwall has a 3' high x 2' wide x 3" deep spall at the interface with the north wall.

Item 62.9 - Wearing Surface

The bituminous concrete wearing surface has isolated minor transverse and longitudinal cracking. Both curbs have minor to moderate vegetation growth. Along the east sidewalk there is minor heaving, full length x up to 18" from the curb.

Item 62.10 - Railing

The bridge railing is reinforced concrete posts and rails. Several of the posts and rails have minor to moderate delamination, with areas of scaling and deterioration, up to full height x full width x 3" deep. **See photos 9 & 10.**

Item 62.11 - Sidewalks

The east sidewalk has minor scaling.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.2 - Embankment Erosion

The northwest embankment / channel wall has collapsed into the channel, starting 15' from the west headwall extending 30' upstream. **See photo 12.**

The southeast embankment has a 30' long area of moderate erosion adjacent to a sewer manhole.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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REMARKS

Item 61.3 - Debris

Span #1 upstream end has a minor accumulation of vegetative debris. **See photo 13.**
The downstream channel at the north side has a moderate accumulation of tree debris.

Item 61.4 - Vegetation

There are several trees growing over the downstream channel.

APPROACHES

Approaches a - Appr. Pavement Condition

Both approaches have isolated minor to moderate transverse and longitudinal cracking.

TRAFFIC SAFETY

Item 36a - Bridge Railing

See Item 62.10.

Item 36c - Approach Guardrail

There are no traffic safety features at the southeast, northeast, and northwest corners of the bridge.
The southwest traffic safety features are steel posts with double timber rails. The posts are out of alignment and the rails have minor to moderate cracking and rot throughout. **See photo 14.**

Item 36d - Approach Guardrail Ends

See Item 36.c.

Photo Log

Photo 1 : East elevation.
Photo 2 : West elevation.
Photo 3 : Span #1 center, poor consolidation.
Photo 4 : Center wall east end, looking north.
Photo 5 : Center wall west end, looking northeast.
Photo 6 : South wall east end.
Photo 7 : North wall west end.
Photo 8 : North wall east end.
Photo 9 : West rail, typical headwall (rail base) and post deterioration.
Photo 10 : East rail overview.
Photo 11 : Southwest wingwall.
Photo 12 : Northwest embankment, partial collapse.
Photo 13 : Span #1 looking upstream.
Photo 14 : Southwest traffic safety features.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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PHOTOS

Photo 1: East elevation.



Photo 2: West elevation.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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PHOTOS

Photo 3: Span #1 center, poor consolidation.



Photo 4: Center wall east end, looking north.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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PHOTOS

Photo 5: Center wall west end, looking northeast.



Photo 6: South wall east end.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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PHOTOS

Photo 7: North wall west end.



Photo 8: North wall east end.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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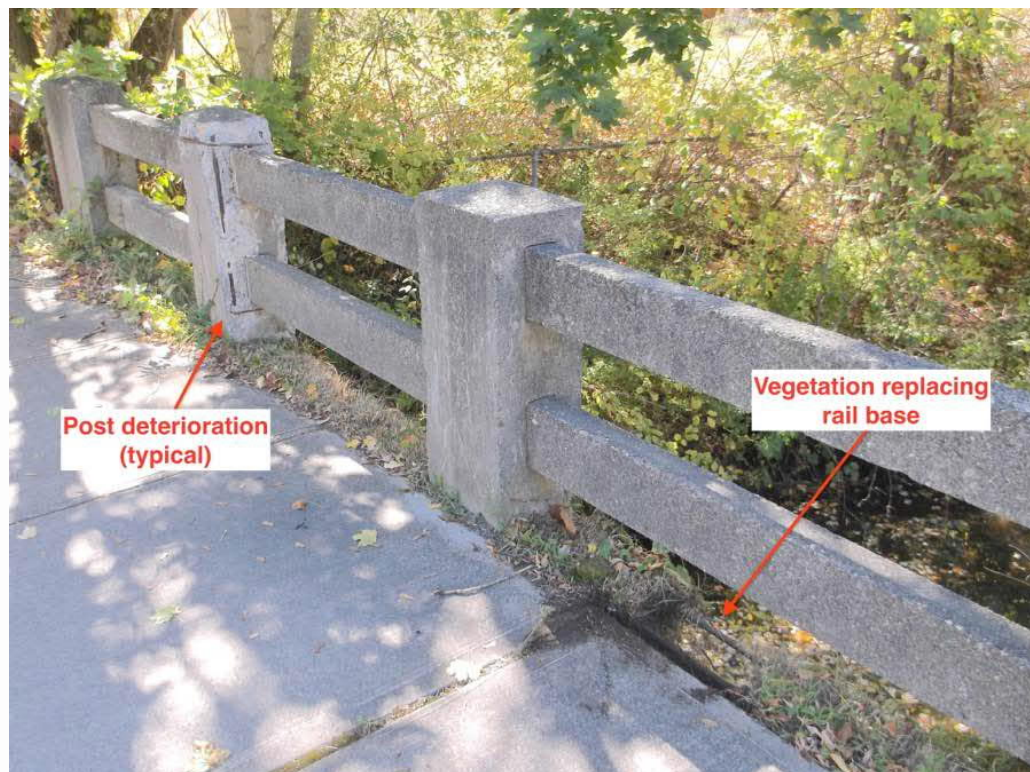
PHOTOS

Photo 9: West rail, typical headwall (rail base) and post deterioration.



Photo 10: East rail overview.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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PHOTOS

Photo 11: Southwest wingwall.

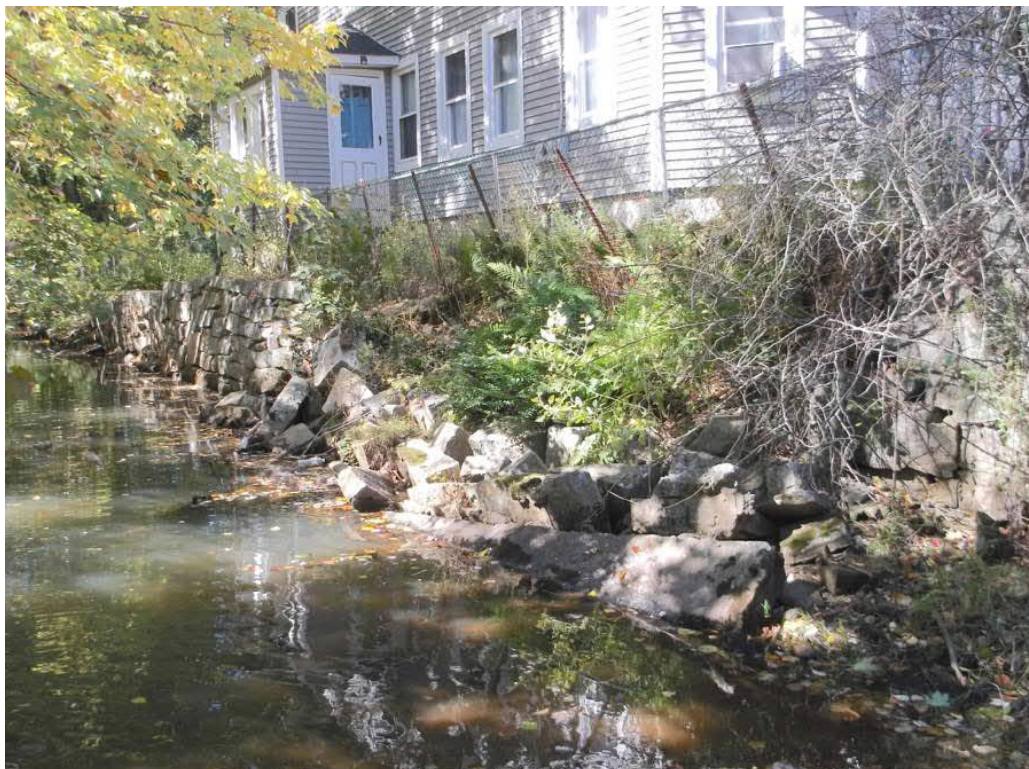


Photo 12: Northwest embankment, partial collapse.

CITY/TOWN UXBRIDGE	B.I.N. 6X7	BR. DEPT. NO. U-02-033	8.-STRUCTURE NO. U02033-6X7-MUN-BRI	INSPECTION DATE OCT 8, 2020
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PHOTOS

Photo 13: Span #1 looking upstream.



Photo 14: Southwest traffic safety features.

Report Date: April 15, 2021

State Information				Classification				Code				
BDEPT#= U02033				Agency Br.No.				(112) NBIS Bridge Length				N
Town= Uxbridge				L.O.				(104) Highway System				N
B.I.N= 6X7				AASHTO= 031.4				(26) Functional Class - Urban Local				19
RANK= 0 H.I.= 100.0 %				FHWA Select List= N (6/21/2017)				(100) Defense Highway				0
(8) Structure Number				U020336X7MUNBRI				(101) Parallel Structure				N
(5) Inventory Route				151000000				(102) Direction of Traffic - 2-way traffic				2
(2) State Highway Department District				03				(103) Temporary Structure				N
(3) County Code 027 (4) Place code				71620				(105) Federal Lands Highways				0
(6) Features Intersected				WATER COLD SPRING BROOK				(110) Designated National Network				N
(7) Facility Carried				HWY ELM ST				(20) Toll - On free road				3
(9) Location				1000 FT N. OF RIVULET ST				(21) Maintain - Town Agency				03
(11) Kilometerpoint				0000.000				(22) Owner - Town Agency				03
(12) Base Highway Network				N				(37) Historical Significance				undetermined
(13) LRS Inventory Route & Subroute				000000000000				Condition				Code
(16) Latitude				42 DEG 05 MIN 18.56 SEC				(58) Deck				N
(17) Longitude				71 DEG 38 MIN 34.37 SEC				(59) Superstructure				N
(98) Border Bridge State Code				Share %				(60) Substructure				N
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection				4
								(62) Culverts				4
Structure Type and Material								Load Rating and Posting				Code
(43) Structure Type Main: Concrete				Code 119				(31) Design Load - Unknown				0
Culvert				Jointless bridge type: Not applicable				(63) Operating Rating Method - Allowable Stress (AS)				2
(44) Structure Type Appr: Other				Code 000				(64) Operating Rating				00.0
(45) Number of spans in main unit				002				(65) Inventory Rating Method - Allowable Stress (AS)				2
(46) Number of approach spans				0000				(66) Inventory Rating				00.0
(107) Deck Structure Type - Not applicable				Code N				(70) Bridge Posting				0
(108) Wearing Surface / Protective System:								(41) Structure - Open				A
A) Type of wearing surface - Not applicable=no deck				Code N				Appraisal				Code
B) Type of membrane - Not applicable=no deck				Code N				(67) Structural Evaluation				2
C) Type of deck protection - Not applicable=no deck				Code N				(68) Deck Geometry				4
								(69) Underclearances, vert. and horiz.				N
								(71) Waterway adequacy				6
								(72) Approach Roadway Alignment				7
								(36) Traffic Safety Features				0 N 0 0
								(113) Scour Critical Bridges				6
Age and Service								Inspections				
(27) Year Built				1930				(90) Inspection Date 10/08/20				(91) Frequency 12 MO
(106) Year Reconstructed				0000				(92) Critical Feature Inspection:				(93) CFI DATE
(42) Type of Service: On - Highway-Ped								(A) Fracture Critical Detail				N 00 MO A) 00/00/00
Under - Waterway				Code 55				(B) Underwater Inspection				N 00 MO B) 00/00/00
(28) Lanes: On Structure 02 Under structure				00				(C) Other Special Inspection				Y 12 MO C) 10/08/20
(29) Average Daily Traffic				000480				(*) Other Inspection (I)				N 00 MO *) 00/00/00
(30) Year of ADT 2018 (109) Truck ADT				05 %				(*) Closed Bridge				N 00 MO *) 00/00/00
(19) Bypass, detour length				001 KM				(*) UW Special Inspection				N 00 MO *) 00/00/00
								(*) Damage Inspection				MO *) 00/00/00
Geometric Data								Rating Loads				
(48) Length of maximum span				0002.8 M				Report Date 00/00/00				H20 Type 3 Type 3S2 Type HS
(49) Structure Length				00005.9 M				Operating				0.0 0.0 0.0 0.0
(50) Curb or sidewalk: Left 01.8 M Right				01.8 M				Inventory				0.0 0.0 0.0 0.0
(51) Bridge Roadway Width Curb to Curb				007.6 M				Field Posting				
(52) Deck Width Out to Out				012.1 M				Status				Posting Date 00/00/00
(32) Approach Roadway Width (w/shoulders)				007.6 M				2 Axle 3 Axle 5 Axle Single				
(33) Bridge Median - No median				Code 0				Actual				
(34) Skew 10 DEG (35) Structure Flared				N				Recommended				
(10) Inventory Route MIN Vert Clear				99.99 M				Missing Signs N				
(47) Inventory Route Total Horiz Clear				07.6 M				Misc.				
(53) Min Vert Clear Over Bridge Rdwy				99.99 M				Bridge Name				N Anti-missile fence N Acrow Panel N Jointless Bridge
(54) Min Vert Underclear ref N				00.00 M				Freeze/Thaw N : Not Applicable				
(55) Min Lat Underclear RT ref N				00.0 M				Accessibility (Needed/Used)				
(56) Min Lat Underclear LT				00.0 M				N / N Liftbucket N / N Rigging N / N Other				
								N / N Ladder N / N Staging				
								N / N Boat N / N Traffic Control				
								Y / Y Wader N / N RR Flagperson				Inspection
								N / N Inspector 50 N / N Police				Hours: 008
Navigation Data												
(38) Navigation Control - No navigation control on waterway				Code 0								
(111) Pier Protection				Code 1								
(39) Navigation Vertical Clearance				000.0 M								
(116) Vert-lift Bridge Nav Min Vert Clear				M								
(40) Navigation Horizontal Clearance				0000.0 M								

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Hollis Street over Meadow Brook
(Bridge No. N/A)

Priority 2

AVAILABLE INFORMATION

Hollis Street is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a three-sided concrete box culvert. The out-to-out width of the structure is 15'-6" with a clear span of 9'-10". The rectangular hydraulic opening of the structure is approximately 3'-10" high by 9'-10" wide. At the time of inspection, the flow was 12" deep on the upstream side and 10" on the downstream side. The brook was flowing westward.

The roadway width over the structure is approximately 13'-8" with no sidewalks and consists of an asphaltic wearing surface. There is a sharp horizontal curve at the south approach and a driveway located at the southeast approach, directly adjacent to the structure.

There are no utilities carried by the structure. A drainage outfall is located just upstream of the bridge in the south embankment (Photo 9). Also, beaver dams are present immediately upstream of the culvert and may periodically generate flow restrictions.

Dry-laid stone masonry training walls are present on the downstream side of the culvert. These training walls protect concrete wingwalls that are integral with the culvert. The upstream wingwalls are stone masonry and support both approach roadways; no training walls are present upstream of the culvert.

The existing bridge rail consists of timber rails on metal posts that are mounted to the headwalls. There is no approach guardrail on either side.

The bridge is currently posted to have a weight limit of 5 tons. Signs are posted at both approaches.

FINDINGS

The overall condition of the structure is poor with several deficiencies noted. While the roof of the box culvert is in good condition with only light scaling, the culvert sidewalls typically exhibit moderate-to-severe scaling and spalling throughout. These issues are more advanced at the northeast abutment corner, indicated by an area of partial loss of concrete measuring approximately 3'-0" high x 2'-4" wide x 8" deep (Photo 11). Deep spalling and heavy vegetation growth were also noted to be typical on both the upstream and downstream headwalls.

The wingwalls are generally in poor-to-critical condition with sizeable voids. The northeast wall is failing and exhibits approximately 12" of lateral displacement (Photo 12).

The southeast wall has a wide horizontal crack across the face leading to a large area of spalling with loss of concrete (Photo 13).

The stone masonry walls on both sides of the brook show large voids and are crumbling into the brook due to erosion and scour. Additionally, the northwest wall has separated up to 6" from the culvert (Photo 14). Visibility of the concrete wingwalls was limited but do appear to be in fair condition.

The roadway over the culvert is extremely narrow. The south approach alignment has poor visibility due to a sharp horizontal curve. The roadway wearing surface is in fair condition with a small amount of settling on the southeast corner over the culver. However, the timber post and railing system is failing and substandard. Rail posts are displaced and have lost connection to the rail, typical throughout. There are several missing rails on the east side (Photo 15).

The culvert floor has a moderate amount of debris, with some boulders just upstream and downstream of the culvert (Photo 10).

RECOMMENDATIONS

The existing substructure is exhibiting advanced section loss and deterioration. Also, the existing safety railing is substandard for protection of vehicular traffic. BETA recommends a complete replacement of this structure. We recommend that the culvert be replaced with a precast concrete box culvert or similar structure. Similarly, BETA recommends replacement of the existing stone wingwalls with precast wall elements. The work should incorporate a minimum lane width of 10' in each direction, as prescribed by the MassDOT Roadway Project Development and Design Guide. BETA also recommends the addition of a MassDOT approved guardrail at both approaches and over the culvert.

Based on the age of the structure and increasing concrete deterioration, repairing existing concrete deficiencies would not prove practical.

Until the structure is replaced, inspections should be conducted at intervals not exceeding 12 months. Inspections should target all concrete elements and ensure further deterioration does not warrant a more aggressive replacement timetable.

BUDGETARY COST ESTIMATE

Full Replacement:

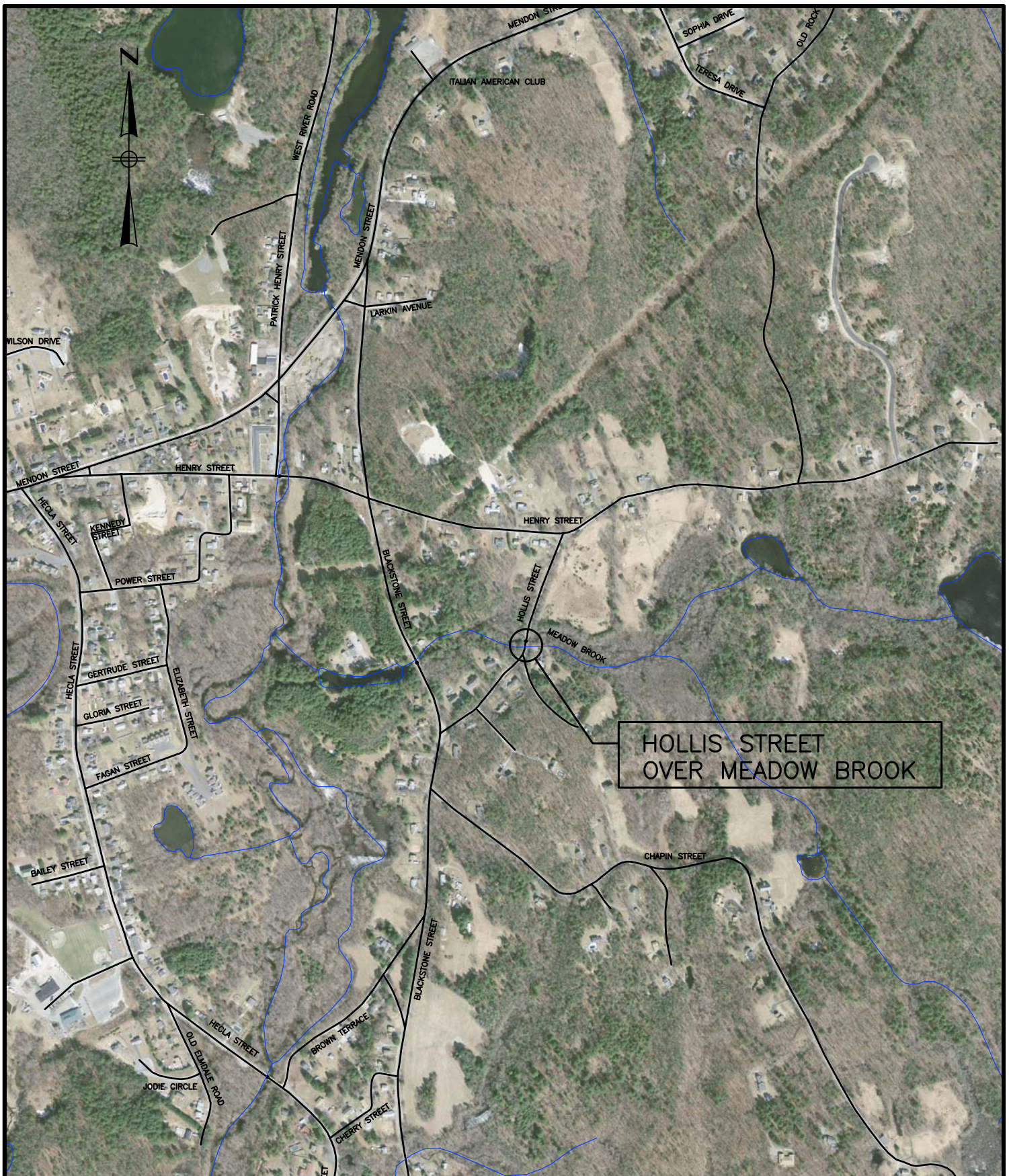
Construction:	\$585,000
Engineering:	<u>\$150,000</u>
Total:	\$735,000

Attachments

Locus Map

Inspection Photos

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BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HOLLIS STREET
OVER
MEADOW BROOK

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Photo 1 Looking West: East Culvert Elevation



Photo 2 Looking East: West Culvert Elevation



Photo 3 Looking North: North Abutment Elevation



Photo 4 Looking South: South Abutment Elevation



Photo 5 Looking Northwest: Underside of Slab



Photo 6 Looking West: Northeast Wingwall Elevation



Photo 7 Looking West: Southeast Wingwall Elevation



Photo 8 Looking South: Southwest Wingwall Elevation



Photo 9 Looking Southeast: Drainage Outfall



Photo 10 Looking South: Debris Under Culvert



Photo 11 Looking Northwest: Spalling at Northeast Abutment Corner



Photo 12 Lateral Displacement of Northeast Wingwall



Photo 13 Looking East: Cracking and Spalling of Southeast Wingwall



Photo 14 Looking North: Separation of Northwest Training Wall and Culvert



Photo 15 Looking South: North Approach



Photo 16 Looking North: South Approach



Photo 17 Looking Southeast: East Railing



Photo 18 Looking Northwest: West Railing

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Rockmeadow Road Ext. over Rock Meadow Brook
(Bridge No. U-02-034)

Priority 3

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 67.9.

A rating report dated February 2, 2019 was noted by MassDOT. The report notes that a posting is required for a rating of 10, 15, and 23 tons for a Type H, Type 3, and Type 3S2 trucks, respectively.

The most recent MassDOT routine bridge inspection report on record is dated April, 2020 and shows a NBIS culvert rating of a 4.

Rock Meadow Road is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a corrugated metal pipe with tapered openings. MassDOT lists the date of construction as 1956. The structure has an out-to-out width of 34'-0" measured at the top of the pipe, and 52'-6" measured from the bottom of the taper. It has a clear span of 13'-0". The hydraulic opening of the arch structure is 8'-3" high by 13'-0" wide. The brook was flowing west ward and the depth of flow at the time of inspection was measured to be 3'-2" just outside the pipe. The depth of fill over the structure is approximately 24".

The roadway width over the structure is approximately 15'-0" with no sidewalks on either side and consists of an asphaltic wearing surface. There is a horizontal curve with poor visibility at the south approach. There are residential driveways and an intersection with Forest Lane approximately 100' south of the structure. There is also an intersection with Mendon Street approximately 100' north of the structure.

Overhead wires run along the east fascia of the structure.

The bridge guardrail consists of concrete posts and metal wire that is continuous over the structure from the approaches on both sides.

The structure is posted at both approaches for a weight limit of 10T, 15T, 23T for Type H, Type 3, and Type 3S2 trucks, respectively. There is also a sign reading "Slow Children" at the north approach.

FINDINGS

The overall condition of the structure varies from fair to poor. While the roof and walls are in fair condition, the floor is in poor condition with several deficiencies noted.

The corrugated pipe sidewalls and roof are in fair condition above the water line with no deficiencies noted. However, the pipe floor is in critical condition, showing heavy corrosion with voids and 100% section loss in some areas (Photo 7). Numerous holes in the floor were found to be typical due to advanced corrosion (Photos 6 and 8). Section loss was typical throughout the entirety of the pipe floor. It is also noted that the pipe is showing signs of distortion (Photo 14).

The pipe rests on concrete toewalls at each opening. The walls were found to be in fair condition. The wall at the west side opening is exposed full length and has spots of undermining. Additionally, there is a 3' wide x 2.2' deep area of scour at the west toewall (Photo 13).

The channel upstream and downstream consists some boulders, with some debris in the culvert. (Photo 9).

Roadway embankments at both openings show moderate to severe erosion. The concrete posts are in poor condition, with about 75% exhibiting heavy spalling with exposed reinforcing and displacement typical throughout. Additionally, the railing is not consistently attached to the concrete posts.

The roadway is narrow but in fair condition with moderate alligator cracking on the west side of the roadway and minor wheel line rutting in the north approach. There is a pothole on the south approach and there is an area of settling at the northeast corner over the culvert (Photo 19). The horizontal curve at the south approach yields poor visibility. Also, there is heavy vegetation growth on both sides of the street that contributes to the lack of sight distance.

RECOMMENDATIONS

The pipe floor has advanced deterioration and section loss and is starting to lose its shape. Due to the condition of the pipe floor and signs of distortion, BETA recommends this structure be fully replaced with a 3-sided concrete box culvert. BETA also recommends that the existing concrete post and steel wire guardrail assembly be removed and replaced at all approaches and over the culvert. As part of the replacement, new guardrail shall be installed in conformance with current MassDOT standards. Additionally, the work should incorporate a minimum lane width of 10' in each direction, as prescribed by the MassDOT Roadway Project Development and Design Guide. Currently, roadway width over the culvert is not adequate to carry two lanes of traffic. The roadway centerlines should be striped accordingly. All signage and striping should be in accordance with current MUTCD standards.

Until the pipe can be replaced it is recommended that the existing posting be enforced. Additionally, "BE PREPARED TO STOP" or "REDUCED SPEED" signs should be added at the approaches in the interim. Interim repairs to the culvert structure are not feasible at this time.

Until the structure is replaced, inspections should be conducted at intervals not exceeding 12 months.

BUDGETARY COST ESTIMATE

Full-Replacement:

Construction: \$635,000

Engineering: \$160,000

Total: \$985,000

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Attachments

Locus Map

Inspection Photos

MassDOT Culvert & Special Member Report Dated April 2, 2020

National Bridge Inventory Sheet Dated April 15, 2021

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BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

ROCKMEADOW ROAD
OVER
ROCK MEADOW BROOK

BRIDGE NO.
U-02-034

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Photo 1 Looking West: West Culvert Entrance



Photo 2 Looking East: West Culvert Elevation



Photo 3 Looking East: East Culvert Entrance



Photo 4 Looking West: East Culvert Elevation



Photo 5 Looking North: Northeast Corner of Pipe



Photo 6 Looking North: Northwest Corner of Pipe



Photo 7 Looking North: North Wall of Pipe



Photo 8 Looking North: Section Loss at North Wall of Pipe



Photo 9 Looking South: Southeast Corner of Pipe



Photo 10 Looking South: Southwest Corner of Pipe



Photo 11 Looking South: South Wall of Pipe

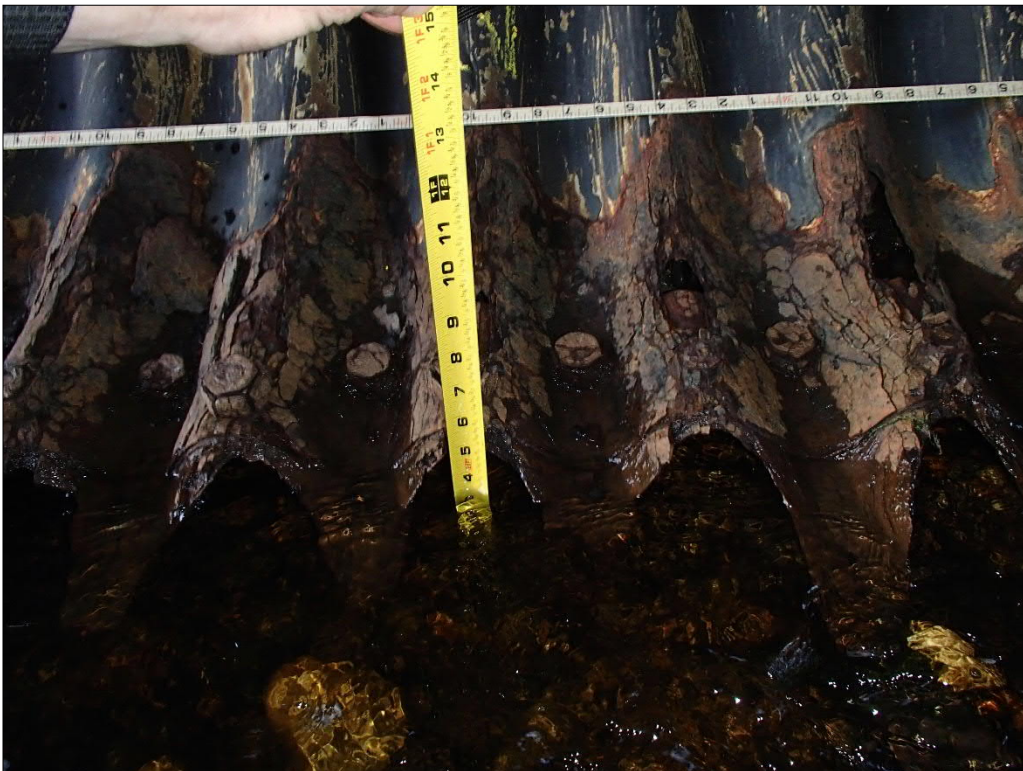


Photo 12 Looking South: Section Loss at South Wall of Pipe



Photo 13 Looking Northeast: West Toewall



Photo 14 Looking West: Distortion of Pipe



Photo 15 Looking South: North Approach



Photo 16 Looking North: South Approach



Photo 17 Looking Northwest: West Railing



Photo 18 Looking Southeast: East Railing



Photo 19 Looking West: Washout/Settling near Northeast Corner over Culvert

2-DIST
03B.I.N.
6X3STRUCTURES INSPECTION FIELD REPORT
CULVERT & SPECIAL MEMBER INSPECTIONBR. DEPT. NO.
U-02-034

CITY/TOWN UXBRIDGE	8-STRUCTURE NO. U02034-6X3-MUN-BRI	11-Kilo. POINT 000.000	41-STATUS P:POSTED	90-ROUTINE INSP. DATE APR 2, 2020
07-FACILITY CARRIED HWY ROCK MDW EXT	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1956	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER ROCK MEADOW BROOK	26-FUNCTIONAL CLASS Rural Local	DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 319 : Steel Culvert	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER T. * Toloczko	
107-DECK TYPE N : Not applicable	WEATHER Cloudy	TEMP. (air) 6°C	TEAM MEMBERS R. ORLANDO	

TYPE OF CULVERT:

SHAPE:	PIPE ARCH
MATERIAL:	STEEL
COATING:	ASPHALTIC

BARRELS: (In Meters)

SIZE:	3.91Wx2.54H	NUMBER:	1
-------	-------------	---------	---

DEPTH OF COVER (To the nearest tenth of a meter)

E	W
0.3	0.6

CURB REVEAL

(In millimeters)	N	N
------------------	---	---

ITEM 62 CULVERT & RETAINING WALLS

4

I62 (Dive Report):

N

I62 (This Report):

4

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		Dive This Rpt.	DEF			
1. Roof	N	N	-	7. Protective Coating	N	0	S-A	13. Member Alignment	N	6	M-P
2. Floor	N	N	-	8. Embankment	N	5	S-P	14. Deformation	N	6	M-P
3. Walls	N	N	-	9. Wearing Surface	N	6	M-P	15. Scour	N	7	-
4. Headwall	N	N	-	10. Railing	N	3	S-A	16. Settlement	N	7	-
5. Wingwall	N	N	-	11. Sidewalks	N	N	-	17.	N	N	-
6. Pipe	N	4	S-A	12. Utilities	N	N	-	18.	N	N	-

UNDERMINING (Y/N) If YES please explain **N**

COLLISION DAMAGE: **Please explain**
None (X) Minor () Moderate () Severe ()

LOAD VIBRATION: **Please explain**
None (X) Minor () Moderate () Severe ()

ITEM 61 CHANNEL & CHANNEL PROTECTION

6

STREAM FLOW VELOCITY:

Tidal () High () Moderate (X) Low ()

APPROACH CONDITION

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		
1. Channel Scour	N	7	-	5. Utilities	N	N	-
2. Embankment Erosion	N	6	M-P	6. Rip-Rap/Slope Protection	N	5	S-P
3. Debris	N	7	-	7. Aggradation	N	5	S-P
4. Vegetation	N	6	M-P				

ITEM 61 (Dive Report): **N**

ITEM 61 (This Report): **6**

93b- U/W INSP DATE: **00/00/0000**

	DEF
a. Appr. pavement condition	6 M-P
b. Appr. Roadway Settlement	6 M-P
c. Appr. Sidewalk Settlement	N -
d.	N -

WEIGHT POSTING

Not Applicable ☐

Actual Posting

H	3	3S2	Single
10	15	23	N

Recommended Posting

H	3	3S2	Single
10	15	23	N

Waived Date: **00/00/0000** EJDMT Date: **00/00/0000**

Signs In Place (Y=Yes, N=No, NR=Not Required)
Legibility/Visibility

	At bridge	Advance	
N	S	N	S
Y	Y	NR	N
7	7	7	7

ITEM 36 TRAFFIC SAFETY

ACCESSIBILITY (Y/N/P):

TOTAL HOURS **8**

	36	COND	DEF		Needed	Used	Needed	Used
A. Bridge Railing	0	3	S-A	Ladder	N	N		
B. Transitions	N	N	-	Boat	N	N	N	N
C. Approach Guardrail	0	3	S-A	Waders	Y	Y		
D. Approach Guardrail Ends	0	3	S-A					

PLANS (Y/N): **Y**

(V.C.R.) (Y/N): **N**

TAPE#: _____

RATING

Rating Report (Y/N): **Y**Date: **02/01/2019**Inspection data at time of existing rating
I 62: **4** Date: **04/11/2018**Recommend for Rating or Rerating (Y/N): **N**

REASON: _____

If YES please give priority:

HIGH () MEDIUM () LOW ()

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

2-DIST
03B.I.N.
6X3**STRUCTURES INSPECTION FIELD REPORT**
CULVERT & SPECIAL MEMBER INSPECTIONBR. DEPT. NO.
U-02-034

CITY/TOWN UXBRIDGE		8-STRUCTURE NO. U02034-6X3-MUN-BRI		11-Kilo. POINT 000.000	90-ROUTINE INSP. DATE Apr 2, 2020	93*-SPEC. MEMB. INSP. DATE Apr 2, 2020
07-FACILITY CARRIED HWY ROCK MDW EXT		MEMORIAL NAME/LOCAL NAME		27-YR BUILT 1956	106-YR REBUILT 0000	*YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER ROCK MEADOW BROOK		26-FUNCTIONAL CLASS Rural Local		DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 319 : Steel Culvert		22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER T. *Toloczko		
107-DECK TYPE N : Not applicable		WEATHER Cloudy	TEMP. (air) 6°C	TEAM MEMBERS R. ORLANDO		

WEIGHT POSTING		<i>Not Applicable</i>		At bridge		Advance		PLANS (Y/N): Y	
	H	3	3S2	Single	N	S	N	S	
Actual Posting	10	15	23	N	Y	Y	NR	N	
Recommended Posting	10	15	23	N	7	7			(V.C.R.) (Y/N): N
Waived Date: 00/00/0000		EJDMT Date: 00/00/0000		Signs In Place (Y=Yes, N=No, NR=Not Required) Legibility/Visibility				TAPE#: _____	

RATING		Rating Report (Y/N): Y		Date: 02/01/2019	Recommend for Rating or Rerating (Y/N): N	If YES please give priority: HIGH () MEDIUM () LOW ()	
Inspection data at time of existing rating I 58: - I 59: - I 60: - I 62: 4 Date: 04/11/2018					REASON: _____		

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION		INV. RATING OF MEMBER FROM RATING ANALYSIS			Deficiencies
					PREVIOUS (0-9)	PRESENT (0-9)	H-20	3	3S2	
A	Item 62.6 - Pipe	N		See remarks in comments section.	N	4	18	42	66	S-A
B										
C										
D										
E										

List of field tests performed:	I-58	I-59	I-60	I-62	
	(Overall Previous Condition)	-	-	-	4
	(Overall Current Condition)	-	-	-	4

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN**N=NOT APPLICABLE****H=HIDDEN/INACCESSIBLE****R=REMOVED**

CITY/TOWN UXBRIDGE	B.I.N. 6X3	BR. DEPT. NO. U-02-034	8.-STRUCTURE NO. U02034-6X3-MUN-BRI	INSPECTION DATE APR 2, 2020
------------------------------	----------------------	----------------------------------	---	---------------------------------------

REMARKS, PHOTOS & SKETCHES

BRIDGE ORIENTATION

According to the plans the approaches are North and South and the elevations are East and West. This is a single barrel galvanized corrugated bolted structural steel plate pipe arch culvert. The brook flows East to West.

GENERAL REMARKS

- The North At-Bridge weight posting acts as the Advance weight posting. A South Advance weight posting sign request was filed to place a weight posting at the intersection of Rockmeadow Rd Ext and Teresa Dr.

ITEM 62 - CULVERT

Item 62.6 - Pipe

The coating along the bottom of the pipe has failed and there is full width x full length heavy rusting with moderate to heavy rust flaking. Along both waterlines there is full length intermittent 100% section loss, heaviest along the North waterline approximately 16' from the West end. **See Photos 1 and 2.**

Item 62.8 - Embankment

The Northeast riprap embankment has a 15' high x 7' wide x 30" deep area of settlement. **See Photo 3.** There are several trees growing through the riprap at both embankments.

Item 62.9 - Wearing Surface

The bituminous concrete wearing surface and both approaches have many areas of minor to moderate transverse, longitudinal, and map cracking. **See Photos 4 and 5.**

CONDITION RATING GUIDE

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	Use if structure is not a culvert.
G	9	EXCELLENT	No deficiencies.
G	8	VERY GOOD	No noticeable or noteworthy differences which affect the condition of the culvert. Insignificant scrape marks caused by drift.
G	7	GOOD	Shrinkage cracks, light scaling, and insignificant spalling, which does not expose reinforcing steel. Insignificant damage caused by drift with not misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
F	6	SATISFACTORY	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
F	5	FAIR	Moderate to major deterioration, or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
P	4	POOR	Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joints permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.
P	3	SERIOUS	Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls, nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls, or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Bridge closed. Corrective action may put back in light service.
	0	FAILED	Bridge closed. Replacement necessary.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - (Examples include but are not limited to: Spalled concrete, minor to moderate corrosion to steel culverts, minor settlement or misalignment, minor scouring, minor damage to guardrail, etc.)

S= Severe/Major Deficiency - (Examples include but are not limited to: Large spalls, wide cracks, moderate to major deterioration in concrete, considerable settlement, considerable scouring or undermining, extensive corrosion and deflection in steel culverts, etc.)

C-S= Critical Deficiency - A deficiency in a structural component or element of a bridge that poses an extreme hazard or unsafe condition to the public. (Follow-up Critical Deficiency Report must be submitted separately)

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) stay at the bridge until the District Maintenance crew or the responsible Agency crew(if not a State bridge) show up and corrective action is taken.]

A = ASAP- [Action will be taken by the District Maintenance Engineer or the Responsible Agency (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN UXBRIDGE	B.I.N. 6X3	BR. DEPT. NO. U-02-034	8.-STRUCTURE NO. U02034-6X3-MUN-BRI	INSPECTION DATE APR 2, 2020
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REMARKS

Item 62.10 - Railing

See Item 36a.

Item 62.13 - Member Alignment

See Item 62.14.

Item 62.14 - Deformation

The Northeast bottom corner has an 8' long x 3' wide slightly upwardly deformed area. **See Photo 3.**

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.2 - Embankment Erosion

The Northeast (upstream) channel embankment has minor erosion. **See Photo 6.**

Item 61.4 - Vegetation

See Item 61.7.

Item 61.6 - Rip-Rap/Slope Protection

See Item 62.8.

Item 61.7 - Aggradation

The Southeast (upstream) channel embankment has significant aggradation with minor vegetation directing flow against the Northeast channel embankment. **See Photo 6.**

APPROACHES

Approaches a - Appr. pavement condition

See Item 62.9. The North approach Southbound lane has a 3' diameter bituminous patch. **See Photo 4.**

Approaches b - Appr. Roadway Settlement

The North approach Southbound lane has a 10' diameter area of minor settlement centered on the bituminous patch. The North approach Northbound lane has a 4' diameter area of moderate settlement. **See Photos 4 and 5.**

TRAFFIC SAFETY

Item 36a - Bridge Railing

Both bridge rails are continuous with the approach guardrails and consist of reinforced concrete posts and two steel cable rails. There are several posts throughout both rails with heavy spalling at the bottom exposing rusted rebar. The East guardrail and Northeast approach rail both have a post with 100% concrete section loss with the top steel cable unattached at several posts. **See Photos 4, 5, and 7.**

Item 36c - Approach Guardrail

See Item 36a.

Item 36d - Approach Guardrail Ends

See Item 36a.

CITY/TOWN UXBRIDGE	B.I.N. 6X3	BR. DEPT. NO. U-02-034	8.-STRUCTURE NO. U02034-6X3-MUN-BRI	INSPECTION DATE APR 2, 2020
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REMARKS**Photo Log**

- Photo 1 : South waterline looking East, typical 100% section loss.
Photo 2 : North waterline near West end.
Photo 3 : Northeast embankment.
Photo 4 : Wearing surface and North approach pavement, looking Northwest.
Photo 5 : Wearing surface and North approach pavement, looking Northeast. Settlement in Northbound lane is circled. East rail post with 100% concrete section loss indicated (only rebar remaining).
Photo 6 : Northeast embankment erosion.
Photo 7 : West rail South end, typical post concrete section loss.

CITY/TOWN UXBRIDGE	B.I.N. 6X3	BR. DEPT. NO. U-02-034	8.-STRUCTURE NO. U02034-6X3-MUN-BRI	INSPECTION DATE APR 2, 2020
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PHOTOS

Photo 1: South waterline looking East, typical 100% section loss.

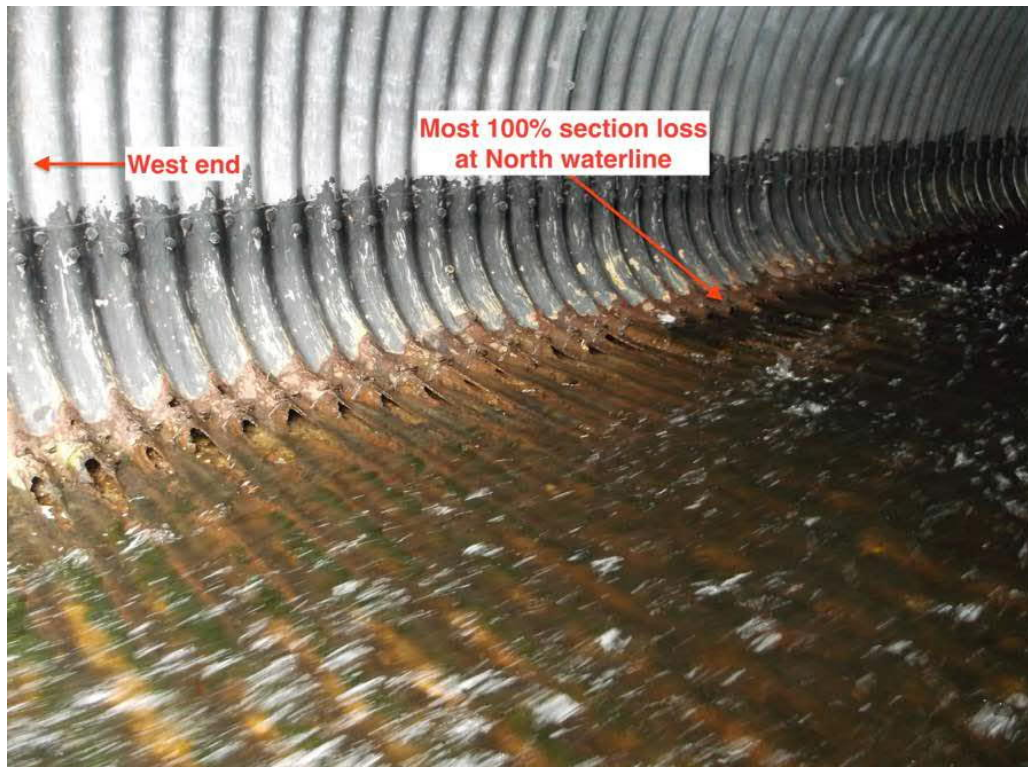


Photo 2: North waterline near West end.

CITY/TOWN UXBRIDGE	B.I.N. 6X3	BR. DEPT. NO. U-02-034	8.-STRUCTURE NO. U02034-6X3-MUN-BRI	INSPECTION DATE APR 2, 2020
------------------------------	----------------------	----------------------------------	---	---------------------------------------

PHOTOS

Photo 3: Northeast embankment.



Photo 4: Wearing surface and North approach pavement, looking Northwest.

CITY/TOWN UXBRIDGE	B.I.N. 6X3	BR. DEPT. NO. U-02-034	8.-STRUCTURE NO. U02034-6X3-MUN-BRI	INSPECTION DATE APR 2, 2020
------------------------------	----------------------	----------------------------------	---	---------------------------------------

PHOTOS



Photo 5: Wearing surface and North approach pavement, looking Northeast. Settlement in Northbound lane is circled. East rail post with 100% concrete section loss indicated (only rebar remaining).



Photo 6: Northeast embankment erosion.

CITY/TOWN UXBRIDGE	B.I.N. 6X3	BR. DEPT. NO. U-02-034	8.-STRUCTURE NO. U02034-6X3-MUN-BRI	INSPECTION DATE APR 2, 2020
------------------------------	----------------------	----------------------------------	---	---------------------------------------

PHOTOS

Photo 7: West rail South end, typical post concrete section loss.

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Report Date: April 15, 2021

State Information				Classification				Code							
BDEPT#= U02034				Agency Br.No.				(112) NBIS Bridge Length				N			
Town= Uxbridge				L.O.				(104) Highway System				N			
B.I.N= 6X3				AASHTO= 067.9				(26) Functional Class - Rural Local				09			
RANK= 0 H.I.= NA				FHWA Select List= N (6/21/2017)				(100) Defense Highway				0			
(8) Structure Number				U020346X3MUNBRI				(101) Parallel Structure				N			
(5) Inventory Route				151000000				(102) Direction of Traffic - 2-way traffic				2			
(2) State Highway Department District				03				(103) Temporary Structure				N			
(3) County Code 027 (4) Place code				71620				(105) Federal Lands Highways				0			
(6) Features Intersected				WATER ROCK MEADOW BROOK				(110) Designated National Network				N			
(7) Facility Carried				HWY ROCK MDW EXT				(20) Toll - On free road				3			
(9) Location				150 FT S OF ST-16				(21) Maintain - Town Agency				03			
(11) Kilometerpoint				0000.000				(22) Owner - Town Agency				03			
(12) Base Highway Network				N				(37) Historical Significance				undetermined			
(13) LRS Inventory Route & Subroute				000000000000				Condition				Code			
(16) Latitude				42 DEG 05 MIN 25.76 SEC				(58) Deck				N			
(17) Longitude				71 DEG 35 MIN 42.97 SEC				(59) Superstructure				N			
(98) Border Bridge State Code				Share %				(60) Substructure				N			
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection				6			
								(62) Culverts				4			
Structure Type and Material								Load Rating and Posting				Code			
(43) Structure Type Main: Steel				Code 319				(31) Design Load - H 10=M 9				1			
Culvert				Jointless bridge type: Not applicable				(63) Operating Rating Method - Load Factor (LF)				1			
(44) Structure Type Appr:				Code 0				(64) Operating Rating				46.6			
(45) Number of spans in main unit				001				(65) Inventory Rating Method - Load Factor (LF)				1			
(46) Number of approach spans				0000				(66) Inventory Rating				27.9			
(107) Deck Structure Type - Not applicable				Code N				(70) Bridge Posting				5			
(108) Wearing Surface / Protective System:								(41) Structure - Posted for load				P			
A) Type of wearing surface - Bituminous				Code 6				Appraisal				Code			
B) Type of membrane - Not applicable=no deck				Code N				(67) Structural Evaluation				4			
C) Type of deck protection - Not applicable=no deck				Code N				(68) Deck Geometry				N			
Age and Service								(69) Underclearances, vert. and horiz.				N			
(27) Year Built				1956				(71) Waterway adequacy				7			
(106) Year Reconstructed				0000				(72) Approach Roadway Alignment				6			
(42) Type of Service: On - Highway								(36) Traffic Safety Features				0 N 0 0			
Under - Waterway				Code 15				(113) Scour Critical Bridges				6			
(28) Lanes: On Structure 02 Under structure				00				Inspections							
(29) Average Daily Traffic				000200				(90) Inspection Date 04/02/20				(91) Frequency 12 MO			
(30) Year of ADT 2000 (109) Truck ADT				00 %				(92) Critical Feature Inspection:				(93) CFI DATE			
(19) Bypass, detour length				001 KM				(A) Fracture Critical Detail				N 00 MO A) 00/00/00			
Geometric Data								(B) Underwater Inspection				N 00 MO B) 00/00/00			
(48) Length of maximum span				0003.9 M				(C) Other Special Inspection				Y 12 MO C) 04/02/20			
(49) Structure Length				00003.9 M				(*) Other Inspection (I)				N 00 MO *) 00/00/00			
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M								(*) Closed Bridge				N 00 MO *) 00/00/00			
(51) Bridge Roadway Width Curb to Curb				000.0 M				(*) UW Special Inspection				N 00 MO *) 00/00/00			
(52) Deck Width Out to Out				000.0 M				(*) Damage Inspection				MO *) 00/00/00			
(32) Approach Roadway Width (w/shoulders)				004.6 M				Rating Loads							
(33) Bridge Median - No median				Code 0				Report Date 02/01/19				H20 Type 3 Type 3S2 Type HS			
(34) Skew 00 DEG (35) Structure Flared				N				Operating				25.0 59.0 94.0 45.0			
(10) Inventory Route MIN Vert Clear				99.99 M				Inventory				18.0 42.0 66.0 32.0			
(47) Inventory Route Total Horiz Clear				05.5 M				Field Posting							
(53) Min Vert Clear Over Bridge Rdwy				99.99 M				Status POSTED				Posting Date 09/24/19			
(54) Min Vert Underclear ref N				00.0 M				2 Axle 3 Axle 5 Axle Single							
(55) Min Lat Underclear RT ref N				00.0 M				Actual 10 15 23							
(56) Min Lat Underclear LT				00.0 M				Recommended 10 15 23							
Navigation Data								Missing Signs N							
(38) Navigation Control - No navigation control on waterway				Code 0				Misc.							
(111) Pier Protection				Code				Bridge Name				N Anti-missile fence N Acrow Panel N Jointless Bridge			
(39) Navigation Vertical Clearance				000.0 M				Freeze/Thaw N : Not Applicable							
(116) Vert-lift Bridge Nav Min Vert Clear				M				Accessibility (Needed/Used)							
(40) Navigation Horizontal Clearance				0000.0 M				N / N Liftbucket				N / N Rigging N / N Other			
								N / N Ladder				N / N Staging			
								N / N Boat				N / N Traffic Control			
								Y / Y Wader				N / N RR Flagperson Inspection Hours: 008			
								N / N Inspector 50				N / N Police			

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West Street over Scadden Brook
(Bridge No. N/A)

Priority 4

AVAILABLE INFORMATION

West Street is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This culvert consists of two separate structures adjacent to one another. Here, the north structure will be referred to as structure 1 and the south structure will be referred to as structure 2.

Structure 1 consists of a 12" cast-in-place concrete slab on mortared stone masonry abutments. This structure has a width of approximately 17'-0" with a clear span of 9'-9". The hydraulic opening of the structure is approximately 5'-1" high by 9'-9" wide.

Structure 2 consists of an 18" cast-in-place concrete slab on concrete abutments. This structure has a width of approximately 14'-1" with a clear span of 9'-9". The hydraulic opening of the structure is approximately 4'-9" high by 9'-9" wide. The depth of fill over both structures is approximately 22".

The flow was 24" deep at the time of inspection and flowing southward. The roadway width over the culvert is approximately 22'-8" with no sidewalks and consists of an asphaltic surface course. There are sharp horizontal and vertical curves at both approaches and a driveway approximately 75' east the structure at the southeast approach. The bridge rail consists of metal posts with highway guardrail attached in addition to timber posts and rails intermittently. There is no approach guardrail.

There are overhead wires running diagonally over the bridge. Additionally, there are paved drainage waterways at the southeast and southwest corners.

Several "No Trespassing" signs are posted along the roadway in the vicinity of the bridge.

FINDINGS

The overall condition of structure 1 is poor with severe scour at the west abutment along the entire base. Structure 2 is in fair condition with several deficiencies noted.

The underside of slabs 1 and 2 are in fair condition. Slab 1 underside is covered with black felt with few exposed areas. Random depressions in the damp proofing indicate minor spalling. Slab 2 has random areas of rust staining and dampness. There are some cracks at the interface of both structures with rust stains and efflorescence (Photos 7 and 8). Few areas of concrete repair suggest past deficiencies.

The west abutment of structure 1 is in poor condition. The stone masonry abutment exhibits severe scour along the entire base with heavy abrasion at the water line (Photo 15). Excessive voids are present and were measured up to 12" deep. The east abutment is

in fair condition with random missing chinking stones and loss of mortar. The concrete abutments at structure 2 are in fair condition. Moderate scaling was typical up to a foot above the waterline with abrasion typical along the water line (Photo 16). Random spalls at the construction joints were also noted.

Both wingwalls on the north side of the structures are mortared masonry that are in fair condition. The north wingwalls are completely covered with heavy vegetation that have minor areas of missing pointing and chinking stones and slight displacement on the east wall. The wingwalls on the south side of the structure are dry-laid masonry with large voids in fair-to-poor condition. The walls are starting to crumble causing erosion of the embankment immediately adjacent to the roadway (Photo 12).

Heavy amounts of debris was present at both upstream and downstream entrances to the culvert. Vegetation has grown over to partially block flow at the northwest corner (Photo 13). Debris was also present in the culvert, particularly against the east abutment wall (Photo 14).

The pavement over the culvert shows moderate linear cracking, patching, and debris in the shoulders. There is also an area of washout on the southwest corner over the culvert (Photo 21). The sharp horizontal curve in the east approach greatly reduces visibility. The north guardrail over the culvert is leaning away from the roadway due to past vehicular collision, causing it to become unstable (Photo 19). The south guardrail over the culvert has collision damage at the east end (Photo 20). Additionally, guardrail posts typically exhibit corrosion (Photo 22). No approach guardrail is present.

RECOMMENDATIONS

The west abutment at structure 1 is exhibiting sever scour and section loss. Also, the existing safety railing is substandard for protection of vehicular traffic. It is evident that the scour areas have worsened over time compared to previous inspections. Due to worsening conditions, BETA recommends a complete replacement of this structure in the long term. It is recommended that the culvert be replaced with a precast concrete box culvert or similar structure. The new structure should also incorporate precast wingwalls at both the upstream and downstream entrance. As part of the work, BETA also recommends the addition of MassDOT approved guardrail at both approaches and replacements of existing guardrail over the culvert.

In the interim until culvert replacement can be scheduled, the following should be implemented:

- Scour voids noted in the existing stone masonry abutments should be filled in, particularly at the west abutment. This should be considered a high priority.
- Replace all missing and/or loose chinking stones in the stone abutments and wingwalls.
- Repoint all masonry joints in the stone abutments and wingwalls.

- Fill in any voids at the wingwalls to prevent further damage to the roadway surface.

Until the aforementioned interim repairs are complete, inspections should be conducted at intervals not exceeding 6 months to monitor the condition of the stone masonry abutments. Inspections should also be conducted on the bridge substructure after extreme flood events to note any possible damage to the structure and/or roadway.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	\$640,000
Engineering:	<u>\$160,000</u>
Total:	\$800,000

Interim Repairs

Construction:	\$32,000
Engineering:	<u>\$8,000</u>
Total:	\$40,000

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Attachments

Locus Map

Inspection Photos

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BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

WEST STREET
OVER
SCADDEN BROOK

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Photo 1 Looking South: North Culvert Elevation



Photo 2 Looking Southwest: West Abutment of Structure 1



Photo 3 Looking Southeast: East Abutment of Structure 1



Photo 4 Looking North: South Culvert Elevation



Photo 5 Looking Northwest: West Abutment of Structure 2



Photo 6 Looking Northeast: East Abutment of Structure 2



Photo 7 Looking West: Culvert Roof Interface – Shows Cracks w/ Rust Stains & Efflo.



Photo 8 Looking East: Culvert Roof Interface – Shows Cracks w/ Rust Stains & Efflo.



Photo 9 Looking Southwest: Northwest Wingwall



Photo 10 Looking Southeast: Northeast Wingwall



Photo 11 Looking Northwest: Southwest Wingwall



Photo 12 Looking Northeast: Southeast Wingwall



Photo 13 Looking North: Vegetation Impeding Flow at Northwest Corner



Photo 14 Looking Southeast: Debris in Brook at East Abutment Wall



Photo 15 Looking West: West Abutment of Structure 1



Photo 16 Looking Northeast: East Abutment of Structure 2



Photo 17 Looking East: West Approach



Photo 18 Looking West: East Approach



Photo 19 Looking North: North Railing



Photo 20 Looking South: South Railing



Photo 21 Looking South: Washout at Southwest Corner over Culvert



Photo 22 Looking North: Rust at South Railing

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South Street over Bacon Brook
(Bridge No. U-02-066)

Priority 5

AVAILABLE INFORMATION

South Street is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a 24" cast-in-place exposed concrete slab on concrete abutments. The date of construction is circa 1940. The structure has an out-to-out width of 22'-0" with a clear span of 11'-5". The hydraulic opening of the structure is roughly 4'-10" high by 11'-5" wide. The depth of flow at the time of inspection was approximately 12" and flowing eastward.

The roadway width over the structure is 17'-0" with no sidewalks on either side. There is no pavement or fill over the structure as it consists of an exposed concrete slab. Narrow horizontal curves with poor visibility makeup both approaches. A service entrance to a farm directly adjacent to the structure is located at the north approach.

Overhead wires run along the east side of the roadway. There are also natural roadway drainage swales located at the northeast and southwest corners of the structure.

There is no bridge railing. The existing safety feature over the structure consists of a 4' high chain link fence with no approach guardrail.

There is no signage at this location with the exception of a private sign reading "Private Property" posted at the north approach.

FINDINGS

The overall condition of the structure is fair with several deficiencies noted.

The concrete slab is in fair condition, showing minor problems. Its underside is covered in damp proofing that is deteriorated. Where visible, the slab's overall condition appears to be in fair condition and exhibits some hairline cracks. Two rows of concrete blocks run transversely across the slab and are exposed (Photo 4). These blocks are likely construction related, used as form supports or steel reinforcing spacers. The blocks are not considered a deficiency but do allow water/moisture to penetrate the slab. The top of the slab typically exhibits moderate scaling and wear with exposed aggregate.

The abutments are in fair condition showing moderate deterioration, especially at the west opening. The northwest and southwest abutment corners show areas of heavy spalling and delamination (Photos 8 and 10). Random hairline cracks are typical on both abutment walls. Additionally, there is a full height crack with a maximum width of $\frac{3}{8}$ " near the northwest abutment corner (Photo 9). There is also an 18" section of exposed

footing at the north abutment. Around this location there is an area of scour noted, with no undermining present.

The concrete wingwalls are in poor condition. The two training walls on the east side transition from concrete into mortared masonry. Both stone wall portions show loss of mortar with random voids at the waterline. The northeast stone wall is displaced approximately 3" and the southeast stone wall has heavy vegetation (Photos 5 and 6). The two wingwalls at the west opening are concrete and are integrated with a stone retaining wall that supports the roadway. Both concrete walls are in poor condition with heavy scaling, spalling, efflorescence, and delamination. A 20" deep scour void is located at the southwest wingwall for approximately half its length. The southwest stone retaining wall has stones falling off and appears displaced. Directly upstream of the culvert is a feeding area for cattle. The congregation of cattle at this location has caused the stream to migrate away from its natural shape, thus altering flow and introducing potential scour issues. At the time of inspection, the culvert entrance on the west side was blocked by a row of barrels (Photo 11)

The approach roadway is in fair condition. There is some ponding at the east corner of the south approach and some cracking at the approach to deck transition on the south side (Photo 14). Additionally, the west corner of the south approach has an area of settlement and undermining adjacent to the stone wall (Photo 15). A narrow horizontal curve at the north approach makes for poor visibility.

There is currently no bridge railing. A chain link fence over the bridge is bent with vegetation growth on both sides. The east fence is newly replaced; however, it is bent over and displaced. The lack of bridge rail and approach guardrail is a safety hazard.

RECOMMENDATIONS

This structure is in fair condition overall, while the wingwalls are in poor condition. The condition of the concrete wingwalls makes repairs impractical. BETA recommends the following repairs to extend the structures anticipated service life:

- Replace the wingwalls and training walls.
- Repair all spalls, cracks, and delaminated areas in the bridge substructure.
- Repair all spalls and cracks to the concrete slab. Also, finish and smooth all recessed block locations at the slab underside.
- Re-surface the slab top-side to prevent additional wear.
- Place stone riprap at exposed concrete abutment footing to prevent future scour.
- BETA also recommends the addition of crash tested guardrail at all approaches and over the structure.

Conduct annual inspections to monitor overall bridge conditions and possible scour resulting from stream migration.

BUDGETARY COST ESTIMATE

Repairs

Construction:	\$140,000
Engineering:	<u>\$35,000</u>
Total:	\$175,000

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Attachments

Locus Map

Inspection Photos

MassDOT Routine Inspection Report Dated June 19, 2019

National Bridge Inventory Sheet Dated April 15, 2021

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BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

SOUTH STREET
OVER
BACON BROOK

BRIDGE NO.
U-02-066

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Photo 1 Looking West: East Culvert Elevation



Photo 2 Looking Northwest: North Abutment



Photo 3 Looking Southwest: South Abutment



Photo 4 Looking East: Culvert Roof



Photo 5 Looking North: Northeast Wingwall



Photo 6 Looking South: Southeast Wingwall



Photo 7 Looking North: Northwest Wingwall



Photo 8 Looking South: Southwest Wingwall



Photo 9 Looking North: Crack near West End of North Abutment



Photo 10 Looking North: Northwest Abutment Corner



Photo 11 Looking North: Barrels at West Entrance



Photo 12 Looking South: North Approach



Photo 13 Looking North: South Approach



Photo 14 Looking East: Crack at South Approach



Photo 15 Looking West: Settling at South Approach



Photo 16 Looking Northeast: East Railing



Photo 17 Looking Northwest: West Railing

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STRUCTURES INSPECTION FIELD REPORT

BR. DEPT. NO.

U-02-066

2-DIST
03B.I.N.
6XB

ROUTINE INSPECTION

CITY/TOWN UXBRIDGE		8-STRUCTURE NO. U02066-6XB-MUN-BRI		11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE JUN 19, 2019
07-FACILITY CARRIED HWY SOUTH ST		MEMORIAL NAME/LOCAL NAME		27-YR BUILT 1940	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER BACON BROOK		26-FUNCTIONAL CLASS Rural Local		DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 101 : Concrete Slab		22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER T. *Toloczko		
107-DECK TYPE 1 : Concrete Cast-in-Place		WEATHER Cloudy	TEMP. (air) 21°C	TEAM MEMBERS T. T. GUMULA		

ITEM 58		7	DEF
DECK			
1. Wearing surface	8	-	
2. Deck Condition	7	-	
3. Stay in Place Forms	N	-	
4. Curbs	N	-	
5. Median	N	-	
6. Sidewalks	N	-	
7. Parapets	N	-	
8. Railing	5	M-P	
9. Anti Missile Fence	N	-	
10. Drainage System	N	-	
11. Lighting Standards	N	-	
12. Utilities	N	-	
13. Deck Joints	N	-	
14.	N	-	
15.	N	-	
16.	N	-	
CURB REVEAL (In millimeters)		E N	W N

APPROACHES		DEF
a. Appr. pavement condition	5	S-P
b. Appr. Roadway Settlement	3	S-A
c. Appr. Sidewalk Settlement	N	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge)		(Y/N)	N	DEF
a. Condition of Welds	N	-		
b. Condition of Bolts	N	-		
c. Condition of Signs	N	-		

ITEM 59		7	DEF
SUPERSTRUCTURE			
1. Stringers	N	-	
2. Floorbeams	N	-	
3. Floor System Bracing	N	-	
4. Girders or Beams	N	-	
5. Trusses - General	N	-	
a. Upper Chords	N	-	
b. Lower Chords	N	-	
c. Web Members	N	-	
d. Lateral Bracing	N	-	
e. Sway Bracings	N	-	
f. Portals	N	-	
g. End Posts	N	-	
6. Pin & Hangers	N	-	
7. Conn Plt's, Gussets & Angles	N	-	
8. Cover Plates	N	-	
9. Bearing Devices	N	-	
10. Diaphragms/Cross Frames	N	-	
11. Rivets & Bolts	N	-	
12. Welds	N	-	
13. Member Alignment	8	-	
14. Paint/Coating	N	-	
15. Concrete Slab.	7	-	

Year Painted	N
COLLISION DAMAGE: <i>Please explain</i> None (X) Minor () Moderate () Severe ()	
LOAD DEFLECTION: <i>Please explain</i> None (X) Minor () Moderate () Severe ()	
LOAD VIBRATION: <i>Please explain</i> None (X) Minor () Moderate () Severe ()	

Any Fracture Critical Member: (Y/N)	N
Any Cracks: (Y/N)	N

ITEM 60		5	DEF
SUBSTRUCTURE			
1. Abutments	Dive	Cur	5
a. Pedestals	N	N	-
b. Bridge Seats	N	5	S-P
c. Backwalls	N	N	-
d. Breastwalls	N	5	S-P
e. Wingwalls	N	5	S-P
f. Slope Paving/Rip-Rap	N	N	-
g. Pointing	N	N	-
h. Footings	N	7	-
i. Piles	N	N	-
j. Scour	N	6	M-P
k. Settlement	N	6	M-P
l.	N	N	-
m.	N	N	-
2. Piers or Bents		N	
a. Pedestals	N	N	-
b. Caps	N	N	-
c. Columns	N	N	-
d. Stems/Webs/Pierwalls	N	N	-
e. Pointing	N	N	-
f. Footing	N	N	-
g. Piles	N	N	-
h. Scour	N	N	-
i. Settlement	N	N	-
j.	N	N	-
k.	N	N	-
3. Pile Bents		N	
a. Pile Caps	N	N	-
b. Piles	N	N	-
c. Diagonal Bracing	N	N	-
d. Horizontal Bracing	N	N	-
e. Fasteners	N	N	-

UNDERMINING (Y/N)	If YES please explain	N
COLLISION DAMAGE: None (X) Minor () Moderate () Severe ()		
SCOUR: <i>Please explain</i> None () Minor (X) Moderate () Severe ()		
I-60 (Dive Report):	N	I-60 (This Report): 5
93B-U/W (DIVE) Insp	00/00/0000	

X=UNKNOWN

N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN UXBRIDGE	B.I.N. 6XB	BR. DEPT. NO. U-02-066	8.-STRUCTURE NO. U02066-6XB-MUN-BRI	INSPECTION DATE JUN 19, 2019
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ITEM 61
CHANNEL & CHANNEL PROTECTION

	Dive	Cur	DEF
1.Channel Scour	N	6	M-P
2.Embankment Erosion	N	7	-
3.Debris	N	7	-
4.Vegetation	N	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	N	-
7.Aggradation	N	7	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:
Tidal () High () Moderate () Low (X) None ()

ITEM 61 (Dive Report): ☐ N ITEM 61 (This Report): ☐ 6

93b-U/W INSP. DATE:

ITEM 36 TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	0	5	M-P
B. Transitions	0	N	-
C. Approach Guardrail	0	N	-
D. Approach Guardrail Ends	0	N	-

WEIGHT POSTING *Not Applicable* ☒ X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date:
EJDMT Date:

At bridge	Other Advance								
<table style="width:100%; border-collapse: collapse;"> <tr> <th>N</th> <th>S</th> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	N	S	<input type="checkbox"/>	<input type="checkbox"/>	<table style="width:100%; border-collapse: collapse;"> <tr> <th>N</th> <th>S</th> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	N	S	<input type="checkbox"/>	<input type="checkbox"/>
N	S								
<input type="checkbox"/>	<input type="checkbox"/>								
N	S								
<input type="checkbox"/>	<input type="checkbox"/>								

CLEARANCE POSTING

	E	W	meter
Actual Field Measurement	<input type="text" value="0"/>	<input type="text" value="0"/>	
Posted Clearance	<input type="text" value="0"/>	<input type="text" value="0"/>	

At bridge	Advance								
<table style="width:100%; border-collapse: collapse;"> <tr> <th>E</th> <th>W</th> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	E	W	<input type="checkbox"/>	<input type="checkbox"/>	<table style="width:100%; border-collapse: collapse;"> <tr> <th>E</th> <th>W</th> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	E	W	<input type="checkbox"/>	<input type="checkbox"/>
E	W								
<input type="checkbox"/>	<input type="checkbox"/>								
E	W								
<input type="checkbox"/>	<input type="checkbox"/>								

E	W
<input type="checkbox"/>	<input type="checkbox"/>

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

TOTAL HOURS

PLANS (Y/N): ☐ N

(V.C.R.) (Y/N): ☐ N

TAPE#: _____

List of field tests performed:
None

RATING
Rating Report (Y/N): ☐ N
Date:
Inspection data at time of existing rating
I 58: - I 59: - I 60: - Date: 00/00/0000

Recommend for Rating or Rerating (Y/N): ☐ N

REASON: _____

If YES please give priority:
HIGH () MEDIUM () LOW ()

CONDITION RATING GUIDE

(For Items 58, 59, 60 and 61)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advanced section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:
M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.
S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.
C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.
C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:
I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].
A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].
P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN UXBRIDGE	B.I.N. 6XB	BR. DEPT. NO. U-02-066	8.-STRUCTURE NO. U02066-6XB-MUN-BRI	INSPECTION DATE JUN 19, 2019
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REMARKS

BRIDGE ORIENTATION

According to the compass the approaches are North and South and the elevations are East and West. This is a single span concrete slab bridge. The brook flows West to East.

GENERAL REMARKS

Note: A rating request was submitted with the last Routine Inspection dated 6/29/17.

ITEM 58 - DECK

Item 58.2 - Deck Condition

See Item 59.15.

Item 58.8 - Railing

Both bridge rails consist of 4' high chain link fence.

West fence: There is minor surface rusting throughout. The fence is secure but moderately out of plumb above the Southwest wingwall area and eroded shoulder. **See Photo 1.** The top rail is bent down slightly on the bridge. **See Photo 2.** See Approaches b.

East fence: The top rail is disconnected from the post nearest the Northeast deck corner. **See Photo 3.**

APPROACHES

Approaches a - Appr. pavement condition

There is minor transverse cracking in the center of the South approach to deck transition. The South approach pavement West edge is partially undermined. See Approaches b.

Approaches b - Appr. Roadway Settlement

The West side shoulder of the South approach has a 3' diameter failure due to erosion, undermining the edge of roadway up to 3". Large stone has been placed in the shoulder abutting the Southwest wingwall end. **See Photos 1 & 4.**

ITEM 59 - SUPERSTRUCTURE

Item 59.15 - Concrete Slab.

Most of the slab underside is covered with tar paper. There are two full width intermittent transverse rows of exposed embedded concrete bricks near each end of the slab. **See Photo 5.**

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.b - Bridge Seats

See Item 60.1.d.

Item 60.1.d - Breastwalls

Both rubble concrete breastwalls have minor abrasion from the high waterline down. Both breastwalls have isolated areas of poor consolidation, minor horizontal hairline cracking, and minor efflorescence.

North breastwall: The West corner has a full height x 2' wide x up to 4.5' deep delamination/spall with deterioration that is undermining the end of the deck slab by 4". **See Photo 6.** There is a full height x 0.13" wide vertical settlement crack 6' in from the West end. **See Photo 7.**

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REMARKS

Item 60.1.e - Wingwalls

The Southwest wingwall has a full height x 6' long x up to 4" deep area of cracking, efflorescence, delamination, and heavy scaling/deterioration. **See Photo 8.**

Item 60.1.h - Footings

The full length of the North footing is exposed up to 14" high with no undermining.

Item 60.1.j - Scour

The North half of the channel is approximately 1' deeper than the South half under the bridge. See Item 60.1.h.

Item 60.1.k - Settlement

See Item 60.1.d.

SubStructure Scour Notes

See Item 60.1.j.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour

See Item 60.1.j.

TRAFFIC SAFETY

Item 36a - Bridge Railing

See Item 58.8. There are no approach safety features at all four corners.

Photo Log

- Photo 1 : West fence South end and shoulder fill.
- Photo 2 : West fence, bent top rail.
- Photo 3 : East fence North end, disconnected top rail.
- Photo 4 : Southwest wingwall and shoulder fill.
- Photo 5 : Deck slab underside, North end looking West.
- Photo 6 : North breastwall West end.
- Photo 7 : North breastwall settlement crack, 6' in from West end.
- Photo 8 : Southwest wingwall.

CITY/TOWN UXBRIDGE	B.I.N. 6XB	BR. DEPT. NO. U-02-066	8.-STRUCTURE NO. U02066-6XB-MUN-BRI	INSPECTION DATE JUN 19, 2019
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PHOTOS

Photo 1: West fence South end and shoulder fill.



Photo 2: West fence, bent top rail.

CITY/TOWN UXBRIDGE	B.I.N. 6XB	BR. DEPT. NO. U-02-066	8.-STRUCTURE NO. U02066-6XB-MUN-BRI	INSPECTION DATE JUN 19, 2019
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PHOTOS

Photo 3: East fence North end, disconnected top rail.



Photo 4: Southwest wingwall and shoulder fill.

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PHOTOS

Photo 5: Deck slab underside, North end looking West.



Photo 6: North breastwall West end.

CITY/TOWN UXBRIDGE	B.I.N. 6XB	BR. DEPT. NO. U-02-066	8.-STRUCTURE NO. U02066-6XB-MUN-BRI	INSPECTION DATE JUN 19, 2019
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PHOTOS

Photo 7: North breastwall settlement crack, 6' in from West end.



Photo 8: Southwest wingwall.

Report Date: April 15, 2021

State Information				Classification				Code				
BDEPT#= U02066				Agency Br.No.				(112) NBIS Bridge Length				N
Town= Uxbridge				L.O.				(104) Highway System				N
B.I.N= 6XB				AASHTO= 018.8				(26) Functional Class - Rural Local				09
RANK= 0 H.I.= 74.0 %				FHWA Select List= N (6/21/2017)				(100) Defense Highway				0
(8) Structure Number				U020666XBMUNBRI				(101) Parallel Structure				N
(5) Inventory Route				151000000				(102) Direction of Traffic - 2-way traffic				2
(2) State Highway Department District				03				(103) Temporary Structure				N
(3) County Code 027 (4) Place code				71620				(105) Federal Lands Highways				0
(6) Features Intersected				WATER BACON BROOK				(110) Designated National Network				N
(7) Facility Carried				HWY SOUTH ST				(20) Toll - On free road				3
(9) Location				.5 M. S. OF ELMWOOD AVE				(21) Maintain - Town Agency				03
(11) Kilometerpoint				0000.000				(22) Owner - Town Agency				03
(12) Base Highway Network				N				(37) Historical Significance				undetermined
(13) LRS Inventory Route & Subroute				000000000000				Condition				Code
(16) Latitude				42 DEG 01 MIN 08.61 SEC				(58) Deck				7
(17) Longitude				71 DEG 36 MIN 48.75 SEC				(59) Superstructure				7
(98) Border Bridge State Code				Share %				(60) Substructure				5
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection				6
(62) Culverts												N
Structure Type and Material								Load Rating and Posting				Code
(43) Structure Type Main: Concrete				Code 101				(31) Design Load - Unknown				0
Slab				Jointless bridge type: Not applicable				(63) Operating Rating Method - Allowable Stress (AS)				2
(44) Structure Type Appr: Other				Code 000				(64) Operating Rating				00.0
(45) Number of spans in main unit				001				(65) Inventory Rating Method - Allowable Stress (AS)				2
(46) Number of approach spans				0000				(66) Inventory Rating				00.0
(107) Deck Structure Type - Concrete Cast-in-Place				Code 1				(70) Bridge Posting				0
(108) Wearing Surface / Protective System:								(41) Structure - Open				A
A) Type of wearing surface - Concrete				Code 1				Appraisal				Code
B) Type of membrane - None				Code 0				(67) Structural Evaluation				3
C) Type of deck protection - None				Code 0				(68) Deck Geometry				3
(27) Year Built				1940				(69) Underclearances, vert. and horiz.				N
(106) Year Reconstructed				0000				(71) Waterway adequacy				7
(42) Type of Service: On - Highway								(72) Approach Roadway Alignment				5
Under - Waterway				Code 15				(36) Traffic Safety Features				0 0 0 0
(28) Lanes: On Structure 02 Under structure				00				(113) Scour Critical Bridges				6
(29) Average Daily Traffic				000650				Inspections				
(30) Year of ADT 1995 (109) Truck ADT				05 %				(90) Inspection Date 06/19/19				(91) Frequency 24 MO
(19) Bypass, detour length				005 KM				(92) Critical Feature Inspection:				(93) CFI DATE
Geometric Data								(A) Fracture Critical Detail				N 00 MO A) 00/00/00
(48) Length of maximum span				0003.5 M				(B) Underwater Inspection				N 00 MO B) 00/00/00
(49) Structure Length				00004.8 M				(C) Other Special Inspection				N 00 MO C) 00/00/00
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M								(*) Other Inspection (I)				N 00 MO *) 00/00/00
(51) Bridge Roadway Width Curb to Curb				006.1 M				(*) Closed Bridge				N 00 MO *) 00/00/00
(52) Deck Width Out to Out				006.5 M				(*) UW Special Inspection				N 00 MO *) 00/00/00
(32) Approach Roadway Width (w/shoulders)				006.1 M				(*) Damage Inspection				MO *) 00/00/00
(33) Bridge Median - No median				Code 0				Rating Loads				
(34) Skew 00 DEG (35) Structure Flared				N				Report Date 00/00/00				H20 Type 3 Type 3S2 Type HS
(10) Inventory Route MIN Vert Clear				99.99 M				Operating				0.0 0.0 0.0 0.0
(47) Inventory Route Total Horiz Clear				06.1 M				Inventory				0.0 0.0 0.0 0.0
(53) Min Vert Clear Over Bridge Rdwy				99.99 M				Field Posting				
(54) Min Vert Underclear ref N				00.00 M				Status				Posting Date 00/00/00
(55) Min Lat Underclear RT ref N				00.0 M				2 Axle 3 Axle 5 Axle Single				
(56) Min Lat Underclear LT				00.0 M				Actual				
Navigation Data								Recommended				
(38) Navigation Control - No navigation control on waterway				Code 0				Missing Signs N				
(111) Pier Protection				Code				Misc.				
(39) Navigation Vertical Clearance				000.0 M				Bridge Name				N Anti-missile fence N Acrow Panel N Jointless Bridge
(116) Vert-lift Bridge Nav Min Vert Clear				M				Freeze/Thaw N : Not Applicable				
(40) Navigation Horizontal Clearance				0000.0 M				Accessibility (Needed/Used)				
								N / N Liftbucket				N / N Rigging N / N Other
								N / N Ladder				N / N Staging
								N / N Boat				N / N Traffic Control
								Y / Y Wader				N / N RR Flagperson Inspection Hours: 008
								N / N Inspector 50				N / N Police

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West Street over Laurel Brook
(Bridge No. N/A)

Priority 6

AVAILABLE INFORMATION

West Street is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a concrete arch founded on concrete abutments. The structure has an out-to-out width of 20' with a clear span of 12'-0". The hydraulic opening of the arch is approximately 5'-2" high by 12'-0" wide. At the time of inspection the flow was measured at 8" at the east entrance and 12" at the west entrance, while flowing eastward. The depth of fill over the structure is approximately 19".

The roadway width over the structure is approximately 18'-1" with no sidewalks and consists of an asphaltic wearing surface. The concrete headwalls extend from the top of the arch opening to above the roadway and act as a bridge railing. Due to advanced concrete deterioration, the height of the barrier above the roadway varies from approximately 3' to 4'. No approach guardrail is present.

No utilities are carried by the bridge. However, there is a drainage swale leading from the roadway behind the southwest abutment wall.

There are "No Trespassing" signs posted all along the roadway in the vicinity of the bridge.

FINDINGS

The overall condition of this structure is fair with several deficiencies noted.

The concrete arch is in fair condition. Its underside exhibits several areas of moderate scaling and efflorescence (See Photo 4). At the east end, there is a hairline longitudinal crack with efflorescence and extends to each of the abutment walls.

The abutments are in fair-to-poor condition and are exhibiting some signs of advanced deterioration. Both abutment walls have heavy abrasion at the water line and heavy scaling up to 12" above the waterline. The north abutment wall is deteriorated at the west corner up to 4" deep. The abrasion at the south abutment is worse with some section loss throughout. The southwest abutment corner has an area of loss and undermining with a maximum depth of about 16" (Photo 8). There is a large amount of debris at both entrances, including pieces of the culvert barrier wall that have fallen off. The debris is worse at the east entrance (Photo 9).

The concrete spandrel walls are in fair condition. Random areas of diagonal hairline cracking with efflorescence are typical on the spandrel walls and roof (Photo 5). The wingwalls are in fair condition, except for the southwest wingwall which is poor. The area

of undermining at the southwest abutment corner continues along the southwest wingwall. This area of undermining is substantial, as the depth of section loss reaches 21" which is through the entirety of the wall (Photos 6 and 7). Additionally, there is a full height crack between the southwest abutment corner and southwest wingwall. All other wingwalls exhibit scaling at the base, vegetation growth, and some cracks with efflorescence.

The roadway is narrow but in fair condition with several deficiencies noted; however, the barriers are in poor condition. The north approach has some cracking and an area of ponding. The area behind the southwest wingwall shows settlement and collapse of the fill (Photo 14). The pavement adjacent to this area shows settlement and undermining (Photo 15). The barriers typically exhibit cracks with efflorescence and areas of exposed aggregate. Furthermore, the top 12" of both barriers have deteriorated off into the brook. It is possible that vehicular collision has contributed to the advanced deterioration.

RECOMMENDATIONS

This structure is in fair condition with several deficiencies noted. The characteristics of some of the deficiencies may indicate the presence of Alkali Silica Reactions (ASR), a chemical reaction that results in the structural breakdown of concrete over time; however, it is not possible to confirm the presence of ASR without sampling the concrete and performing microscopic petrographic examinations. Due to the overall condition of the structure and possible presence of ASR, it is not practical to repair the spandrel walls or arch of the structure. BETA recommends a long-term replacement of this culvert. In the interim, BETA recommends that the following repairs are completed to extend the structures anticipated service life:

- Section loss/undermining of the south abutment and southwest wingwall should be filled in. This should be considered a high priority.
- Area behind the southwest wingwall should be cleaned out and filled in with control density fill to protect the roadway surface from further damage. This should be considered a high priority.
- Roadway width over the culvert is not adequate to carry two lanes of traffic. Add additional "BE PREPARED TO STOP" or "REDUCED SPEED" approach signs and stripe the roadway centerlines accordingly. All signage and striping should be in accordance with current MUTCD standards.
- BETA also recommends the addition of crash tested guardrail at all approaches and over the structure.

The clear span of this structure is greater than 10'-0". The Town should contact MassDOT to have a bridge number assigned to this structure and begin a bi-annual inspection program.

BUDGETARY COST ESTIMATE

Repairs

Construction:	\$32,000
Engineering:	<u>\$8,000</u>
Total:	\$40,000

Full-Replacement

Construction:	\$585,000
Engineering:	<u>\$150,000</u>
Total:	\$735,000

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Attachments

Locus Map

Inspection Photos

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HIGHWAY, LINCOLN, RI 02865

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F: 401.333.9225

BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

WEST STREET
OVER
LAUREL BROOK

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Photo 1 Looking West: East Culvert Elevation



Photo 2 Looking Northwest: North Abutment



Photo 3 Looking Southwest: South Abutment



Photo 4 Looking East: West Culvert Elevation

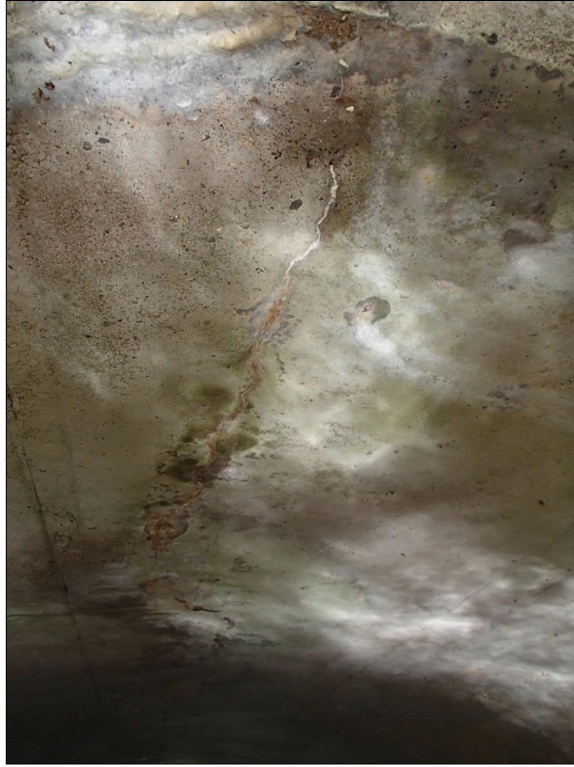


Photo 5 Looking West: Culvert Arch Roof



Photo 6 Looking South: Southwest Wingwall



Photo 7 Looking South: Southwest Wingwall Void



Photo 8 Looking South: Southwest Abutment Corner Void



Photo 9 Looking South: Debris at East Entrance to Culvert



Photo 10 Looking South: North Approach



Photo 11 Looking North: South Approach



Photo 12 Looking Northwest: West Barrier



Photo 13 Looking Northeast: East Barrier



Photo 14 Looking North: Collapse behind Southwest Wingwall



Photo 15 Looking East: Undermining of Pavement near Southwest Wingwall

Hartford Avenue East over the Blackstone Canal
(Bridge No. U-02-019)

Priority 7

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 63.5.

A bridge rating report dated April, 2010 was provided by MassDOT. Based on the calculations and the condition of the arch, the report concludes that the bridge capacity is satisfactory and does not require posting.

MassDOT most recently conducted a routine arch inspection on October 9, 2020 and a routine underwater inspection on April 5, 2018.

Hartford Avenue is classified as an Urban Minor Arterial according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a mortared stone masonry arch that was constructed circa 1870. The structure has an out-to-out width of 24'-0" with a clear span of 60'-0". The hydraulic opening of structure is approximately 18'-4" high by 60'-0" wide. The canal was flowing southward, but depth of flow was not measured.

The roadway width over the structure is 21'-3" with no sidewalk on either side and consists of an asphaltic wearing surface. The east approach is straight and clear, but the west approach exhibits a slight horizontal and vertical curve with limited visibility and contains several driveways.

Overhead wires run along the north fascia of the bridge. There is also a rip-rap waterway at the south side of the east approach. Approximately 200' downstream of the bridge there is a dam that feeds into the Blackstone River.

The bridge railing consists of mortared granite stone masonry walls that are 30" high and 16" thick. The approach guardrail is a standard SS highway shape and terminates just before reaching the granite wall. There is no transition between the approach rail and the bridge rail.

Only one sign is present in the vicinity and reads "Watch for Pedestrians". The sign is located directly adjacent to the structure in the west approach.

FINDINGS

The overall condition of the structure is fair with some minor deterioration noted.

The arch structure is in fair condition. The underside of the arch typically shows missing mortar, missing stones, and voids throughout. There are some random hairline cracks

throughout, but there was a crack noted at the southeast arch ring corner (Photo 9). Additionally, there is a coping stone falling off on the north face (Photo 10).

Both abutments are also in fair condition but did exhibit random voids, moderate loss of mortar, and areas of efflorescence (Photos 4 and 5). The east abutment also has a full height crack on the north end and a fractured stone at the center of the abutment. Some scour is present along both abutments, and is continually being monitored.

The training walls on the north side of the bridge typically show missing mortar and chinking stones up to 5' above the waterline. The wingwalls on the south side of the bridge have some missing mortar and chinking stones as well but with some vegetation. The southeast wall also has a large 7"x12"x66" deep void where it meets the arch structure (Photo 9).

Overall, the roadway is in fair condition with moderate pavement cracking throughout (Photo 12). The west approach has limited visibility. The east approach has an area of pavement patching where it goes over the bridge (Photo 13). The stone bridge railing on the south side has moderate mortar loss with voids and an area of full penetration (Photo 14).

RECOMMENDATIONS

The overall condition of the structure is fair. Based on recent BETA inspection findings, the April 2010 rating report, the 2020 routine arch inspection, and the 2018 routine underwater inspection, BETA recommends that the following items be addressed:

- Replace all loose stones and fill all voids to the stone bridge railing.
- Repair/Seal all cracks to the asphaltic wearing surface over the arch structure.
- Replace all missing and/or loose chinking stones in the stone arch, abutments, spandrel walls, training walls, and wingwalls.
- Repoint all masonry joints to the stone arch, abutments, spandrel walls, training walls, and wingwalls.
- Repair all cracked stones in the stone arch and abutments.
- Fill in any scour holes along both abutments.

BUDGETARY COST ESTIMATE

Repairs

Construction:	\$160,000
Engineering:	<u>\$40,000</u>
Total:	\$200,000

Attachments

Locus Map

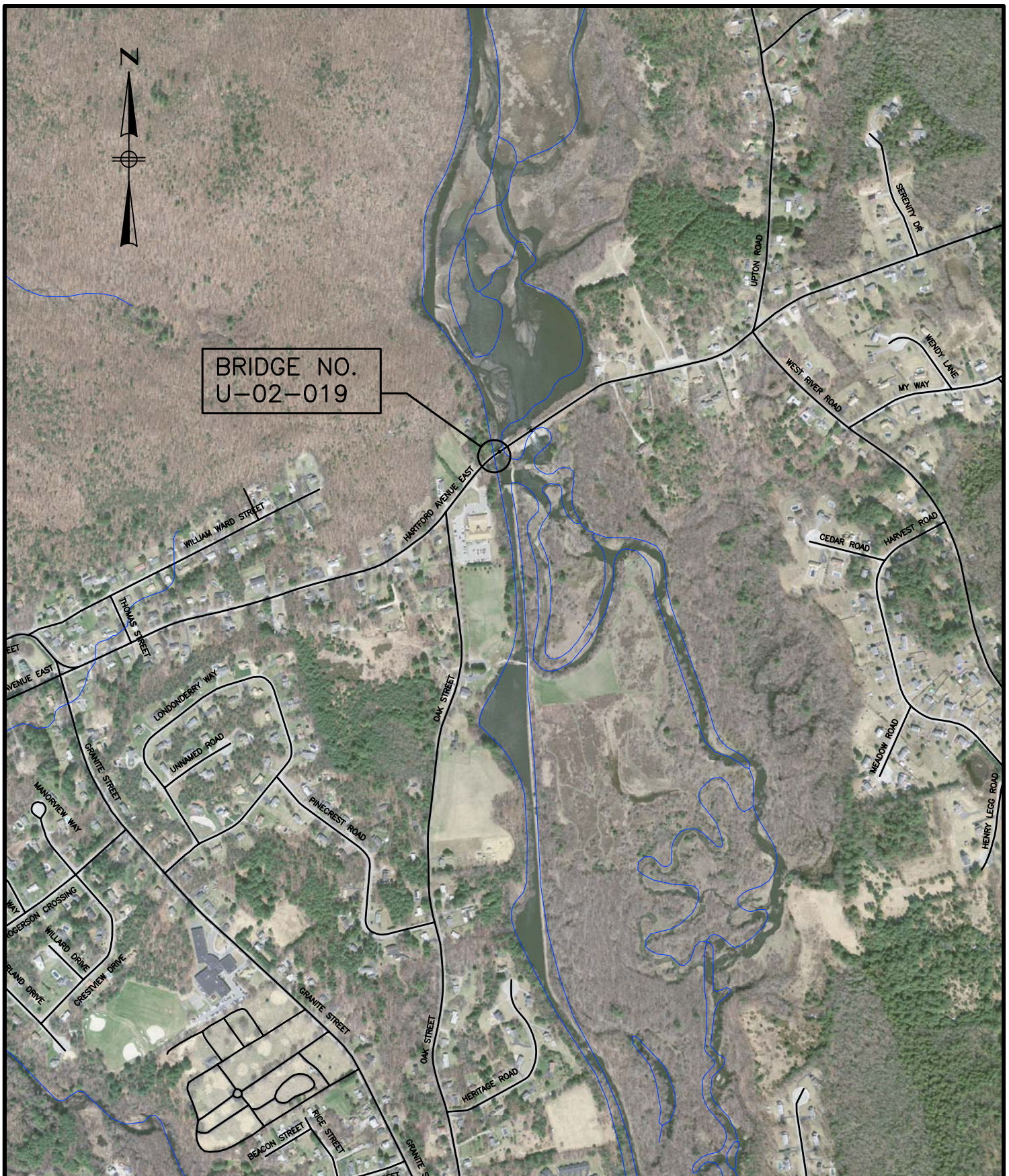
Inspection Photos

MassDOT Routine Arch Inspection Report Dated October 9, 2020

National Bridge Inventory Sheet Dated April 15, 2021

MassDOT Routine Underwater Inspection Report Dated April 5, 2018

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www.BETA-Inc.com

701 GEORGE WASHINGTON
HIGHWAY, LINCOLN, RI 02865

P: 401.333.2382

F: 401.333.9225

BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HARTFORD AVENUE EAST
OVER
THE BLACKSTONE CANAL

BRIDGE NO.
U-02-019

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Photo 1 Looking Northwest: South Elevation



Photo 2 Looking North: Southeast Face



Photo 3 Looking North: Southeast Wingwall



Photo 4 Looking Northwest: West Arch Abutment



Photo 5 Looking North: Southeast: East Arch Abutment



Photo 6 Looking West: Northwest Training Wall



Photo 7 Looking Southwest: Northwest Wingwall



Photo 8 Looking East: North Elevation & Northeast Wingwall



Photo 9 Looking North: Southeast Arch Bottom Corner



Photo 10 Looking South: North Coping Stone Movement



Photo 11 Looking East: West Approach



Photo 12 Looking East: Culvert Roadway



Photo 13 Looking East: Patching Near East Approach



Photo 14 Looking South: South Stone Barrier



Photo 15 Looking North: North Stone Barrier

STRUCTURES INSPECTION FIELD REPORT

2-DIST
03B.I.N.
1DK

ROUTINE ARCH INSPECTION

BR. DEPT. NO.
U-02-019

CITY/TOWN UXBRIDGE	8-STRUCTURE NO. U02019-1DK-MUN-NBI	11-Kilo. POINT 001.899	41-STATUS A:OPEN	90-ROUTINE INSP. DATE OCT 9, 2020
07-FACILITY CARRIED HWY HARTFORD AVE	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1870	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER BLACKSTONE CANAL	26-FUNCTIONAL CLASS Urban Minor Arterial	DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 811 : Masonry Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER D. Simkhovich	
107-DECK TYPE N : Not applicable	WEATHER Sunny	TEMP. (air) 8°C	TEAM MEMBERS T. TOLOCZKO	

ITEM 58 DECK <table border="1"> <tr> <td></td> <td>N</td> <td>DEF</td> </tr> <tr><td>1. Wearing Surface</td><td>5</td><td>M-P</td></tr> <tr><td>2. Deck Condition</td><td>N</td><td>-</td></tr> <tr><td>3. Spandrel Fill</td><td>6</td><td>S-P</td></tr> <tr><td>4. Curbs</td><td>N</td><td>-</td></tr> <tr><td>5. Median</td><td>N</td><td>-</td></tr> <tr><td>6. Sidewalks</td><td>N</td><td>-</td></tr> <tr><td>7. Parapets</td><td>5</td><td>S-P</td></tr> <tr><td>8. Railing</td><td>N</td><td>-</td></tr> <tr><td>9. Anti Missile Fence</td><td>N</td><td>-</td></tr> <tr><td>10. Drainage System</td><td>N</td><td>-</td></tr> <tr><td>11. Lighting Standards</td><td>N</td><td>-</td></tr> <tr><td>12. Utilities</td><td>N</td><td>-</td></tr> <tr><td>13. 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Railing	N	-	9. Anti Missile Fence	N	-	10. Drainage System	N	-	11. Lighting Standards	N	-	12. Utilities	N	-	13. Deck Joints	N	-	14.	N	-	15.	N	-	16.	N	-	N	S	N	N		DEF	a. Appr. Pavement Condition	5 S-P	b. Appr. Roadway Settlement	7 -	c. Appr. Sidewalk Settlement	N -	d.	N -		DEF	a. Condition of Welds	N -	b. Condition of Bolts	N -	c. Condition of Signs	N -	ITEM 59 SUPERSTRUCTURE <table border="1"> <tr> <td></td> <td>6</td> <td>DEF</td> </tr> <tr><td>1. Arch/Arch Ring</td><td>6</td><td>M-P</td></tr> <tr><td>2. Keystone Area</td><td>6</td><td>M-P</td></tr> <tr><td>3. Stringers</td><td>N</td><td>-</td></tr> <tr><td>4. Floorbeams</td><td>N</td><td>-</td></tr> <tr><td>5. Spandrel Walls</td><td>6</td><td>M-P</td></tr> <tr><td>6. Spring Lines</td><td>6</td><td>M-P</td></tr> <tr><td>7. Diaphragms/Cross Frames</td><td>N</td><td>-</td></tr> <tr><td>8. Conn Plt's, Gussets & Angles</td><td>N</td><td>-</td></tr> <tr><td>9. Pin & Hangers</td><td>N</td><td>-</td></tr> <tr><td>10. 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X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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ITEM 61
CHANNEL & CHANNEL PROTECTION

	Dive	Cur	DEF
1.Channel Scour	7	H	-
2.Embankment Erosion	6	7	-
3.Debris	7	7	-
4.Vegetation	7	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	7	H	-
7.Aggradation	7	H	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:
Tidal () High () Moderate () Low (X) None ()

ITEM 61 (Dive Report): **7** ITEM 61 (This Report): **7**

93b-U/W INSP. DATE: 04/05/2018

ITEM 36 TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	0	5	S-P
B. Transitions	0	N	-
C. Approach Guardrail	0	7	-
D. Approach Guardrail Ends	0	7	-

WEIGHT POSTING *Not Applicable* ☒

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/0000 **EJDMT Date:** 00/00/0000

At bridge	Other Advance								
<table style="width:100%; border-collapse: collapse;"> <tr> <th>E</th> <th>W</th> </tr> <tr> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> </tr> </table>	E	W			<table style="width:100%; border-collapse: collapse;"> <tr> <th>E</th> <th>W</th> </tr> <tr> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> </tr> </table>	E	W		
E	W								
E	W								

CLEARANCE POSTING ☒

	N	S	meter
Actual Field Measurement	ft in	ft in	
Posted Clearance	0 0	0 0	

Signs In Place
(Y=Yes, N=No, NR=Not Required)
Legibility/Visibility

At bridge	Advance								
<table style="width:100%; border-collapse: collapse;"> <tr> <th>N</th> <th>S</th> </tr> <tr> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> </tr> </table>	N	S			<table style="width:100%; border-collapse: collapse;"> <tr> <th>N</th> <th>S</th> </tr> <tr> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> <td style="border: 1px solid black; width: 50px; height: 50px;"></td> </tr> </table>	N	S		
N	S								
N	S								

ft	in
0	0

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	P	N
Inspector 50	Y	Y
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	Y	Y
Other:		
FLOAT TUBE	P	N

TOTAL HOURS 8

PLANS (Y/N): N

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:

RATING
Rating Report (Y/N): Y
Date: 04/01/2010
Inspection data at time of existing rating
I 58: - I 59: 6 I 60: 6 Date: 10/29/2008

Recommend for Rating or Rerating (Y/N): N
REASON: _____
If YES please give priority:
HIGH () MEDIUM () LOW ()

CONDITION RATING GUIDE

(For Items 58, 59, 60 and 61)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advanced section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:
M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.
S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.
C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.
C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:
I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].
A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].
P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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REMARKS

BRIDGE ORIENTATION

According to the rating report, the approaches are East and West and the elevations are North and South. This bridge is a single span granite masonry arch. The canal flows North to South.

GENERAL REMARKS

For all underwater channel and substructure elements, refer to the Underwater Inspection done on 4/5/2018.

ITEM 58 - DECK

Item 58.1 - Wearing Surface

The bituminous concrete wearing surface has moderate transverse, longitudinal and map cracking throughout, heaviest in the Westbound lane. **See photo 1.**

Item 58.3 - Spandrel Fill

See Item 59.10.

Item 58.7 - Parapets

There is missing pointing in several areas throughout both parapets.

South parapet: There are several loose and missing chinking stones, creating voids. Several of the stones are up to 2 inches out of horizontal alignment along the West half. **See photo 2.**

APPROACHES

Approaches a - Appr. Pavement Condition

The West approach has moderate longitudinal cracking in the Eastbound lane. There is 25' x 4' bituminous concrete patch in the Eastbound lane. **See photo 3.** The East approach has heavy cracking with areas of breakup. **See photo 4.**

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring

There are many missing chinking stones and areas of missing pointing throughout the underside, resulting in voids up to 10 inches wide, with up to 35 inches of penetration. There is evidence of minor loss of fill at some of the larger voids. There are isolated areas of minor active leakage and many areas of efflorescence staining, mostly in the lower 1/3 of the arch. **See photos 5 and 6.**

The South archring stone, four rows West of the keystone, and the South archring stone, 6 rows above the East breastwall, both have full width x 1/16 inch wide cracks. The North stone just West of the keystone area has a full width x 0.03 inch wide crack. **See photos 7 - 9.**

Item 59.2 - Keystone Area

See Item 59.1.

Item 59.5 - Spandrel Walls

There is one area of vegetation growth in the masonry joints at the West end of the South spandrel wall. **See photo 10.** There are several missing and loose chinking stones throughout both spandrel walls.

Item 59.6 - Spring Lines

See Item 59.1 and 60.1.d.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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REMARKS

Item 59.10 - Masonry Joints

There is moderate efflorescence staining throughout the underside of the arch. There are isolated voids between stones possibly due to dislodged chinking stones and cracked mortar resulting in voids with up to 35" of penetration.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

East breastwall: There is a full height x up to 1/4 inch wide crack to top stone (below springline) at the South end. There are five cracked stones to the North half, up to 3/8 inch wide, and three up to 3/8 inch wide cracks to two stones at the North end. **See photos 11 and 12.**

Item 60.1.e - Wingwalls

The wingwalls are flared extensions of the spandrel walls. See Item 59.5.

Item 60.1.g - Pointing

Most of the pointing is missing throughout both breastwalls.

TRAFFIC SAFETY

Item 36a - Bridge Railing

Both bridge rails consist of granite masonry parapets. See Item 58.7.

Item 36c - Approach Guardrail

The Southeast, Northwest and Northeast approach traffic safety features consist of single panel "w beam" guardrail not connected to stone parapets. The Southwest traffic safety feature consists of a continuation of the granite masonry parapet that is turned away from the traffic.

Photo Log

- Photo 1 : Cracking to the wearing surface.
- Photo 2 : Minor misalignment of the parapet stones. South parapet.
- Photo 3 : West approach pavement.
- Photo 4 : East approach pavement.
- Photo 5 : Underside of the arch. View from the Southeast corner.
- Photo 6 : Southeast corner of the arch.
- Photo 7 : Cracked South archring stone near the keystone.
- Photo 8 : Cracked South archring stone above East breastwall.
- Photo 9 : Cracked North archring stone West of keystone.
- Photo 10 : Vegetation growth at the West end of the South spandrel wall.
- Photo 11 : East breastwall.
- Photo 12 : East breastwall North end.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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PHOTOS

Photo 1: Cracking to the wearing surface.



Photo 2: Minor misalignment of the parapet stones. South parapet.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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PHOTOS

Photo 3: West approach pavement.



Photo 4: East approach pavement.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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PHOTOS

Photo 5: Underside of the arch. View from the Southeast corner.



Photo 6: Southeast corner of the arch.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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PHOTOS

Photo 7: Cracked South archring stone near the keystone.



Photo 8: Cracked South archring stone above East breastwall.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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PHOTOS

Photo 9: Cracked North archring stone West of keystone.



Photo 10: Vegetation growth at the West end of the South spandrel wall.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE OCT 9, 2020
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PHOTOS

Photo 11: East breastwall.



Photo 12: East breastwall North end.

Report Date: April 15, 2021

State Information										Classification										Code																			
BDEPT#= U02019										Agency Br.No.										(112) NBIS Bridge Length										Y									
Town= Uxbridge										L.O.										(104) Highway System										N									
B.I.N= 1DK										AASHTO= 063.5										(26) Functional Class - Urban Minor Arterial										16									
RANK= 562 H.I.= 61.8 %										FHWA Select List= Y (6/21/2017)										(100) Defense Highway										0									
(8) Structure Number										U020191DKMUNNBI										(101) Parallel Structure										N									
(5) Inventory Route										151000000										(102) Direction of Traffic - 2-way traffic										2									
(2) State Highway Department District										03										(103) Temporary Structure										N									
(3) County Code 027 (4) Place code										71620										(105) Federal Lands Highways										0									
(6) Features Intersected										WATER BLACKSTONE CANAL										(110) Designated National Network										N									
(7) Facility Carried										HWY HARTFORD AVE										(20) Toll - On free road										3									
(9) Location										200 FT E OF OAK ST										(21) Maintain - Town Agency										03									
(11) Kilometerpoint										0001.899										(22) Owner - Town Agency										03									
(12) Base Highway Network										N										(37) Historical Significance undetermined																			
(13) LRS Inventory Route & Subroute										000000000000																				Code									
(16) Latitude										42 DEG 05 MIN 52.81 SEC										(58) Deck										N									
(17) Longitude										71 DEG 37 MIN 22.92 SEC										(59) Superstructure										6									
(98) Border Bridge State Code										Share %										(60) Substructure										5									
(99) Border Bridge Structure No. #																				(61) Channel & Channel Protection										7									
																				(62) Culverts										N									
Structure Type and Material																				Load Rating and Posting										Code									
(43) Structure Type Main: Masonry										Code 811										(31) Design Load - Unknown										0									
Arch - Deck										Jointless bridge type: Not applicable										(63) Operating Rating Method - No rating analysis performed										5									
(44) Structure Type Appr: Other										Code 000										(64) Operating Rating										44.1									
(45) Number of spans in main unit										001										(65) Inventory Rating Method - Allowable Stress (AS)										2									
(46) Number of approach spans										0000										(66) Inventory Rating										37.7									
(107) Deck Structure Type - Not applicable										Code N										(70) Bridge Posting										5									
(108) Wearing Surface / Protective System:																				(41) Structure - Open										A									
A) Type of wearing surface - Not applicable=no deck										Code N										(67) Structural Evaluation										5									
B) Type of membrane - Not applicable=no deck										Code N										(68) Deck Geometry										2									
C) Type of deck protection - Not applicable=no deck										Code N										(69) Underclearances, vert. and horiz.										N									
																				(71) Waterway adequacy										7									
																				(72) Approach Roadway Alignment										6									
																				(36) Traffic Safety Features										0 0 0 0									
																				(113) Scour Critical Bridges										7									
Age and Service																				Inspections																			
(27) Year Built										1870										(90) Inspection Date 10/09/20										(91) Frequency 24 MO									
(106) Year Reconstructed										0000										(92) Critical Feature Inspection:										(93) CFI DATE									
(42) Type of Service: On - Highway																				(A) Fracture Critical Detail N 00 MO A)										00/00/00									
Under - Waterway										Code 15										(B) Underwater Inspection Y 36 MO B)										04/05/18									
(28) Lanes: On Structure 02 Under structure										00										(C) Other Special Inspection N 00 MO C)										00/00/00									
(29) Average Daily Traffic										008093										(*) Other Inspection (FLOOD) N 00 MO *)										04/05/10									
(30) Year of ADT 2017 (109) Truck ADT										06 %										(*) Closed Bridge N 00 MO *)										00/00/00									
(19) Bypass, detour length										006 KM										(*) UW Special Inspection N 00 MO *)										00/00/00									
																				(*) Damage Inspection										MO *) 00/00/00									
Geometric Data																				Rating Loads																			
(48) Length of maximum span										0018.3 M										Report Date 04/01/10										H20									
(49) Structure Length										00018.3 M										Operating										0.0									
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M																				Inventory										27.0									
(51) Bridge Roadway Width Curb to Curb										006.3 M										Type 3										Type 3S2									
(52) Deck Width Out to Out										007.2 M										Type HS																			
(32) Approach Roadway Width (w/shoulders)										006.4 M										0.0										0.0									
(33) Bridge Median - No median										Code 0										37.0										63.0									
(34) Skew 00 DEG (35) Structure Flared										N										42.0																			
(10) Inventory Route MIN Vert Clear										99.99 M										Field Posting																			
(47) Inventory Route Total Horiz Clear										06.3 M										Status LEGAL										Posting Date 06/21/10									
(53) Min Vert Clear Over Bridge Rdwy										99.99 M										2 Axle										3 Axle									
(54) Min Vert Underclear ref N										00.00 M										5 Axle										Single									
(55) Min Lat Underclear RT ref N										00.0 M										Actual																			
(56) Min Lat Underclear LT										00.0 M										Recommended																			
																				Missing Signs N																			
Navigation Data																				Misc.																			
(38) Navigation Control - No navigation control on waterway										Code 0										Bridge Name																			
(111) Pier Protection										Code										N Anti-missile fence N Acrow Panel N Jointless Bridge																			
(39) Navigation Vertical Clearance										000.0 M										Freeze/Thaw N : Not Applicable																			
(116) Vert-lift Bridge Nav Min Vert Clear										M										Accessibility (Needed/Used)																			
(40) Navigation Horizontal Clearance										0000.0 M										N / N Liftbucket N / N Rigging P / N Other																			
																				N / N Ladder N / N Staging FLOATTUBE																			
																				N / N Boat N / N Traffic Control																			
																				P / N Wader N / N RR Flagperson										Inspection									
																				Y / Y Inspector 50 Y / Y Police										Hours: 008									

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2-DIST
03B.I.N.
1DK

UNDERWATER OPERATIONS TEAM

ROUTINE UNDERWATER INSPECTION REPORT

BR. DEPT. NO.
U-02-019

CITY/TOWN UXBRIDGE		8-STRUCTURE NO. U02019-1DK-MUN-NBI		LEVEL OF INSPECTION II		93B-DATE INSPECTED APR 5, 2018	
07-FACILITY CARRIED HWY HARTFORD AVE		ACCESS TO BRIDGE S.W. EMBANKMENT		UNDERWATER OPERATIONS ENGINEER RANDI E. BONICA			
06-FEATURES INTERSECTED WATER BLACKSTONE CANAL		DEPTH 2 m	VISIBILITY 0.3 m	TEAM LEADER (DIVE MASTER) WILLIAM J. COLLERAN		Report submitted by:	
BOTTOM CONDITION BOULDERS, SILT		CURRENT SLIGHT		TEAM MEMBERS B. FITZGERALD, Z. GIKAS, R. E. BONICA			

ITEM 60**SUBSTRUCTURE**

		6	DEF
1. Abutments	6		
a. Pedestals	N	-	
b. Bridge Seats	N	-	
c. Backwalls	N	-	
d. Breastwalls	6	M-P	
e. Wingwalls	6	M-P	
f. Slope Paving/Rip-Rap	7	-	
g. Pointing	5	M-P	
h. Footings	H	-	
i. Piles	N	-	
j. Scour	7	-	
k. Settlement	6	M-P	
l.	N	-	
2. Piers or Bents	N		
a. Pedestals	N	-	
b. Caps	N	-	
c. Columns	N	-	
d. Stems/Webs/Pierwalls	N	-	
e. Pointing	N	-	
f. Footing	N	-	
g. Piles	N	-	
h. Scour	N	-	
i. Settlement	N	-	
j.	N	-	
k.	N	-	
3. Pile Bents	N		
a. Pile Caps	N	-	
b. Piles	N	-	
c. Diagonal Bracing	N	-	
d. Horizontal Bracing	N	-	
e. Fasteners	N	-	

UNDERMINING (Y/N)

N

ITEM 61**CHANNEL & CHANNEL PROTECTION**

		7	DEF
1. Channel Scour	7	-	
2. Embankment Erosion	6	-	
3. Debris	7	-	
4. Vegetation	7	-	
5. Utilities	N	-	
6. Rip-Rap/Slope Protection	7	-	
7. Aggradation	7	-	
8. Fender System	N	-	
a. Piles	N	-	
b. Diagonal Bracing	N	-	
c. Horizontal Bracing	N	-	
d. Wales	N	-	
e. Fasteners	N	-	
f. Ladders	N	-	
9.	N	-	

ITEM 59**SUPERSTRUCTURE**

		N	DEF
		N	-
		N	-
		N	-

ITEM 62**CULVERTS**

		N	DEF
1. Roof	N	-	
2. Floor	N	-	
3. Walls	N	-	
4. Headwall	N	-	
5. Wingwall	N	-	
6. Pipe	N	-	
7. Protective Coating	N	-	
8. Embankment	N	-	
9. Wearing Surface	N	-	
10. Railing	N	-	
11. Sidewalks	N	-	
12. Utilities	N	-	
13. Member Alignment	N	-	
14. Deformation	N	-	
15. Scour	N	-	
16. Settlement	N	-	
17.	N	-	
18.	N	-	
UNDERMINING (Y/N)			N

DEFICIENCY REPORTING GUIDE**DEFICIENCY:** A defect in a structure that requires corrective action.**CATEGORIES OF DEFICIENCIES:****M= Minor Deficiency-** Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.**S= Severe/Major Deficiency-** Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.**C-S= Critical Structural Deficiency-** A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.**C-H= Critical Hazard Deficiency-** A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.**URGENCY OF REPAIR:****I=Immediate-** [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]**A=ASAP-** [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]**P=Prioritize-** [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE APR 5, 2018
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REMARKS

GENERAL REMARKS

- 1) Orientation - Abutments are labeled left and right when facing downstream.
- 2) Sta 10+00 is at the downstream end.
- 3) Single span granite arch bridge. The main flow of the river is through bridge U-02-018 which is about 200' to the east. A dam is located approximately 150' downstream.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

Left Abutment:

There is a 1/4" crack in the 1st block below the springline with 1/4" outward displacement at Sta 10+13.5. There is a 3/8" crack in the 2nd block below the springline and a 1/2" crack in the 4th block below the springline at Sta 10+13.5. There is a fractured stone at the upstream corner with 0.4' outward displacement. There are several 1/8" cracks in the 1st block below the springline and one 1/16" crack in the 2nd block below the springline at Sta 10+15.5.

Right Abutment:

Generally in good condition. There is timber sheeting exposed from Sta 10+16 ft to 10+24 with a max. height of 0.5'. (See sketch).

Item 60.1.e - Wingwalls

Left Abutment:

The upstream wing and retaining wall has several loose chinking stones. There are two 1/4" wide vertical cracks to the 1st block below the springline at the upstream left wing and one 1/4" vertical crack to the 1st block below the springline at the downstream left wing. (See Sketch).

Right Abutment:

Generally in good condition.

Item 60.1.f - Slope Paving/Rip-Rap

There are scattered boulders along length of both breastwalls.

Item 60.1.g - Pointing

Left Abutment:

There are several small voids between the granite blocks from missing chinking stones with a max penetration of 3.3'. Most of the pointing in the joints below the waterline is missing.

Right Abutment:

Some pointing in the joints below the waterline is missing.

Item 60.1.k - Settlement

Left Abutment:

There is a 1/4" crack in the 1st block below the springline with 1/4" outward displacement at Sta 10+13.5. There is a 3/8" crack in the 2nd block below the springline and a 1/2" crack in the 4th block below the springline at Sta 10+13.5. There is a fractured stone at the upstream corner with 0.4' outward displacement. There are several 1/8" cracks in the 1st block below the springline and one 1/16" crack in the 2nd block below the springline at Sta 10+15.5.

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE APR 5, 2018
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REMARKS**ITEM 61 - CHANNEL AND CHANNEL PROTECTION****Item 61.2 - Embankment Erosion**

Both downstream embankments have some moderate undercutting, heaviest to the downstream right.

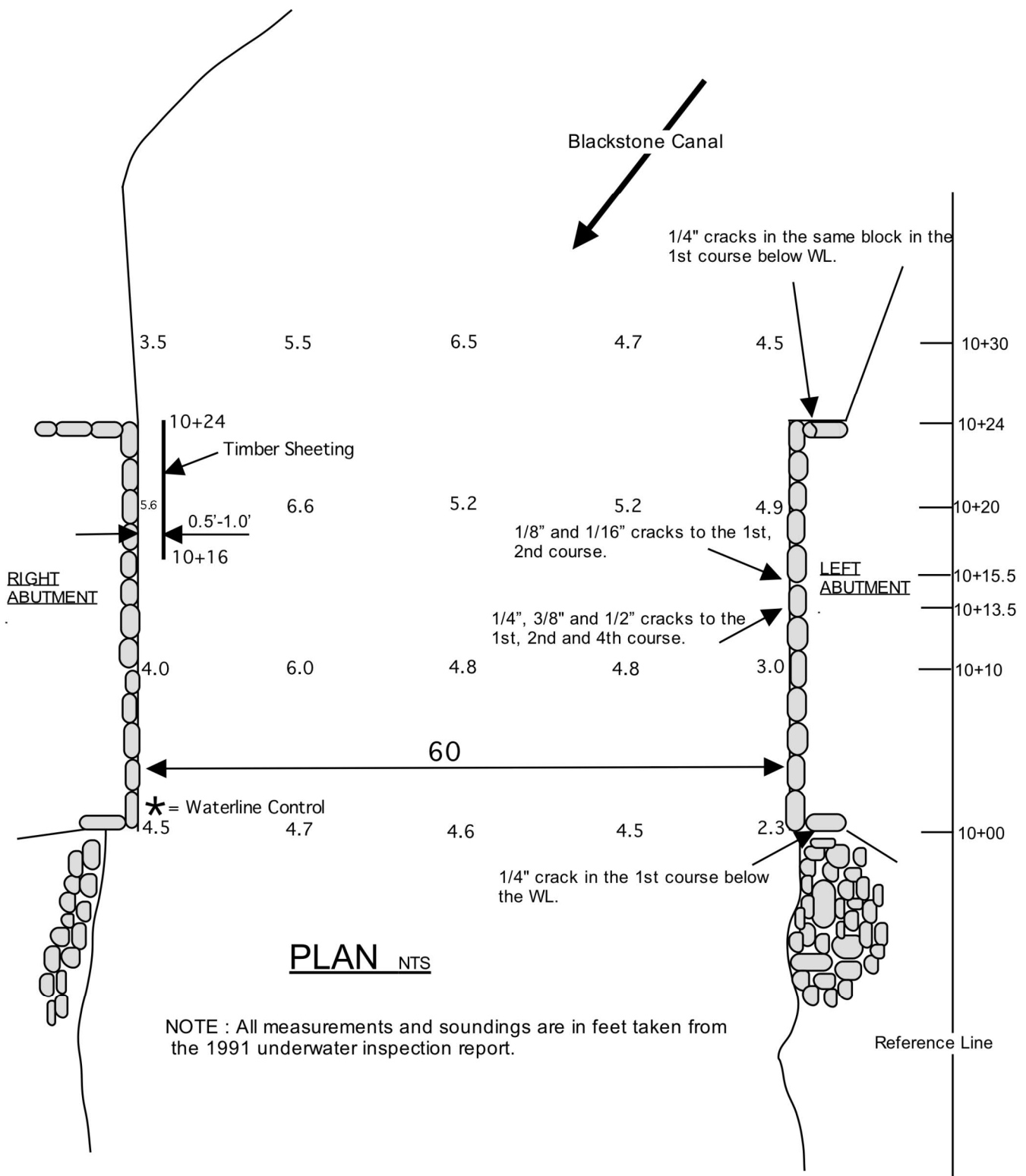
Sketch / Chart Log

Sketch 1 : PLAN

Chart 1 : SCOUR MONITORING

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE APR 5, 2018
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SKETCHES



Sketch 1: PLAN

CITY/TOWN UXBRIDGE	B.I.N. 1DK	BR. DEPT. NO. U-02-019	8.-STRUCTURE NO. U02019-1DK-MUN-NBI	INSPECTION DATE APR 5, 2018
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CHARTS

Scour Monitoring Chart @ STA 10+20

ENGLISH MEASUREMENTS (feet)

OFFSETS	1/1991	3/1994	4/1997	4/2000	3/2003	3/2006	2/2009	2/2012
RIGHT ABUTMENT	5.6	5.6	5.6	5.6	5.9	5.5	5.5	5.6
1/4 SPAN	6.6	7.2	6.6	6.2	6.2	6.0	6.2	6.3
1/2 SPAN	5.2	4.3	4.3	4.3	4.9	3.5	5.0	4.8
3/4 SPAN	5.2	4.9	4.9	4.9	4.9	4.5	4.7	4.7
LEFT ABUTMENT	4.9	4.9	5.2	4.9	5.2	5.3	5.2	5.2
Y	1.1	-0.3	0.4	1.3	1.0	1.6	1.5	1.6
Correction	-	-1.4	-0.7	0.1	-0.1	0.5	0.4	0.5

OFFSETS	4/2015	4/2018						
RIGHT ABUTMENT	5.6	5.6						
1/4 SPAN	6.1	6.0						
1/2 SPAN	4.5	5.6						
3/4 SPAN	4.6	4.4						
LEFT ABUTMENT	4.7	5.4						
Y	0.9	0.9						
Correction	-0.2	-0.2						

Notes

1. Water control shot (Y) = waterline to springline at Sta 10+00, Right Abutment. Waterline Y in 1994 was above springline. All other years, waterline was below springline.
2. For comparison all soundings are adjusted to 1991 water level.
3. Station 10+00 is located at downstream end.

Chart 1: SCOUR MONITORING

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Hecla Street over the West River
(Bridge No. U-02-014)

Priority 8

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 78.9.

The bridge is currently posted for a 14 ton weight limit. However, current Structural Inventory and Appraisal (SI&A) data indicates a load rating was performed in 2014 with no required load postings. Per current data, this bridge does not require any load restrictions.

Hecla Street is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a mortared stone masonry arch. The date of construction is circa 1930. The structure has an out-to-out width of 24'-0" with a clear span of 32'-0". The hydraulic opening of structure is approximately 14'-5" high by 32'-0" wide. The depth of flow at the time of inspection was 3' and flowing westward. The depth of fill over the structure is approximately 25".

The roadway width over the structure is 14'-0" and consists of an asphaltic wearing surface. Sidewalks are not accessible on either side. The bridge railing consists of chain link fence mounted to the top of the arch spandrel walls. Jersey barriers are present at both curb lines and result in the narrow roadway width listed above. Alignment at both approaches is fairly straight and the intersection with Brown Terrace is located approximately 50' south of the structure.

Overhead wires run along the east fascia of the bridge and there is a USGS gauging station at the northeast corner. Additionally, there is a smaller arch located approximately 50' south of this structure. The two arches share spandrel walls. The stream is completely dry at the smaller arch with heavy vegetation growth.

There are several signs posted at this bridge. At both approaches, there are signs that read "Weight Limit 14 Tons", "Yield to Pedestrians", and "Caution Narrow Bridge". Additionally, at the north approach, there are also signs that read "Sidewalk Closed" and "Yield to Oncoming Traffic" (Photos 16 & 17).

FINDINGS

The overall condition of the structure is fair with several deficiencies noted.

The masonry arch structure is in fair condition and shows little shifting of stones. On the underside of the arch, mortar was laid over the entire surface trapping moisture. Consequently, there are random areas of moisture stains and efflorescence (Photo 12).

Additionally, there are areas of missing pointing and chinking stones, loose mortar, and voids between. There is a 6'x6'x3" deep area of fragmenting stones at mid-span near the west opening. Some of the voids are more pronounced at the underside of the crown arch towards midspan.

A concrete wall is present in front of the north abutment as a means of scour protection (Photo 4). The concrete wall has minor scaling throughout. Both stone abutments exhibit missing mortar, missing chinking stones, and voids up to 18". The south abutment has small voids at the waterline and heavy water staining (Photo 11). Heavy debris is typical in the channel (Photo 13) and no scour was detected at the base of the concrete walls.

The stone wingwalls are in fair-to-poor condition with missing mortar, missing stones, and voids typical throughout. The northeast wingwall has a crack where it meets the arch ring (Photo 10). The wingwalls & east spandrel walls have minor cracking at the top and approximately 6" of outward displacement that is worse at the south end. Both spandrel walls also show random missing mortar and chinking stones. A concrete slab supports the roadway at the top of the northwest wall and is severely undermined (Photo 14).

The condition of the roadway is poor, especially over the arch. There is random longitudinal, transverse, and map cracking throughout the pavement. There is moderate heaving and random settlement throughout as well, which is most noticeable around the crown over the culvert. The bridge railing consists of only a chain link fence and is not a crash tested system. In addition, stone displacement at the top of the spandrel wall has compromised the railing base/foundation (Photo 19). The edge of pavement at the east fascia is fragmented, and the roadway appears unstable. Jersey barriers at both curb lines have created a large reduction of lane width and have made both sidewalks inaccessible to pedestrians (Photos 21 and 22). Pedestrian traffic is restricted to sub-standard vehicular travel lanes and poses a severe safety hazard.

RECOMMENDATIONS

A 100% Bridge Betterment design was complete in March 2012 for this structure to address deficiencies and overall rehabilitation. The design was performed in accordance with MassDOT standards but never advanced to PS&E and/or Advertising. The scope of rehabilitation measures was as follows:

- Replace all missing and/or loose chinking stones in the stone arch, wingwalls, and abutments.
- Repoint all masonry joints as required.
- Addition of a new concrete slab spanning over the existing arch.
- Widen the bridge cross section by 8" to accommodate two 11 foot travel lanes. If feasible, an appropriate overhang providing up to 11'-6" travel lanes should be designed.

- Design and install bridge safety curb with S3-TL4 rail on both sides of existing bridge.
- Design guardrail transition to accommodate existing intersection with Brown Terrace at South approach.
- Mill and pave asphalt overlay to match existing roadway profile and alignment. Replace approach pavement to limits as required.

Given the scope of work listed above, BETA recommends the town move forward with the completed design for rehabilitation.

BUDGETARY COST ESTIMATE

Rehabilitation

Construction:	\$865,000
Engineering:	<u>\$220,000</u>
Total:	\$1,085,000

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Attachments

Locus Map

Inspection Photos

MassDOT Routine Arch Inspection Report Dated June 16, 2020

National Bridge Inventory Sheet Dated April 15, 2021

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BRIDGE NO.
U-02-014



www.BETA-Inc.com

701 GEORGE WASHINGTON
HIGHWAY, LINCOLN, RI 02865
P: 401.333.2382
F: 401.333.9225

BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HECLA STREET
OVER
THE WEST RIVER

BRIDGE NO.
U-02-014

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Photo 1 Looking West: East Culvert Elevation



Photo 2 Looking East: West Culvert Elevation



Photo 3 Looking North: North Abutment



Photo 4 Looking South: South Abutment



Photo 5 Looking North: North Spandrel Wall



Photo 6 Looking South: South Spandrel Wall



Photo 7 Looking West: Southeast Wingwall



Photo 8 Looking West: Northeast Wingwall



Photo 9 Looking North: Northwest Wingwall

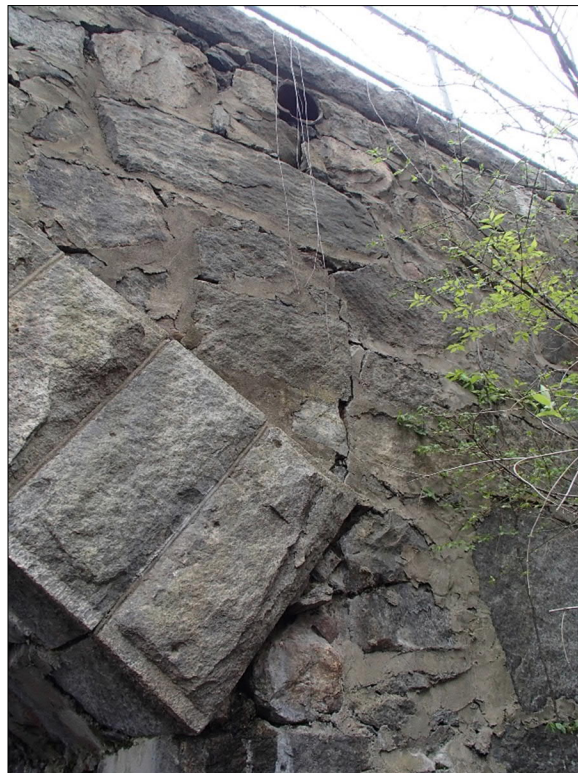


Photo 10 Looking Northwest: Crack at Northeast Corner



Photo 11 Looking South: South Abutment Water Stains



Photo 12 Looking North: Northwest Spandrel Roof



Photo 13 Looking West: Debris in River



Photo 14 Looking Northeast: Undermining of Slab near Northwest Wall



Photo 15 Looking South: Pavement over Culvert



Photo 16 Looking South: North Approach



Photo 17 Looking North: South Approach



Photo 18 Looking North: Collision Damage on Southeast Approach Guardrail



Photo 19 Looking South: East Fence



Photo 20 Looking Southwest: West Fence



Photo 21 Looking South: West Barriers



Photo 22 Looking South: East Barriers

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STRUCTURES INSPECTION FIELD REPORT

2-DIST
03B.I.N.
1J3

ROUTINE ARCH INSPECTION

BR. DEPT. NO.
U-02-014

CITY/TOWN UXBRIDGE	8-STRUCTURE NO. U02014-1J3-MUN-NBI	11-Kilo. POINT 000.418	41-STATUS P:POSTED	90-ROUTINE INSP. DATE JUN 16, 2020
07-FACILITY CARRIED HWY HECLA ST	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1930	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER WEST RIVER	26-FUNCTIONAL CLASS Urban Local	DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 811 : Masonry Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER D. Simkhovich	
107-DECK TYPE N : Not applicable	WEATHER Clear	TEMP. (air) 25°C	TEAM MEMBERS T. TOLOCZKO	

ITEM 58 DECK <table border="1"> <tr> <td></td> <td>N</td> <td>DEF</td> </tr> <tr><td>1. Wearing Surface</td><td>4</td><td>S-A</td></tr> <tr><td>2. Deck Condition</td><td>N</td><td>-</td></tr> <tr><td>3. Spandrel Fill</td><td>6</td><td>S-P</td></tr> <tr><td>4. Curbs</td><td>N</td><td>-</td></tr> <tr><td>5. Median</td><td>N</td><td>-</td></tr> <tr><td>6. Sidewalks</td><td>N</td><td>-</td></tr> <tr><td>7. Parapets</td><td>N</td><td>-</td></tr> <tr><td>8. Railing</td><td>4</td><td>S-A</td></tr> <tr><td>9. Anti Missile Fence</td><td>N</td><td>-</td></tr> <tr><td>10. Drainage System</td><td>N</td><td>-</td></tr> <tr><td>11. Lighting Standards</td><td>N</td><td>-</td></tr> <tr><td>12. Utilities</td><td>N</td><td>-</td></tr> <tr><td>13. Deck Joints</td><td>N</td><td>-</td></tr> <tr><td>14.</td><td>N</td><td>-</td></tr> <tr><td>15.</td><td>N</td><td>-</td></tr> <tr><td>16.</td><td>N</td><td>-</td></tr> </table> CURB REVEAL (In millimeters) <table border="1"> <tr> <td>E</td> <td>W</td> </tr> <tr> <td>N</td> <td>N</td> </tr> </table> APPROACHES <table border="1"> <tr> <td></td> <td>DEF</td> </tr> <tr><td>a. Appr. Pavement Condition</td><td>4 S-A</td></tr> <tr><td>b. Appr. Roadway Settlement</td><td>5 S-P</td></tr> <tr><td>c. Appr. Sidewalk Settlement</td><td>N -</td></tr> <tr><td>d.</td><td>N -</td></tr> </table> OVERHEAD SIGNS (Attached to bridge) (Y/N) N <table border="1"> <tr> <td></td> <td>DEF</td> </tr> <tr><td>a. Condition of Welds</td><td>N -</td></tr> <tr><td>b. Condition of Bolts</td><td>N -</td></tr> <tr><td>c. Condition of Signs</td><td>N -</td></tr> </table>		N	DEF	1. Wearing Surface	4	S-A	2. Deck Condition	N	-	3. Spandrel Fill	6	S-P	4. Curbs	N	-	5. Median	N	-	6. Sidewalks	N	-	7. Parapets	N	-	8. Railing	4	S-A	9. Anti Missile Fence	N	-	10. Drainage System	N	-	11. Lighting Standards	N	-	12. Utilities	N	-	13. Deck Joints	N	-	14.	N	-	15.	N	-	16.	N	-	E	W	N	N		DEF	a. Appr. Pavement Condition	4 S-A	b. Appr. Roadway Settlement	5 S-P	c. Appr. Sidewalk Settlement	N -	d.	N -		DEF	a. Condition of Welds	N -	b. Condition of Bolts	N -	c. Condition of Signs	N -	ITEM 59 SUPERSTRUCTURE <table border="1"> <tr> <td></td> <td>6</td> <td>DEF</td> </tr> <tr><td>1. Arch/Arch Ring</td><td>6</td><td>M-P</td></tr> <tr><td>2. Keystone Area</td><td>7</td><td>-</td></tr> <tr><td>3. Stringers</td><td>N</td><td>-</td></tr> <tr><td>4. Floorbeams</td><td>N</td><td>-</td></tr> <tr><td>5. Spandrel Walls</td><td>5</td><td>S-A</td></tr> <tr><td>6. Spring Lines</td><td>7</td><td>-</td></tr> <tr><td>7. Diaphragms/Cross Frames</td><td>N</td><td>-</td></tr> <tr><td>8. Conn Plt's, Gussets & Angles</td><td>N</td><td>-</td></tr> <tr><td>9. Pin & Hangers</td><td>N</td><td>-</td></tr> <tr><td>10. 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X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN UXBRIDGE	B.I.N. 1J3	BR. DEPT. NO. U-02-014	8.-STRUCTURE NO. U02014-1J3-MUN-NBI	INSPECTION DATE JUN 16, 2020
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ITEM 61 CHANNEL & CHANNEL PROTECTION <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th></th> <th>Dive</th> <th>Cur</th> <th>DEF</th> </tr> <tr><td>1.Channel Scour</td><td>N</td><td>7</td><td>-</td></tr> <tr><td>2.Embankment Erosion</td><td>N</td><td>7</td><td>-</td></tr> <tr><td>3.Debris</td><td>N</td><td>6</td><td>M-P</td></tr> <tr><td>4.Vegetation</td><td>N</td><td>7</td><td>-</td></tr> <tr><td>5.Utilities</td><td>N</td><td>N</td><td>-</td></tr> <tr><td>6.Rip-Rap/Slope Protection</td><td>N</td><td>N</td><td>-</td></tr> <tr><td>7.Aggradation</td><td>N</td><td>7</td><td>-</td></tr> <tr><td>8.Fender System</td><td>N</td><td>N</td><td>-</td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table> STREAM FLOW VELOCITY: Tidal () High () Moderate () Low (X) None () ITEM 61 (Dive Report): N ITEM 61 (This Report): 7 93b-U/W INSP. DATE: 00/00/0000		Dive	Cur	DEF	1.Channel Scour	N	7	-	2.Embankment Erosion	N	7	-	3.Debris	N	6	M-P	4.Vegetation	N	7	-	5.Utilities	N	N	-	6.Rip-Rap/Slope Protection	N	N	-	7.Aggradation	N	7	-	8.Fender System	N	N	-													<div style="border: 1px solid black; padding: 5px; width: 30px; margin: 0 auto;">7</div>	ITEM 36 TRAFFIC SAFETY <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th></th> <th>36</th> <th>COND</th> <th>DEF</th> </tr> <tr><td>A. Bridge Railing</td><td>0</td><td>4</td><td>S-A</td></tr> <tr><td>B. Transitions</td><td>N</td><td>N</td><td>-</td></tr> <tr><td>C. Approach Guardrail</td><td>0</td><td>4</td><td>S-A</td></tr> <tr><td>D. Approach Guardrail Ends</td><td>0</td><td>4</td><td>S-A</td></tr> </table> WEIGHT POSTING <i>Not Applicable</i> <input type="checkbox"/> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th></th> <th>H</th> <th>3</th> <th>3S2</th> <th>Single</th> </tr> <tr><td>Actual Posting</td><td>N</td><td>N</td><td>N</td><td>14</td></tr> <tr><td>Recommended Posting</td><td>N</td><td>N</td><td>N</td><td>N</td></tr> </table> Waived Date: 00/00/0000 EJDMT Date: 00/00/0000 <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> At bridge <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>N</td><td>S</td></tr> <tr><td>N</td><td>N</td></tr> <tr><td style="text-align: center;">/</td><td style="text-align: center;">/</td></tr> </table> </div> <div style="text-align: center;"> Other Advance <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>N</td><td>S</td></tr> <tr><td>N</td><td>N</td></tr> <tr><td style="text-align: center;">/</td><td style="text-align: center;">/</td></tr> </table> </div> </div> Signs In Place (Y=Yes, N=No, NR=Not Required) Legibility/Visibility <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td style="text-align: center;">/</td><td style="text-align: center;">/</td></tr> </table>		36	COND	DEF	A. Bridge Railing	0	4	S-A	B. Transitions	N	N	-	C. Approach Guardrail	0	4	S-A	D. Approach Guardrail Ends	0	4	S-A		H	3	3S2	Single	Actual Posting	N	N	N	14	Recommended Posting	N	N	N	N	N	S	N	N	/	/	N	S	N	N	/	/	/	/	ACCESSIBILITY (Y/N/P) <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th></th> <th>Needed</th> <th>Used</th> </tr> <tr><td>Lift Bucket</td><td>N</td><td>N</td></tr> <tr><td>Ladder</td><td>P</td><td>N</td></tr> <tr><td>Boat</td><td>N</td><td>N</td></tr> <tr><td>Waders</td><td>Y</td><td>Y</td></tr> <tr><td>Inspector 50</td><td>N</td><td>N</td></tr> <tr><td>Rigging</td><td>N</td><td>N</td></tr> <tr><td>Staging</td><td>N</td><td>N</td></tr> <tr><td>Traffic Control</td><td>N</td><td>N</td></tr> <tr><td>RR Flagger</td><td>N</td><td>N</td></tr> <tr><td>Police</td><td>N</td><td>N</td></tr> <tr><td>Other:</td><td> </td><td> </td></tr> <tr><td> </td><td>N</td><td>N</td></tr> </table> TOTAL HOURS 8 PLANS (Y/N): Y (V.C.R.) (Y/N): N TAPE#: _____ List of field tests performed: 		Needed	Used	Lift Bucket	N	N	Ladder	P	N	Boat	N	N	Waders	Y	Y	Inspector 50	N	N	Rigging	N	N	Staging	N	N	Traffic Control	N	N	RR Flagger	N	N	Police	N	N	Other:				N	N
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RATING Rating Report (Y/N): Y Date: 12/01/2014 Inspection data at time of existing rating I 58: - I 59: 6 I 60: 6 Date: 06/02/2014	Recommend for Rating or Rerating (Y/N): N REASON: _____
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CONDITION RATING GUIDE			(For Items 58, 59, 60 and 61)
CODE	CONDITION	DEFECTS	
N	NOT APPLICABLE		
G 9	EXCELLENT	Excellent condition.	
G 8	VERY GOOD	No problem noted.	
G 7	GOOD	Some minor problems.	
F 6	SATISFACTORY	Structural elements show some minor deterioration.	
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.	
P 4	POOR	Advanced section loss, deterioration, spalling or scour.	
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.	
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.	
0	FAILED	Out of service - beyond corrective action.	

DEFICIENCY REPORTING GUIDE	
DEFICIENCY:	A defect in a structure that requires corrective action.
CATEGORIES OF DEFICIENCIES:	
M= Minor Deficiency	Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.
S= Severe/Major Deficiency	Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.
C-S= Critical Structural Deficiency	A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.
C-H= Critical Hazard Deficiency	A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.
URGENCY OF REPAIR:	
I = Immediate-	[Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].
A = ASAP-	[Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].
P = Prioritize-	[Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

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REMARKS

BRIDGE ORIENTATION

According to the rating report, the approaches are South and North and the elevations are West and East. This structure is a single span masonry arch. The river flows from East to West.

GENERAL REMARKS

There is Jersey barrier on both sides of the wearing surface across the entire structure, placing traffic in a single center lane. There are speed reduction signs at both approaches. **See photos 1 & 2.**

There are 14 ton posting signs at both approaches, but based on the NBIS letter dated 10/18/19 no posting is required.

ITEM 58 - DECK

Item 58.1 - Wearing Surface

The bituminous concrete wearing surface has heavy transverse, map, and longitudinal cracking throughout, some sealed.

The single lane has minor to heavy wheel rutting up to 4" deep with unevenness throughout. There are bituminous patches on both sides of the keystone area up to 20' long x 4' wide. **See photo 3.**

Item 58.3 - Spandrel Fill

See Item 58.1.

Item 58.8 - Railing

The original railing is chain link fence continuous with the approaches. Temporary Jersey barrier currently serves as the bridge railing and restricts traffic to a single center lane. Several of the Jersey barriers are not linked (missing vertical connector rods).

The East fence is leaning up to 17" outwards at the South end. The West fence is leaning up to 8" outwards at the North end. **See photo 4.** See Item 59.5.

APPROACHES

Approaches a - Appr. Pavement Condition

Both approaches have moderate to heavy longitudinal, transverse, and map cracking (some sealed) with minor to moderate settlement throughout. Both approaches have bituminous patches, up to 25' long x 4' wide in the South approach. **See photos 5 & 6.**

There is moderate unevenness (settlement and heaving) at the Southeast corner, directly over the most severe capstone displacement. See Item 59.5.

Approaches b - Appr. Roadway Settlement

See Approaches a.

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring

The masonry arch underside has a partial concrete cover. The concrete cover is deteriorating up to 5' from both arch sides, heaviest on the West side. The deteriorated areas have moderate efflorescence and evidence of minor water leakage. **See photo 7.**

Item 59.2 - Keystone Area

See Item 59.1.

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REMARKS

Item 59.5 - Spandrel Walls

East: The entire length of the spandrel wall has outwardly displaced capstones, from 1" at the North end to up to 10" over the South half. **See photo 8.** The South end capstones also have minor mortar cracking.

West: The Northwest capstones have up to 6" outward displacement and minor mortar cracking from the keystone North 21'. The North wall remainder has minor missing pointing. **See photo 9.**

Item 59.10 - Masonry Joints

The West spandrel wall has some minor missing pointing with up to 10" of penetration.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

The North breastwall has a concrete apron 24" wide x unknown depth, with up to 25" of vertical exposure at the East end.

The South breastwall has moderate missing pointing at the waterline and isolated evidence of water leakage.

Item 60.1.e - Wingwalls

The Northeast wingwall has minor outward displacement with up to 1" of separation between stones and mortar. **See photo 10.**

Item 60.1.g - Pointing

See Items 60.1.d & e.

Item 60.1.i - Erosion

The Northwest wingwall cap extension is undermined up to 4', measured from the concrete rail base outer edge. This void extends into the North approach pavement behind the temporary barrier.

Since the previous inspection a piece of unsupported bituminous concrete 3' long x 1' high x 1' wide fell into the void from the bottom of the rail base (no corresponding void in the pavement above). **See photo 11.**

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.3 - Debris

There is minor tree debris in both the upstream and downstream channels. **See photo 12.**

Item 61.7 - Aggradation

The North apron from midspan to the West spandrel wall has moderate aggradation. **See photo 7.**

TRAFFIC SAFETY

Item 36a - Bridge Railing

See Item 58.8.

Item 36c - Approach Guardrail

Both South approach rails have heavy collision damage. **See photo 13.** See Item 58.8.

Item 36d - Approach Guardrail Ends

See Item 58.8.

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REMARKS

Photo Log

- Photo 1 : North approach signage.
- Photo 2 : South approach signage.
- Photo 3 : Wearing surface overview, looking Northwest.
- Photo 4 : East fence and temporary barrier, looking North.
- Photo 5 : North approach pavement, looking Southeast.
- Photo 6 : South approach pavement, looking Southeast.
- Photo 7 : West side, looking North, concrete cover deterioration and aggradation.
- Photo 8 : East spandrel wall South end, looking South, capstone displacement.
- Photo 9 : Northwest spandrel wall, looking Northeast.
- Photo 10 : Northeast wingwall displacement, looking North (from channel).
- Photo 11 : Northwest wingwall cap void (note bituminous chunk).
- Photo 12 : Downstream debris, looking West.
- Photo 13 : Southwest approach rail damage.

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PHOTOS



Photo 1: North approach signage.



Photo 2: South approach signage.

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PHOTOS

Photo 3: Wearing surface overview, looking Northwest.



Photo 4: East fence and temporary barrier, looking North.

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PHOTOS

Photo 5: North approach pavement, looking Southeast.



Photo 6: South approach pavement, looking Southeast.

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PHOTOS



Photo 7: West side, looking North, concrete cover deterioration and aggradation.



Photo 8: East spandrel wall South end, looking South, capstone displacement.

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PHOTOS

Photo 9: Northwest spandrel wall, looking Northeast.



Photo 10: Northeast wingwall displacement, looking North (from channel).

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PHOTOS

Photo 11: Northwest wingwall cap void (note bituminous chunk).

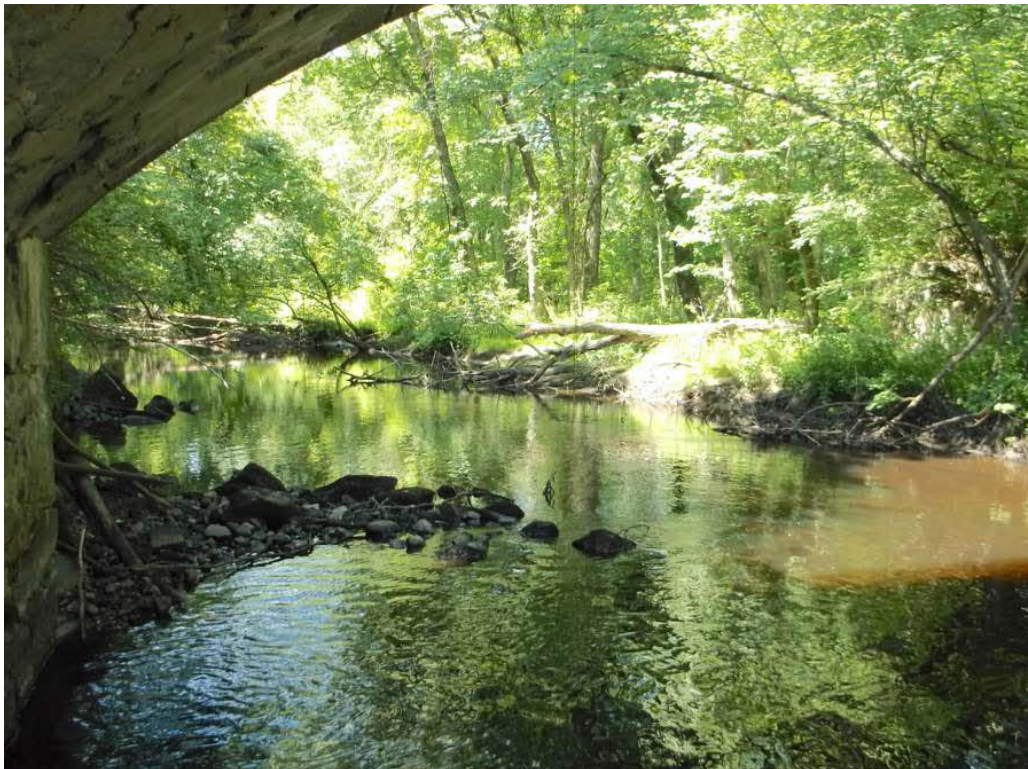


Photo 12: Downstream debris, looking West.

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PHOTOS

Photo 13: Southwest approach rail damage.

Report Date: April 15, 2021

State Information				Classification				Code			
BDEPT#= U02014				Agency Br.No.				(112) NBIS Bridge Length Y			
Town= Uxbridge				L.O.				(104) Highway System N			
B.I.N= 1J3				AASHTO= 078.9				(26) Functional Class - Urban Local 19			
RANK= 3827 H.I.= 83.7 %				FHWA Select List= Y (6/21/2017)				(100) Defense Highway 0			
(8) Structure Number				U020141J3MUNNBI				(101) Parallel Structure N			
(5) Inventory Route				151000000				(102) Direction of Traffic - One lane for 2-way traffic 3			
(2) State Highway Department District				03				(103) Temporary Structure Y			
(3) County Code 027 (4) Place code				71620				(105) Federal Lands Highways 0			
(6) Features Intersected				WATER WEST RIVER				(110) Designated National Network N			
(7) Facility Carried				HWY HECLA ST				(20) Toll - On free road 3			
(9) Location				.75 M S OF RT-16				(21) Maintain - Town Agency 03			
(11) Kilometerpoint				0000.418				(22) Owner - Town Agency 03			
(12) Base Highway Network				N				(37) Historical Significance undetermined			
(13) LRS Inventory Route & Subroute				000000000000				Condition			
(16) Latitude				42 DEG 04 MIN 14.05 SEC				(58) Deck N			
(17) Longitude				71 DEG 36 MIN 31.48 SEC				(59) Superstructure 6			
(98) Border Bridge State Code				Share %				(60) Substructure 6			
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection 7			
								(62) Culverts N			
Structure Type and Material								Load Rating and Posting			
(43) Structure Type Main: Masonry				Code 811				(31) Design Load - Unknown 0			
Arch - Deck				Jointless bridge type: Not applicable				(63) Operating Rating Method - Allowable Stress (AS) 2			
(44) Structure Type Appr:								(64) Operating Rating 99.9			
Other				Code 000				(65) Inventory Rating Method - Allowable Stress (AS) 2			
(45) Number of spans in main unit				001				(66) Inventory Rating 99.9			
(46) Number of approach spans				0000				(70) Bridge Posting 5			
(107) Deck Structure Type - Not applicable				Code N				(41) Structure - Posted for load P			
(108) Wearing Surface / Protective System:								Appraisal			
A) Type of wearing surface - Not applicable=no deck				Code N				(67) Structural Evaluation 6			
B) Type of membrane - Not applicable=no deck				Code N				(68) Deck Geometry 2			
C) Type of deck protection - Not applicable=no deck				Code N				(69) Underclearances, vert. and horiz. N			
								(71) Waterway adequacy 8			
								(72) Approach Roadway Alignment 7			
								(36) Traffic Safety Features 0 N 0 0			
								(113) Scour Critical Bridges 3			
Age and Service								Inspections			
(27) Year Built				1930				(90) Inspection Date 06/16/20 (91) Frequency 24 MO			
(106) Year Reconstructed				0000				(92) Critical Feature Inspection: (93) CFI DATE			
(42) Type of Service: On - Highway								(A) Fracture Critical Detail N 00 MO A) 00/00/00			
Under - Waterway				Code 15				(B) Underwater Inspection N 00 MO B) 05/01/87			
(28) Lanes: On Structure 01 Under structure 00								(C) Other Special Inspection N 00 MO C) 06/08/11			
(29) Average Daily Traffic 000800								(*) Other Inspection (Flood) Y 00 MO *) 04/03/10			
(30) Year of ADT 2014 (109) Truck ADT 02 %								(*) Closed Bridge N 00 MO *) 00/00/00			
(19) Bypass, detour length 003 KM								(*) UW Special Inspection N 00 MO *) 00/00/00			
								(*) Damage Inspection MO *) 00/00/00			
Geometric Data								Rating Loads			
(48) Length of maximum span 0009.8 M								Report Date 12/01/14 H20 Type 3 Type 3S2 Type HS			
(49) Structure Length 00017.7 M								Operating 99.0 99.0 99.0 99.0			
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M								Inventory 99.0 99.0 99.0 99.0			
(51) Bridge Roadway Width Curb to Curb 004.2 M								Field Posting			
(52) Deck Width Out to Out 007.5 M								Status LEGAL Posting Date 10/18/19			
(32) Approach Roadway Width (w/shoulders) 004.4 M								2 Axle 3 Axle 5 Axle Single			
(33) Bridge Median - No median Code 0								Actual 14			
(34) Skew 00 DEG (35) Structure Flared N								Recommended			
(10) Inventory Route MIN Vert Clear 99.99 M								Missing Signs N			
(47) Inventory Route Total Horiz Clear 04.2 M								Misc.			
(53) Min Vert Clear Over Bridge Rdwy 99.99 M								Bridge Name			
(54) Min Vert Underclear ref N 00.00 M								N Anti-missile fence N Acrow Panel N Jointless Bridge			
(55) Min Lat Underclear RT ref N 00.0 M								Freeze/Thaw N : Not Applicable			
(56) Min Lat Underclear LT 00.0 M								Accessibility (Needed/Used)			
Navigation Data											
(38) Navigation Control - No navigation control on waterway Code 0								N / N Liftbucket N / N Rigging N / N Other			
(111) Pier Protection Code								P / N Ladder N / N Staging			
(39) Navigation Vertical Clearance 000.0 M								N / N Boat N / N Traffic Control			
(116) Vert-lift Bridge Nav Min Vert Clear M								Y / Y Wader N / N RR Flagperson Inspection			
(40) Navigation Horizontal Clearance 0000.0 M								N / N Inspector 50 N / N Police Hours: 008			

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Henry Street over the West River
(Bridge No. U-02-015)

Priority 9

AVAILABLE INFORMATION

MassDOT's current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 76.9.

A bridge rating report dated October 1, 2019 was provided by MassDOT. The report notes that no posting is required.

The most recent MassDOT bridge inspection report on record is dated June 17, 2020.

Henry Street is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

A prestressed concrete deck beam superstructure is supported by a substructure comprised of mortared stone masonry abutment wall stems on concrete footings. This bridge was originally constructed in 1930 and rebuilt in 1965. The structure has an out-to-out width of 20'-0" with a clear span of 31'-2". The hydraulic opening of structure is approximately 9'-6" high by 31'-2" wide. The depth of flow at the time of inspection was approximately 36" and flowing southward.

The roadway over the bridge consists of a 3" asphaltic wearing surface directly on top of the prestressed beams. There is no sidewalk on either side, and both approaches are straight and clear despite a narrow roadway. The intersection of Henry and Patrick Henry Street is directly adjacent to the bridge at the west approach.

There are two utilities crossing the bridge at the south fascia. An 18" pipe is mounted directly to the superstructure while overhead wires cross above. It was also noted that a sewer manhole and water gate are present in the west approach. No drainage structures were noted in the vicinity of the structure.

The bridge railing consists of a 4' high chain link fence that is mounted to steel I-beam posts. The posts are fastened to the north and south fascia. The chain link fence runs continuously from the east approach to the west approach on either side with no transition over the bridge.

There were no signs noted at the approaches.

FINDINGS

The overall condition of the superstructure is fair with minor deficiencies noted. Rust staining and water seepage was noted at the beams' shear key joints indicating minor joint deterioration (See Photo 9). The transverse post tension ducts located on the north

and south fascia were not grouted; as a result the post tension tie heads are exhibiting moderate corrosion (Photo 14).

The abutments are in fair condition. Both masonry abutment walls typically show severe loss of mortar and missing chinking stones. The concrete abutment caps/beam seats typically exhibit random hairline cracking with rust. There are several voids present at both abutments, reaching up to 42" deep at the east abutment (Photos 11 and 12). A full height vertical crack was also noted at the east abutment, which extends up from the concrete footing to the beam seat (Photo 13). There are concrete aprons present at each abutment, which are believed to provide scour protection for the stone abutments. The aprons typically exhibit heavy scaling and abrasion at the water line and random cracks (Photo 10). Scour is typical at the concrete aprons and can be measured up to 8" deep at the west apron. As a result of scour, the west apron is undermined.

Large amounts of debris were found in the river at this location. Such debris includes pieces of cast iron piping, masonry blocks, sawn lumber, tree limbs, garbage, and brush.

The masonry wingwalls are in fair condition. They typically show several small voids and heavy vegetation growth. All wingwalls exhibit displacement, which is worse on the north side. A large void was also noted at the joint between the west abutment and northwest wingwall.

The roadway over the culvert and at the approaches are all in fair condition. Both approaches show moderate full width cracking and minor breakup. There is cracking and areas of patching at both joint locations (Photos 22 and 23). A roadway depression was noted behind the northeast wingwall in the east approach and is most likely due the wall's lateral movement. The chain link fence and posts typically show rusting, with deterioration more severe on the north side. An I-beam post in the northwest corner is has become disconnected from the fence leaving a pedestrian safety hazard (Photo 21). The utility supports also have moderate surface rusting.

RECOMMENDATIONS

Overall this structure is in fair condition with several deficiencies noted. BETA recommends that the following repairs be completed to extend the structure's anticipated service life:

- Scour voids noted at the east and west aprons should be filled in. The concrete aprons serve as scour protection for the abutments and should be repaired to further protect the abutments.
- Abutment wall voids should be filled with chinking stones and repointed.
- All scaling and cracks should be repaired in the bridge substructure.
- Existing wearing surface should be removed to allow for application of new membrane waterproofing and shear key repair. After repairs to superstructure are complete, application of a new superpave wearing surface is recommended.

- All debris should be removed from West River directly below the bridge, and immediately upstream and downstream.
- All vegetation should be removed from adjacent wingwalls. Selective reconstruction of the northeast wingwall is recommended.

It should be noted that the existing bridge rail is not a crash tested system and should be replaced. However, due to the configuration of the existing superstructure it may not be feasible to replace with a standard system. Design review would need to be performed to confirm the existing structure's capacity and the practicality of accepting such a detail. Therefore, it is BETA's recommendation that the Town explore the feasibility of upgrading the bridge rail over the bridge and adding approach guardrail and guardrail transitions per AASHTO standards.

BUDGETARY COST ESTIMATE

Repairs

Construction:	\$110,000
Engineering:	<u>\$30,000</u>
Total:	\$140,000

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Attachments

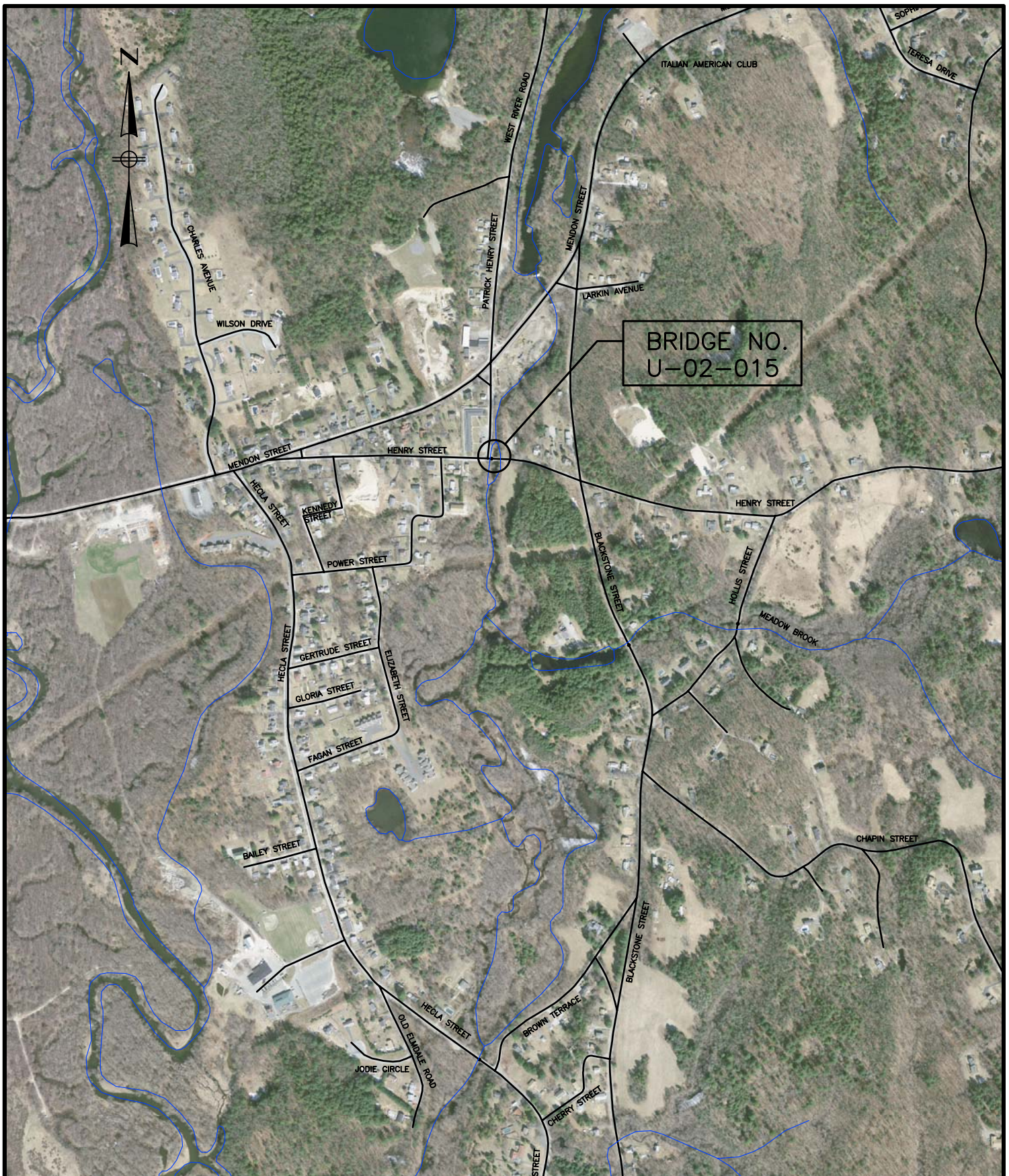
Locus Map

Inspection Photos

MassDOT Routine Inspection Report Dated June 17, 2020

National Bridge Inventory Sheet Dated April 15, 2021

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www.BETA-Inc.com

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HIGHWAY, LINCOLN, RI 02865

P: 401.333.2382

F: 401.333.9225

BRIDGE AND CULVERT EVALUATION UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HENRY STREET
OVER
THE WEST RIVER

BRIDGE NO.
U-02-015

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Photo 1 Looking Northeast: South Bridge Elevation



Photo 2 Looking Southwest: North Bridge Elevation



Photo 3 Looking West: West Abutment



Photo 4 Looking East: East Abutment



Photo 5 Looking West: Northwest Wingwall



Photo 6 Looking Southeast: Northeast Wingwall



Photo 7 Looking North: Southwest Wingwall



Photo 8 Looking North: Southeast Wingwall



Photo 9 Looking East: Cracking and Staining at Beam Joints



Photo 10 Looking West: Scaling and Abrasion at Concrete Apron



Photo 11 Looking West: West Abutment Voids and Apron Cracking



Photo 12 Looking East: Void at East Abutment



Photo 13 Looking East: Full Height Crack at East Abutment



Photo 14 Typical Corrosion of Post Tension Ties



Photo 15 Looking East: West Approach



Photo 16 Looking West: East Approach



Photo 17 Looking West: South Side Water Line



Photo 18 Looking North: North Fence



Photo 19 Looking South: South Fence



Photo 20 Looking South: North Approach Guardrail



Photo 21 Looking Southwest: Post Damage at North Approach Guardrail



Photo 22 Looking North: Cracking at East Joint



Photo 23 Looking North: Cracking at West Joint

STRUCTURES INSPECTION FIELD REPORT

2-DIST
03B.I.N.
1J4

ROUTINE INSPECTION

BR. DEPT. NO.
U-02-015

CITY/TOWN UXBRIDGE		8-STRUCTURE NO. U02015-1J4-MUN-NBI		11-Kilo. POINT 000.402	41-STATUS A:OPEN	90-ROUTINE INSP. DATE JUN 17, 2020
07-FACILITY CARRIED HWY HENRY ST		MEMORIAL NAME/LOCAL NAME		27-YR BUILT 1930	106-YR REBUILT 1965	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER WEST RIVER		26-FUNCTIONAL CLASS Urban Local		DIST. BRIDGE INSPECTION ENGINEER M. Azizi		
43-STRUCTURE TYPE 501 : Prestressed Concrete Slab		22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER D. Simkhovich		
107-DECK TYPE 2 : Concrete Precast Panels		WEATHER Clear	TEMP. (air) 27°C	TEAM MEMBERS T. TOLOCZKO		

ITEM 58 <div>6</div> DECK <div>DEF</div> <table border="1"> <tr><td>1. Wearing surface</td><td>5</td><td>M-P</td></tr> <tr><td>2. Deck Condition</td><td>6</td><td>M-P</td></tr> <tr><td>3. Stay in Place Forms</td><td>N</td><td>-</td></tr> <tr><td>4. Curbs</td><td>7</td><td>-</td></tr> <tr><td>5. Median</td><td>N</td><td>-</td></tr> <tr><td>6. Sidewalks</td><td>N</td><td>-</td></tr> <tr><td>7. Parapets</td><td>N</td><td>-</td></tr> <tr><td>8. Railing</td><td>4</td><td>S-A</td></tr> <tr><td>9. Anti Missile Fence</td><td>N</td><td>-</td></tr> <tr><td>10. Drainage System</td><td>N</td><td>-</td></tr> <tr><td>11. Lighting Standards</td><td>N</td><td>-</td></tr> <tr><td>12. Utilities</td><td>6</td><td>M-P</td></tr> <tr><td>13. Deck Joints</td><td>N</td><td>-</td></tr> <tr><td>14.</td><td>N</td><td>-</td></tr> <tr><td>15.</td><td>N</td><td>-</td></tr> <tr><td>16.</td><td>N</td><td>-</td></tr> </table> <div> <div>CURB REVEAL (In millimeters)</div> <div> <div>N</div> <div>280</div> <div>S</div> <div>280</div> </div> </div>			1. Wearing surface	5	M-P	2. Deck Condition	6	M-P	3. Stay in Place Forms	N	-	4. Curbs	7	-	5. Median	N	-	6. Sidewalks	N	-	7. Parapets	N	-	8. Railing	4	S-A	9. Anti Missile Fence	N	-	10. Drainage System	N	-	11. Lighting Standards	N	-	12. Utilities	6	M-P	13. Deck Joints	N	-	14.	N	-	15.	N	-	16.	N	-	ITEM 59 <div>6</div> SUPERSTRUCTURE <div>DEF</div> <table border="1"> <tr><td>1. Stringers</td><td>N</td><td>-</td></tr> <tr><td>2. Floorbeams</td><td>N</td><td>-</td></tr> <tr><td>3. Floor System Bracing</td><td>N</td><td>-</td></tr> <tr><td>4. Girders or Beams</td><td>6</td><td>M-P</td></tr> <tr><td>5. Trusses - General</td><td>N</td><td>-</td></tr> <tr><td> a. Upper Chords</td><td>N</td><td>-</td></tr> <tr><td> b. Lower Chords</td><td>N</td><td>-</td></tr> <tr><td> c. Web Members</td><td>N</td><td>-</td></tr> <tr><td> d. Lateral Bracing</td><td>N</td><td>-</td></tr> <tr><td> e. Sway Bracings</td><td>N</td><td>-</td></tr> <tr><td> f. Portals</td><td>N</td><td>-</td></tr> <tr><td> g. End Posts</td><td>N</td><td>-</td></tr> <tr><td>6. Pin & Hangers</td><td>N</td><td>-</td></tr> <tr><td>7. Conn Plt's, Gussets & Angles</td><td>N</td><td>-</td></tr> <tr><td>8. Cover Plates</td><td>N</td><td>-</td></tr> <tr><td>9. Bearing Devices</td><td>N</td><td>-</td></tr> <tr><td>10. Diaphragms/Cross Frames</td><td>N</td><td>-</td></tr> <tr><td>11. Rivets & Bolts</td><td>5</td><td>S-A</td></tr> <tr><td>12. Welds</td><td>N</td><td>-</td></tr> <tr><td>13. Member Alignment</td><td>8</td><td>-</td></tr> <tr><td>14. Paint/Coating</td><td>N</td><td>-</td></tr> <tr><td>15.</td><td>N</td><td>-</td></tr> </table> <div> <div>Year Painted</div> <div>N</div> </div> <div> <div>COLLISION DAMAGE: Please explain</div> <div>None (X) Minor () Moderate () Severe ()</div> </div> <div> <div>LOAD DEFLECTION: Please explain</div> <div>None (X) Minor () Moderate () Severe ()</div> </div> <div> <div>LOAD VIBRATION: Please explain</div> <div>None () Minor (X) Moderate () Severe ()</div> </div> <div> <div>Any Fracture Critical Member: (Y/N)</div> <div>N</div> </div> <div> <div>Any Cracks: (Y/N)</div> <div>N</div> </div>			1. Stringers	N	-	2. Floorbeams	N	-	3. Floor System Bracing	N	-	4. Girders or Beams	6	M-P	5. Trusses - General	N	-	a. Upper Chords	N	-	b. Lower Chords	N	-	c. Web Members	N	-	d. Lateral Bracing	N	-	e. Sway Bracings	N	-	f. Portals	N	-	g. End Posts	N	-	6. Pin & Hangers	N	-	7. Conn Plt's, Gussets & Angles	N	-	8. Cover Plates	N	-	9. Bearing Devices	N	-	10. Diaphragms/Cross Frames	N	-	11. Rivets & Bolts	5	S-A	12. Welds	N	-	13. Member Alignment	8	-	14. Paint/Coating	N	-	15.	N	-	ITEM 60 <div>7</div> SUBSTRUCTURE <div>DEF</div> <table border="1"> <tr><td>1. Abutments</td><td>Dive</td><td>Cur</td><td>7</td><td>-</td></tr> <tr><td> a. Pedestals</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> b. Bridge Seats</td><td>N</td><td>7</td><td></td><td>-</td></tr> <tr><td> c. Backwalls</td><td>N</td><td>H</td><td></td><td>-</td></tr> <tr><td> d. Breastwalls</td><td>N</td><td>7</td><td></td><td>M-P</td></tr> <tr><td> e. Wingwalls</td><td>N</td><td>5</td><td></td><td>S-P</td></tr> <tr><td> f. Slope Paving/Rip-Rap</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> g. Pointing</td><td>N</td><td>6</td><td></td><td>M-P</td></tr> <tr><td> h. Footings</td><td>N</td><td>H</td><td></td><td>-</td></tr> <tr><td> i. Piles</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> j. Scour</td><td>N</td><td>6</td><td></td><td>-</td></tr> <tr><td> k. Settlement</td><td>N</td><td>7</td><td></td><td>-</td></tr> <tr><td> l.</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> m.</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>2. Piers or Bents</td><td></td><td></td><td>N</td><td>-</td></tr> <tr><td> a. Pedestals</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> b. Caps</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> c. Columns</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> d. Stems/Webs/Pierwalls</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> e. Pointing</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> f. Footing</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> g. Piles</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> h. Scour</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td> i. 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Fasteners</td><td>N</td><td>N</td><td></td><td>-</td></tr> </table> <div> <div>UNDERMINING (Y/N) If YES please explain</div> <div>N</div> </div> <div> <div>COLLISION DAMAGE:</div> <div>None (X) Minor () Moderate () Severe ()</div> </div> <div> <div>SCOUR: Please explain</div> <div>None (X) Minor () Moderate () Severe ()</div> </div> <div> <div>I-60 (Dive Report):</div> <div>N</div> <div>I-60 (This Report):</div> <div>7</div> </div> <div> <div>93B-U/W (DIVE) Insp</div> <div>00/00/0000</div> </div>			1. Abutments	Dive	Cur	7	-	a. Pedestals	N	N		-	b. Bridge Seats	N	7		-	c. Backwalls	N	H		-	d. Breastwalls	N	7		M-P	e. Wingwalls	N	5		S-P	f. Slope Paving/Rip-Rap	N	N		-	g. Pointing	N	6		M-P	h. Footings	N	H		-	i. Piles	N	N		-	j. Scour	N	6		-	k. Settlement	N	7		-	l.	N	N		-	m.	N	N		-	2. Piers or Bents			N	-	a. Pedestals	N	N		-	b. Caps	N	N		-	c. Columns	N	N		-	d. Stems/Webs/Pierwalls	N	N		-	e. Pointing	N	N		-	f. Footing	N	N		-	g. Piles	N	N		-	h. Scour	N	N		-	i. Settlement	N	N		-	j.	N	N		-	k.	N	N		-	3. Pile Bents			N	-	a. Pile Caps	N	N		-	b. Piles	N	N		-	c. Diagonal Bracing	N	N		-	d. Horizontal Bracing	N	N		-	e. Fasteners	N	N		-
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4. Girders or Beams	6	M-P																																																																																																																																																																																																																																																																																								
5. Trusses - General	N	-																																																																																																																																																																																																																																																																																								
a. Upper Chords	N	-																																																																																																																																																																																																																																																																																								
b. Lower Chords	N	-																																																																																																																																																																																																																																																																																								
c. Web Members	N	-																																																																																																																																																																																																																																																																																								
d. Lateral Bracing	N	-																																																																																																																																																																																																																																																																																								
e. Sway Bracings	N	-																																																																																																																																																																																																																																																																																								
f. Portals	N	-																																																																																																																																																																																																																																																																																								
g. End Posts	N	-																																																																																																																																																																																																																																																																																								
6. Pin & Hangers	N	-																																																																																																																																																																																																																																																																																								
7. Conn Plt's, Gussets & Angles	N	-																																																																																																																																																																																																																																																																																								
8. Cover Plates	N	-																																																																																																																																																																																																																																																																																								
9. Bearing Devices	N	-																																																																																																																																																																																																																																																																																								
10. Diaphragms/Cross Frames	N	-																																																																																																																																																																																																																																																																																								
11. Rivets & Bolts	5	S-A																																																																																																																																																																																																																																																																																								
12. Welds	N	-																																																																																																																																																																																																																																																																																								
13. Member Alignment	8	-																																																																																																																																																																																																																																																																																								
14. Paint/Coating	N	-																																																																																																																																																																																																																																																																																								
15.	N	-																																																																																																																																																																																																																																																																																								
1. Abutments	Dive	Cur	7	-																																																																																																																																																																																																																																																																																						
a. Pedestals	N	N		-																																																																																																																																																																																																																																																																																						
b. Bridge Seats	N	7		-																																																																																																																																																																																																																																																																																						
c. Backwalls	N	H		-																																																																																																																																																																																																																																																																																						
d. Breastwalls	N	7		M-P																																																																																																																																																																																																																																																																																						
e. Wingwalls	N	5		S-P																																																																																																																																																																																																																																																																																						
f. Slope Paving/Rip-Rap	N	N		-																																																																																																																																																																																																																																																																																						
g. Pointing	N	6		M-P																																																																																																																																																																																																																																																																																						
h. Footings	N	H		-																																																																																																																																																																																																																																																																																						
i. Piles	N	N		-																																																																																																																																																																																																																																																																																						
j. Scour	N	6		-																																																																																																																																																																																																																																																																																						
k. Settlement	N	7		-																																																																																																																																																																																																																																																																																						
l.	N	N		-																																																																																																																																																																																																																																																																																						
m.	N	N		-																																																																																																																																																																																																																																																																																						
2. Piers or Bents			N	-																																																																																																																																																																																																																																																																																						
a. Pedestals	N	N		-																																																																																																																																																																																																																																																																																						
b. Caps	N	N		-																																																																																																																																																																																																																																																																																						
c. Columns	N	N		-																																																																																																																																																																																																																																																																																						
d. Stems/Webs/Pierwalls	N	N		-																																																																																																																																																																																																																																																																																						
e. Pointing	N	N		-																																																																																																																																																																																																																																																																																						
f. Footing	N	N		-																																																																																																																																																																																																																																																																																						
g. Piles	N	N		-																																																																																																																																																																																																																																																																																						
h. Scour	N	N		-																																																																																																																																																																																																																																																																																						
i. Settlement	N	N		-																																																																																																																																																																																																																																																																																						
j.	N	N		-																																																																																																																																																																																																																																																																																						
k.	N	N		-																																																																																																																																																																																																																																																																																						
3. Pile Bents			N	-																																																																																																																																																																																																																																																																																						
a. Pile Caps	N	N		-																																																																																																																																																																																																																																																																																						
b. Piles	N	N		-																																																																																																																																																																																																																																																																																						
c. Diagonal Bracing	N	N		-																																																																																																																																																																																																																																																																																						
d. Horizontal Bracing	N	N		-																																																																																																																																																																																																																																																																																						
e. Fasteners	N	N		-																																																																																																																																																																																																																																																																																						

X=UNKNOWN

N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE

R=REMOVED

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ITEM 61
CHANNEL & CHANNEL PROTECTION

	Dive	Cur	DEF
1.Channel Scour	N	7	-
2.Embankment Erosion	N	7	-
3.Debris	N	7	-
4.Vegetation	N	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	N	-
7.Aggradation	N	7	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:
Tidal () High () Moderate () Low (X) None ()

ITEM 61 (Dive Report): N ITEM 61 (This Report): 7

93b-U/W INSP. DATE: 00/00/0000

ITEM 36 TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	0	4	S-A
B. Transitions	0	4	S-A
C. Approach Guardrail	0	6	M-P
D. Approach Guardrail Ends	0	6	M-P

WEIGHT POSTING *Not Applicable* X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/0000 EJDMT Date: 00/00/0000

	At bridge	Other Advance								
Signs In Place (Y=Yes, N=No, NR=Not Required) Legibility/Visibility	<table style="width:100%; border-collapse: collapse;"> <tr><td>E</td><td>W</td></tr> <tr><td> </td><td> </td></tr> </table>	E	W	 	 	<table style="width:100%; border-collapse: collapse;"> <tr><td>E</td><td>W</td></tr> <tr><td> </td><td> </td></tr> </table>	E	W	 	
E	W									
 	 									
E	W									
 	 									

CLEARANCE POSTING

	N	S	meter
Actual Field Measurement	0	0	
Posted Clearance	0	0	

	At bridge	Advance								
Signs In Place (Y=Yes, N=No, NR=Not Required) Legibility/Visibility	<table style="width:100%; border-collapse: collapse;"> <tr><td>N</td><td>S</td></tr> <tr><td> </td><td> </td></tr> </table>	N	S	 	 	<table style="width:100%; border-collapse: collapse;"> <tr><td>N</td><td>S</td></tr> <tr><td> </td><td> </td></tr> </table>	N	S	 	
N	S									
 	 									
N	S									
 	 									

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:	 	

TOTAL HOURS 8

PLANS (Y/N): N

(V.C.R.) (Y/N): N

TAPE#:

List of field tests performed:
None

RATING
Rating Report (Y/N): Y
Date: 10/01/2019
Inspection data at time of existing rating
I 58: 6 I 59: 6 I 60: 7 Date: 06/12/2018

Recommend for Rating or Rerating (Y/N): N
REASON:

If YES please give priority:
HIGH () MEDIUM () LOW ()

CONDITION RATING GUIDE (For Items 58, 59, 60 and 61)

CODE	CONDITION	DEFECTS
N	NOT APPLICABLE	
G 9	EXCELLENT	Excellent condition.
G 8	VERY GOOD	No problem noted.
G 7	GOOD	Some minor problems.
F 6	SATISFACTORY	Structural elements show some minor deterioration.
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P 4	POOR	Advanced section loss, deterioration, spalling or scour.
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

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REMARKS

BRIDGE ORIENTATION

According to the rating report, the approaches are East and West and the elevations are North and South. This is a single span prestressed concrete deck beam bridge with 5 beams and 4 longitudinal beam joints numbered South to North. The river flows North to South.

ITEM 58 - DECK

Item 58.1 - Wearing surface

Along the South curb there is a full length x 6" wide x up to 1.5" deep sand-filled area where the top course of bituminous concrete does not meet the curb.

Both South corners have areas up to 11' long x 6' wide of bituminous patches, minor cracking, breakup, and minor potholes up to 1' diameter x 2" deep. **See photo 1.**

There is a minor longitudinal crack extending 15' from the East transition area along beam joint #3 (8' from the North fascia).

The remainder has several isolated areas of minor transverse and longitudinal cracking up to 3' long, minor patches up to 10" diameter, and minor wheel wear throughout.

Item 58.2 - Deck Condition

See Item 59.4.

Item 58.4 - Curbs

The North curb West end has a minor spall where the boxing glove endpost has broken away.

Item 58.8 - Railing

Both bridge rails are chain link fence supported by steel H-posts bolted to the curb and fascia beam.

The Northeast and Southwest fence end posts are bent and unattached to the fence.

The Northwest corner has a severely bent H-post and disconnected fencing. **See photo 2.**

All H-posts have moderate to heavy surface rust.

The North fence fabric is partially connected to the top rail and is loose between posts #2 and #3.

Item 58.12 - Utilities

The South steel utility brackets have heavy paint peeling and surface rusting throughout with some minor rust flaking. **See photo 3.** The utility brackets are welded to the South rail post outer flanges.

APPROACHES

Approaches a - Appr. pavement condition

West approach: There is moderate transverse and longitudinal cracking, minor wheel wear, and several bituminous patches throughout. The approach to deck transition has full width moderate transverse cracking, minor breakup, and bituminous patches up to 1' long x 2.5' wide. **See photo 4.**

East approach: The East approach has a 3' long x 2' wide bituminous patch at the South end and minor transverse and map cracking throughout. **See photo 1.**

Approaches b - Appr. Roadway Settlement

See Approaches a.

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REMARKS

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams

Adjacent to joint #3 (8' from the North fascia and beneath the Southeast corner wearing surface patches) there is a 15' longitudinal hairline crack.

All beam joints have several minor moisture stains. The East half of beam joints #2 and #3 (heaviest to #3) have moderate moisture stains.

Below the center post-tensioning in beam joints #1 and #3 there are minor moisture stains. **See photo 5.**
See Item 58.1.

Item 59.11 - Rivets & Bolts

The post-tensioning holes are not filled. The North center post-tensioning hole is completely covered by an H-post. The South center post-tensioning hole is partially covered by an H-post. All exposed post-tensioning end assemblies have heavy rust flaking. **See photo 6.**

SuperStructure Load Vibration Notes

There is minor vibration under heavy load.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

Both breastwalls are mortared stone masonry with concrete cap and apron.

Both breastwalls have isolated areas of minor cracked and missing pointing.

Both concrete aprons have areas of moderate to heavy water abrasion and/or poor consolidation, heaviest at the West. There is undermining up to 8" deep along the mudline throughout the South half of the West apron. **See photo 7.**

East breastwall:

Extending vertically from beam joint #4 down to the apron there is up to 0.5" of separation between stones and adjacent mortar.

Under beam #4 one stone has a full height x 0.125" wide vertical crack. **See photo 8.**

Under beam #2 there is a missing chinking stone and a full height x 0.25" wide vertical crack in the apron.

Item 60.1.e - Wingwalls

The dry-laid masonry wingwalls have several voids up to 3' deep and are slightly out of vertical alignment, heaviest at both North wingwalls. **See photos 2 & 9.**

Item 60.1.g - Pointing

See Item 60.1.d.

Item 60.1.j - Scour

See Item 60.1.d.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour

The upstream channel and the channel under the structure are up to 2' lower than the downstream channel.

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REMARKS

TRAFFIC SAFETY

Item 36a - Bridge Railing

The traffic safety elements at all corners except the Northwest are chain link fence.

The Northwest transition is single panel steel W-beam guardrail (turned due to the intersection with Patrick Henry St.) with a boxing glove end set in front of the North bridge rail West endpost. The boxing glove endpost base has broken away from the curb. The Northwest transition posts are not properly spaced. **See photo 10.**

The Northeast fence has heavy surface rusting throughout.
See Item 58.8.

Item 36b - Transitions

See Item 36a.

Item 36c - Approach Guardrail

See Item 36a.

Item 36d - Approach Guardrail Ends

See Item 36a.

Photo Log

- Photo 1 : South side of wearing surface, looking Southwest.
- Photo 2 : Bent North rail post, Northwest wingwall void, and West apron abrasion.
- Photo 3 : South fascia, rusted utility supports.
- Photo 4 : West approach to deck transition, looking Southwest.
- Photo 5 : Underside of beams looking Southeast, typical moisture stains.
- Photo 6 : Northwest post-tensioning hole, typical rusted assembly.
- Photo 7 : West concrete apron looking Southwest, abrasion and undermining.
- Photo 8 : East breastwall under beam #4.
- Photo 9 : Northeast wingwall, voids and displaced stones.
- Photo 10 : Northwest corner at corner of Patrick Henry St., looking Northwest.

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PHOTOS



Photo 1: South side of wearing surface, looking Southwest.

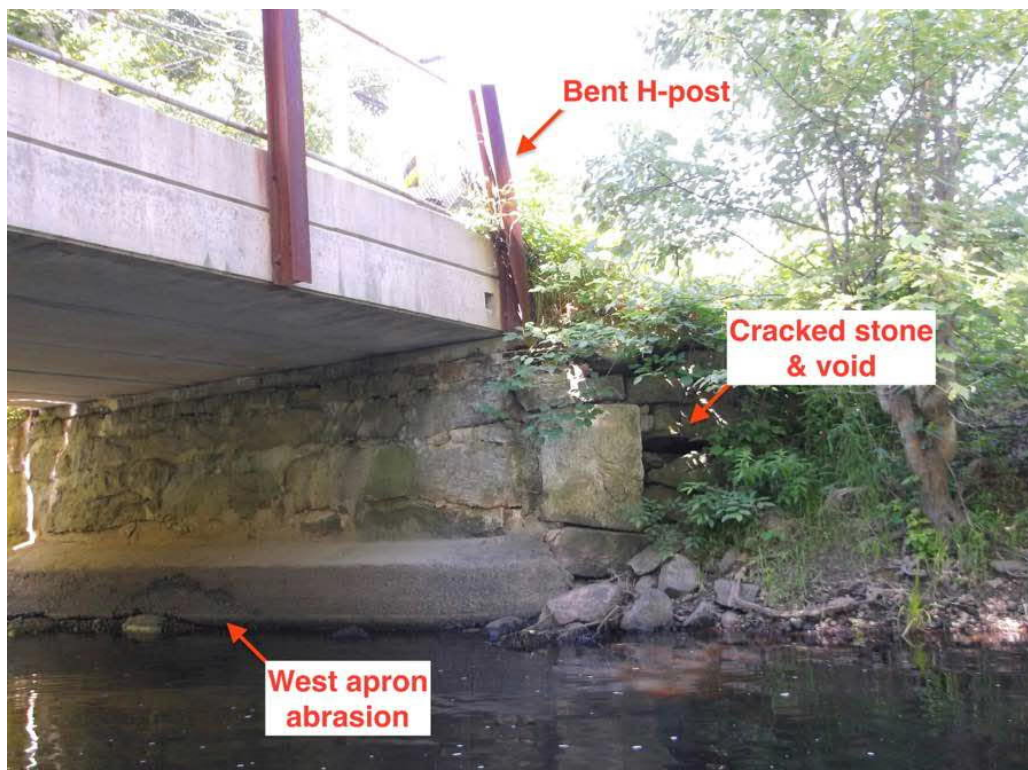


Photo 2: Bent North rail post, Northwest wingwall void, and West apron abrasion.

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PHOTOS

Photo 3: South fascia, rusted utility supports.



Photo 4: West approach to deck transition, looking Southwest.

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PHOTOS

Photo 5: Underside of beams looking Southeast, typical moisture stains.



Photo 6: Northwest post-tensioning hole, typical rusted assembly.

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PHOTOS

Photo 7: West concrete apron looking Southwest, abrasion and undermining.

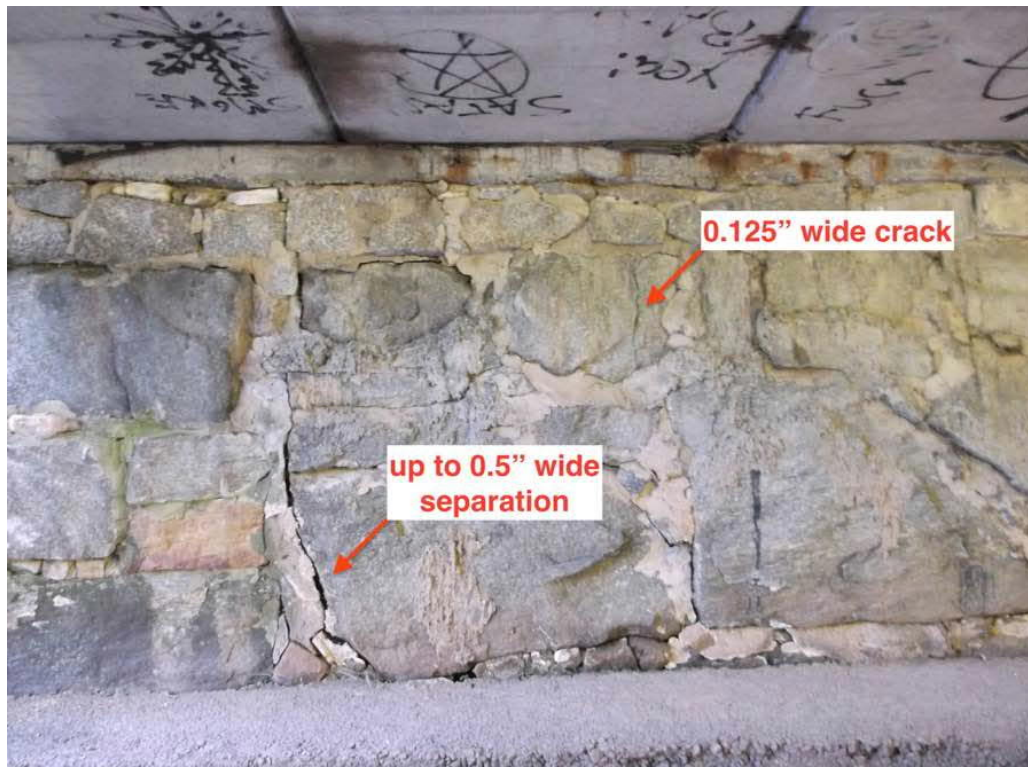


Photo 8: East breastwall under beam #4.

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PHOTOS

Photo 9: Northeast wingwall, voids and displaced stones.



Photo 10: Northwest corner at corner of Patrick Henry St., looking Northwest.

Report Date: April 15, 2021

State Information				Classification				Code				
BDEPT#= U02015				Agency Br.No.				(112) NBIS Bridge Length				Y
Town= Uxbridge				L.O.				(104) Highway System				N
B.I.N= 1J4				AASHTO= 076.9				(26) Functional Class - Urban Local				19
RANK= 4342 H.I.= 93.7 %				FHWA Select List= Y (6/21/2017)				(100) Defense Highway				0
(8) Structure Number				U020151J4MUNNBI				(101) Parallel Structure				N
(5) Inventory Route				151000000				(102) Direction of Traffic - 2-way traffic				2
(2) State Highway Department District				03				(103) Temporary Structure				N
(3) County Code 027 (4) Place code				71620				(105) Federal Lands Highways				0
(6) Features Intersected				WATER WEST RIVER				(110) Designated National Network				N
(7) Facility Carried				HWY HENRY ST				(20) Toll - On free road				3
(9) Location				@ COR. OF PATRICK HENRY R				(21) Maintain - Town Agency				03
(11) Kilometerpoint				0000.402				(22) Owner - Town Agency				03
(12) Base Highway Network				N				(37) Historical Significance				undetermined
(13) LRS Inventory Route & Subroute				000000000000				Condition				Code
(16) Latitude				42 DEG 04 MIN 50.98 SEC				(58) Deck				6
(17) Longitude				71 DEG 36 MIN 30.41 SEC				(59) Superstructure				6
(98) Border Bridge State Code				Share %				(60) Substructure				7
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection				7
								(62) Culverts				N
Structure Type and Material								Load Rating and Posting				Code
(43) Structure Type Main: Prestressed Concrete				Code 501				(31) Design Load - Unknown				0
Slab				Jointless bridge type: Not applicable				(63) Operating Rating Method - Load Factor (LF)				1
(44) Structure Type Appr: Other				Code 000				(64) Operating Rating				59.0
(45) Number of spans in main unit				001				(65) Inventory Rating Method - Load Factor (LF)				1
(46) Number of approach spans				0000				(66) Inventory Rating				32.7
(107) Deck Structure Type - Concrete Precast Panels				Code 2				(70) Bridge Posting				5
(108) Wearing Surface / Protective System:								(41) Structure - Open				A
A) Type of wearing surface - Bituminous				Code 6				Appraisal				Code
B) Type of membrane - Unknown				Code 8				(67) Structural Evaluation				6
C) Type of deck protection - None				Code 0				(68) Deck Geometry				2
								(69) Underclearances, vert. and horiz.				N
								(71) Waterway adequacy				7
								(72) Approach Roadway Alignment				5
(27) Year Built				1930				(36) Traffic Safety Features				0 0 0 0
(106) Year Reconstructed				1965				(113) Scour Critical Bridges				4
(42) Type of Service: On - Highway								Inspections				
Under - Waterway				Code 15				(90) Inspection Date 06/17/20				(91) Frequency 24 MO
(28) Lanes: On Structure 02 Under structure				00				(92) Critical Feature Inspection:				(93) CFI DATE
(29) Average Daily Traffic				000780				(A) Fracture Critical Detail				N 00 MO A) 00/00/00
(30) Year of ADT 2014 (109) Truck ADT				01 %				(B) Underwater Inspection				N 00 MO B) 05/01/87
(19) Bypass, detour length				002 KM				(C) Other Special Inspection				N 00 MO C) 00/00/00
								(*) Other Inspection (Flood)				N 00 MO *) 04/03/10
								(*) Closed Bridge				N 00 MO *) 00/00/00
								(*) UW Special Inspection				N 00 MO *) 00/00/00
								(*) Damage Inspection				MO *) 00/00/00
Geometric Data								Rating Loads				
(48) Length of maximum span				0009.4 M				Report Date 10/01/19				H20 Type 3 Type 3S2 Type HS
(49) Structure Length				00010.7 M				Operating				43.0 56.0 84.0 66.0
(50) Curb or sidewalk: Left 00.0 M Right 00.2 M								Inventory				24.0 31.0 46.0 36.0
(51) Bridge Roadway Width Curb to Curb				005.8 M				Field Posting				
(52) Deck Width Out to Out				006.1 M				Status				LEGAL
(32) Approach Roadway Width (w/shoulders)				005.8 M				2 Axle 3 Axle 5 Axle				Single
(33) Bridge Median - No median				Code 0				Posting Date				10/18/19
(34) Skew 00 DEG (35) Structure Flared				N				Actual				
(10) Inventory Route MIN Vert Clear				99.99 M				Recommended				
(47) Inventory Route Total Horiz Clear				05.8 M				Missing Signs				N
(53) Min Vert Clear Over Bridge Rdwy				99.99 M				Misc.				
(54) Min Vert Underclear ref N				00.00 M				Bridge Name				N Anti-missile fence N Acrow Panel N Jointless Bridge
(55) Min Lat Underclear RT ref N				00.0 M				Freeze/Thaw				N : Not Applicable
(56) Min Lat Underclear LT				00.0 M				Accessibility (Needed/Used)				
Navigation Data								N / N Liftbucket				N / N Rigging N / N Other
(38) Navigation Control - No navigation control on waterway				Code 0				N / N Ladder				N / N Staging
(111) Pier Protection				Code				N / N Boat				N / N Traffic Control
(39) Navigation Vertical Clearance				000.0 M				Y / Y Wader				N / N RR Flagperson
(116) Vert-lift Bridge Nav Min Vert Clear				M				N / N Inspector 50				N / N Police
(40) Navigation Horizontal Clearance				0000.0 M								Inspection Hours: 008

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