Bridge/Culvert Management Plan

November 2011

Submitted to:

Uxbridge
Massachusetts

Submitted by:

BETA
ENGINEERING SUCCESS TOGETHER
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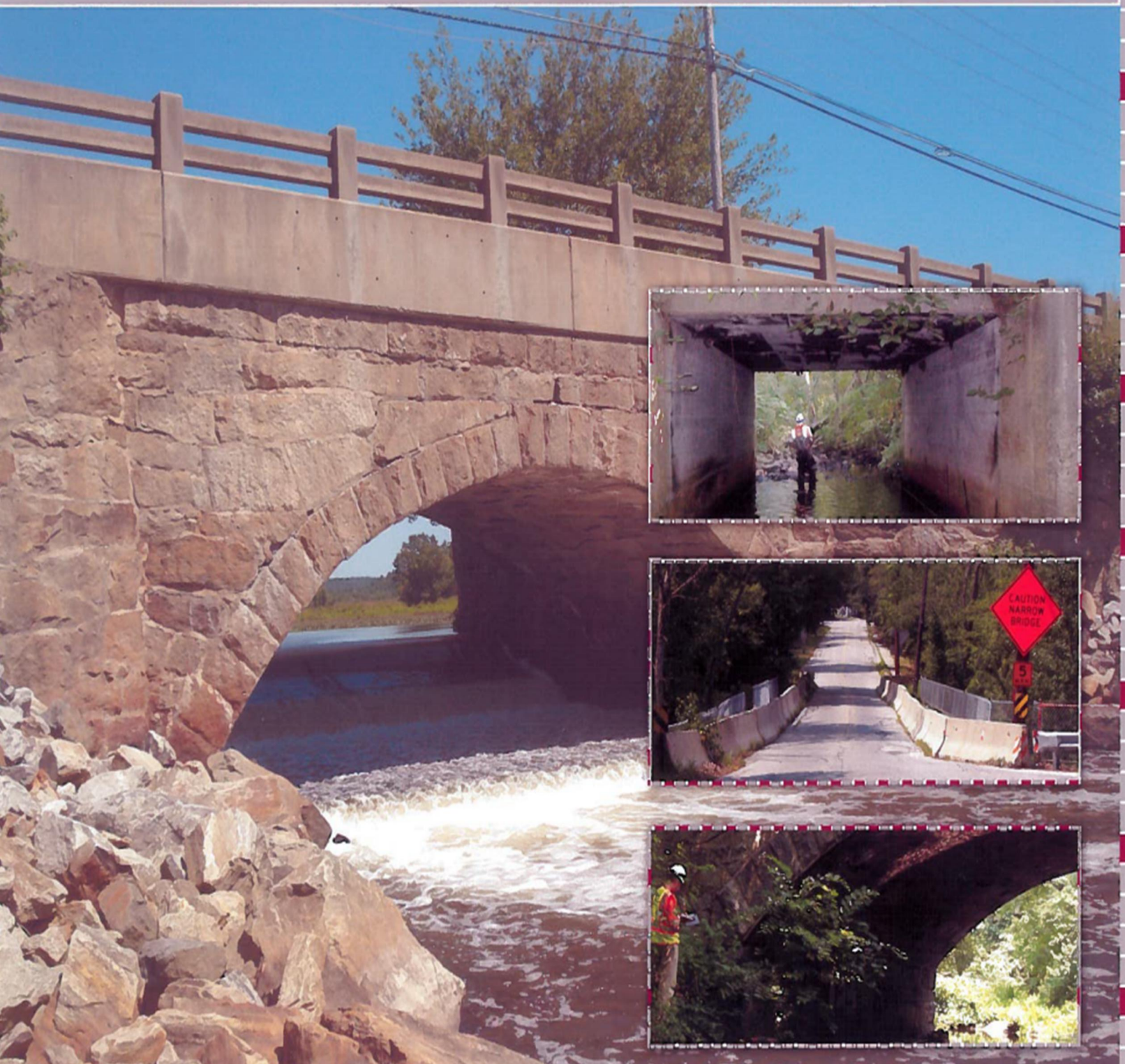

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EXECUTIVE SUMMARY

The twenty-six structures that were evaluated as part of this program have been prioritized 1 through 26, 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 twenty structures were found to have varying levels of structural and safety deficiencies. The remaining six structures have very minor deficiencies and therefore require little attention at the present time.

The term "AASHTO Sufficiency Rating" will be referred to for some of The Town's 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 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 20 feet (i.e. AASHTO=28.0).

Inspection intervals for bridge structures are every two years. Bridges that have spans exceeding 20' are inspected by MassDOT in accordance to the National Bridge Inspection Standards (NBIS). Most of the bridges included in this report are non-NBIS structures, and these structures are not inspected by MassDOT. The municipality is responsible for inspecting these non-NBIS structures.

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 – Hartford Avenue East over Canal

Hartford Avenue East Bridge (Br. No. U-02-028) is a hydraulic structure made up of a timber roof supported on stone masonry walls. Flow ends downstream at the south side of Hartford Avenue and continues upstream underneath the roadway. As it reaches the north side of Hartford Avenue, the culvert continues beneath 104 Hartford Avenue East "The Larkin Building" and becomes private property. This structure is currently posted for a 6 ton load limit. Directly over the culvert steel plates, asphaltic patching, Jersey barriers, and traffic barrels are present as result from a collapse of the structure in 2007. This culvert is currently scheduled to be replaced.

Priority 2 – Marywood Street over Drabbletail Brook

Marywood Street Bridge is a concrete slab structure spanning Drabbletail Brook. This structure is in poor condition with substantial deterioration and undermining at both abutments as a result of scour. The bridge has been closed to vehicular traffic as a result of the inspection performed for this report. The Town is moving forward with plans to replace this structure with a new concrete box culvert.

Priority 3 – 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 bridge rail is in very poor condition and a significant safety hazard. The narrow roadway width and substandard safety barrier are a significant hazard to pedestrians and motorists. BETA recommends that the structure be completely replaced due to its conditions and as it is functionally obsolete with respect to roadway width and bridge railings. Improved roadway alignment and sidewalks should be incorporated into the design of the new structure. This bridge is currently posted for 5 tons.

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. This structure is in marginal condition with several noted deficiencies in the stone masonry abutments and bridge railing. The stone masonry abutments are experiencing advanced scour and undermining.

BETA recommends a complete replacement of the structure based on the condition of the substructure and training walls, the active scour affecting the abutments, and the various modifications required to incorporate a standard bridge railing system.

Priority 5 – Ironstone Road/Old Providence Turnpike over Ironstone Brook

Ironstone Road Bridge (Br. No. U-02-003) is an 18" thick concrete slab structure crossing Ironstone Brook. In addition to the noted concrete deficiencies, this culvert is experiencing advanced scour and undermining at both abutments. There is also evidence of re-occurring settlement on the approaches, indicating piping of the stream outside the culvert. BETA recommends a replacement of this culvert due to the condition of the existing abutments and active scour affecting them.

Priority 6 – Elm Street over Rivulet Brook

Elm Street Bridge (Br. No. U-02-033) is a two-span concrete slab structure which spans across Rivulet 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.

Priority 7 – 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, voids and areas of minor scour at the abutments. Similarly, 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 8 – Carney Street over Drabbletail Brook

Carney Street Bridge is a 24" thick concrete slab that spans Drabbletail Brook and is founded on mortared stone masonry abutments. This structure is in poor-to-fair condition with several deficiencies noted. Multiple full penetration longitudinal cracks were found in the concrete slab. There are several voids and dislodged stones in the abutments. In addition, the northeast training wall is bulging and in need of repair to prevent structural failure. This bridge is currently not posted. Based on the existing condition and inadequacy of the existing bridge rails, BETA recommends the complete replacement of this structure as a long-term solution. Interim repairs are also recommended within the body of this report in the event replacement cannot be scheduled in the near future.

Priority 9 – 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 where stones are either missing or displaced (up to 1') in the arch structure and stone masonry abutments. Based on our field observations and the structure's apparent age, BETA recommends a complete replacement of the structure. Alternatively, slip-lining with a corrugated metal pipe/arch is also recommended if proven technically feasible.

Priority 10 – South Street over Bacon Brook

South Street Bridge (Br. No. U-02-060) is a 24" thick concrete slab structure spanning Bacon Brook which is founded on concrete abutments. This structure appears to be in fair condition with several deficiencies noted. This bridge is not currently posted and based on our field observations appears to be performing adequately. BETA recommends repairs and rehabilitation for this structure.

Priority 11 – Aldrich Street over Aldrich Brook

This structure (Br. No. U-02-038) is a concrete box culvert which carries Aldrich Street over Aldrich Brook. This structure is in fair condition with several deficiencies noted. Most notably is the advanced deterioration of the northern wingwalls and bridge railing. Jersey barriers are currently present at the north curb line to protect the deteriorated bridge rail; these barriers pose lane width restrictions. The box culvert is in fair condition with only minor problems noted. BETA recommends the northern wingwalls and bridge railing be rebuilt. BETA also recommends that repairs of the box culvert structure be undertaken.

Priority 12 – 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 both the slab and abutments. However, lack bridge railing and approach guardrail poses a significant safety hazard to pedestrians and motorists. This structure is currently not posted. Based on our field observations the structure appears to be performing adequately. BETA recommends that repairs to this structure and installation of standard highway guardrail at all approaches and over the culvert be undertaken.

Priority 13 – 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. This structure is generally in fair condition with some problems noted. All concrete components to the superstructure and substructure only show minor deficiencies. The steel superstructure is exhibiting advanced paint failure and minor-to-moderate surface rusting.

Most recent load rating calculations conclude the structure does not meet minimum statutory loading requirements. The bridge is not currently posted due to the presence of two culvert structures immediately adjacent to the bridge and their unknown load carrying capacity. BETA recommends that the structure be painted and repaired. It is also suggested that any additional wearing surface over the structure be removed to insure it meets minimum statutory loading and forgo future posting requirements.

Priority 14 – 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 minor 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. Repairs should be performed to further extend the life of the structure.

Priority 15 – 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.

Priority 16 – Rockmeadow Road over Rock Meadow Brook

This structure (Br. No. U-02-034) is a corrugated metal pipe which carries Rockmeadow Road over Rock Meadow Brook. This corrugated pipe is mostly in good condition with minor deficiencies noted. However, the pipe floor has experiencing advanced corrosion and section loss. The existing guardrail over the structure and at all approaches is exhibiting severe deterioration. Based on our field observations BETA recommends this

structure be slip-lined with a new corrugated metal pipe arch of similar dimensions and the guardrail be replaced. This bridge is currently posted with no record of rating calculations on file with MassDOT.

Priority 17 – West Street over Laurel Brook

West Street Bridge is a concrete arch structure spanning Laurel Brook. The structure is in fair condition with some problems noted. While most bridge components only show minor deterioration, the concrete bridge rails are in poor condition. This bridge is currently not posted. Based on our field observations the structure appears to be performing adequately. Minor repairs should include concrete repairs to the arch, abutments, and bridge rail.

Priority 18 – 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 moderate 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. It is also recommended the northeast wingwall be repaired to prevent further lateral movement.

Priority 19 – 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. This bridge is currently under contract to be rehabilitated. Given the scope of work to be performed, BETA has no repair recommendations at this time. Although no load posting is required for this bridge, it is posted for a 14 ton weight limit. BETA does recommend The Town follow up as to the origins and validity of this posting. If weight restrictions are proven correct, strengthening of the existing arch should be incorporated into the rehabilitation program.

Priority 20 – 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 culvert located within the public right-of-way only. Under Rivulet Street, the culvert is comprised of a stone masonry arch structure and a concrete box culvert. Both structures are in generally good condition and only require minor repairs.

Priority 21 – 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. Lateral displacement was noted at the southwest training wall.

Minor repairs should include the repair of stone training walls to prevent loss of roadway fines and removal of debris from the upstream culvert opening.

Priority 22 – 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 23 – 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 good condition with some minor problems noted. Although most elements only show minor concrete deterioration, the box beam shear keys are exhibiting signs of failure. This could be due to advanced deterioration of the wearing surface above. Based on our inspection findings BETA recommends that repairs be performed to further extend the life of the structure.

Priority 24 – 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 25 – 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.

Priority 26 – River Road over Ironstone Brook

The River Road Bridge (Br. No. U-02-030) is scheduled to be replaced with a new steel folded plate girder superstructure founded on new concrete abutments. Bridge replacement construction was underway at the time of inspection.

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 of 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

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
U-02-002	6X5	Mill Street	Emerson Brook	Stone Masonry Arch on Stone Masonry Abutments	10	21.5	1850	None Noted	Town	Yes	No	See Note 1	-
U-02-003	6X2	Ironstone Road/Old Providence Turnpike	Ironstone Brook	Concrete Slab on Concrete Abutments	11.67	24	1850	None Noted	Town	Yes	No	No	-
U-02-008	1J2	Depot Street	Mumford River	Prestressed Box Beams on Concrete Abutments	75	36	1994	None Noted	Town	Yes	Yes	No	February, 1996
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	February, 1982
U-02-015	1J4	Henry Street	West River	Prestressed Deck Beams on Stone Masonry Abutments	31.1	20	1930 / 1965	None Noted	Town	Yes	No	No	March, 1982
U-02-017	6X6	Hartford Avenue East	West River	Duel Precast Box Culverts	18 (Overall)	105	N/A	None Noted	Town	Yes	No	No	-
U-02-018	1DL	Hartford Avenue East	Blackstone River	Stone Masonry Arch on Stone Masonry Abutments	39	24	1900 / 1960	None Noted	Town	Yes	Yes	See Note 1	December, 1987
U-02-019	1DK	Hartford Avenue East	Blackstone Canal	Stone Masonry Arch on Stone Masonry Abutments	60	24	1870	None Noted	Town	Yes	No	See Note 1	April, 2010
U-02-020	1DM	Hartford Avenue East	Mumford River	Steel Multi-Beam on Concrete Abutments	43	38.5	1955	None Noted	Town	Yes	Yes	No	July, 1993
U-02-028	6X	Hartford Avenue East	Canal	Unknown	NA	NA	1998	6 Tons	Town	Yes	No	No	-
U-02-030	BAM	River Road	Ironstone Brook	Steel Folded Plate Girder on Concrete Abutments	46	35.25	2011 / 2012	None Noted	Town	Yes	Yes	No	-
U-02-033	6X7	Elm Street	Rivulet Brook	2-Span Concrete Slab on Concrete Abutments	18 (Overall)	40.5	1930	None Noted	Town	Yes	No	No	-
U-02-034	6X3	Rock Meadow Road	Rockmeadow Brook	Corrugated Metal Pipe Arch	13	52.5	1850	10, 15, & 23 Tons	Town	Yes	No	No	-
U-02-037	6X8	Blackstone Street	Meadow Brook	Masonry Arch Lined w/ Corr. Metal Pipe on Masonry Abutments	10	32	1938	20,36, & 52 Tons	Town	Yes	Yes	See Note 1	-
U-02-038	6X9	Aldrich Street	Aldrich Brook	Concrete Box Culvert	10	33.6	1941	None Noted	Town	Yes	No	No	-
U-02-060	6XB	South Street	Bacon Brook	Concrete Slab on Concrete Abutments	11.42	22	1940	None Noted	Town	Yes	No	No	-
No Listing	-	Carney Street	Drabbletail Brook	Concrete Slab on Stone Masonry Abutments	11.75	34.5	N/A	None Noted	Town	Yes	No	No	-
No Listing	-	Elmwood Avenue	Aldrich Brook	Concrete Slab on Stone Masonry Abutments	9.42	21.3	N/A	Note Noted	Town	Yes	No	No	-
No Listing	-	Hartford Avenue East	Mumford Tail Race	Concrete Box Culvert	8	52	N/A	None Noted	Town	Yes	No	No	-
No Listing	-	Hazel Street	Cold Spring	Stone Masonry Arch on Stone Masonry Abutments	10	25	N/A	None Noted	Town	Yes	No	See Note 1	-
No Listing	-	Hollis Street	Meadow Brook	Concrete Box Culverts	9.83	15.5	N/A	5 Tons	Town	Yes	No	No	-
No Listing	-	Laurel Street	Laurel Brook	Stone Masonry Arch on Stone Masonry Abutments	12	20.5	N/A	Note Noted	Town	Yes	No	See Note 1	-
No Listing	-	Marywood Street	Drabbletail Brook	Concrete Slab on Stone Masonry Abutments	7.25	23	N/A	None Noted	Town	Yes	No	No	-
No Listing	-	Rivulet Street	Rivulet Brook	Concrete Box Culvert & Masonry Arch on Masonry Abutments	15.5	64	N/A	Note Noted	Town	Yes	No	See Note 1	-
No Listing	-	West Street	Laurel Brook	Concrete Arch on Concrete Abutments	12	20	N/A	None Noted	Town	Yes	No	No	-
No Listing	-	West Street	Scadden Brook	Concrete Slab on Stone Masonry & Concrete Abutments	9.75	29.6	N/A	None Noted	Town	Yes	No	No	-

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	Hartford Avenue East	Canal	Replacement	$ 180,000	$ 45,000	$ 225,000	$ -	$ -	$ -
2	Marywood Street	Drabbletail Brook	Replacement	$ 145,000	$ 40,000	$ 185,000	$ -	$ -	$ -
3	Hollis Street	Meadow Brook	Replacement/Widening	$ 185,000	$ 50,000	$ 235,000	$ 10,000	$ 3,000	$ 13,000
4	West Street	Scadden Brook	Replacement	$ 175,000	$ 45,000	$ 220,000	$ 8,000	$ 2,000	$ 10,000
5	Old Providence Turnpike	Ironstone Brook	Replacement	$ 160,000	$ 40,000	$ 200,000	$ 13,000	$ 4,000	$ 17,000
6	Elm Street	Rivulet Brook	Replacement	$ 310,000	$ 80,000	$ 390,000	$ -	$ -	$ -
7	Henry Street	West River	Repairs	$ -	$ -	$ -	$ 80,000	$ 20,000	$ 100,000
8	Carney Street	Drabbletail Brook	Replacement	$ 190,000	$ 50,000	$ 240,000	$ 24,000	$ 6,000	$ 30,000
9	Hazel Street	Cold Spring	Slip-Line	$ 105,000	$ 30,000	$ 135,000	$ 19,000	$ 5,000	$ 24,000
10	South Street	Bacon Brook	Repairs	$ -	$ -	$ -	$ 60,000	$ 15,000	$ 75,000
11	Aldrich Street	Aldrich Brook	Repairs	$ -	$ -	$ -	$ 110,000	$ 30,000	$ 140,000
12	Elmwood Avenue	Aldrich Brook	Repairs	$ -	$ -	$ -	$ 75,000	$ 20,000	$ 95,000
13	Hartford Avenue East	Mumford River	Repairs	$ -	$ -	$ -	$ 365,000	$ 95,000	$ 460,000
14	Mill Street	Emerson Brook	Repairs	$ -	$ -	$ -	$ 95,000	$ 25,000	$ 120,000
15	Hartford Avenue East	Blackstone Canal	Repairs	$ -	$ -	$ -	$ 85,000	$ 25,000	$ 110,000
16	Rock Meadow Road	Rockmeadow Brook	Slip-Line	$ -	$ -	$ -	$ 80,000	$ 20,000	$ 100,000
17	West Street	Laurel Brook	Repairs	$ -	$ -	$ -	$ 60,000	$ 15,000	$ 75,000
18	Laurel Street	Laurel Brook	Repairs	$ -	$ -	$ -	$ 65,000	$ 20,000	$ 85,000
19*	Hecla Street	West River	NA	$ -	$ -	$ -	$ -	$ -	$ -
20	Rivulet Street	Rivulet Brook	Repairs	$ -	$ -	$ -	$ 50,000	$ 15,000	$ 65,000
21	Hartford Avenue East	Mumford Tail Race	Repairs	$ -	$ -	$ -	$ 15,000	$ 5,000	$ 20,000
22	Hartford Avenue East	Blackstone River	Repairs	$ -	$ -	$ -	$ 70,000	$ 20,000	$ 90,000
23	Depot Street	Mumford River	Repairs	$ -	$ -	$ -	$ 50,000	$ 15,000	$ 65,000
24	Hartford Avenue East	West River	Repairs	$ -	$ -	$ -	$ 10,000	$ 5,000	$ 15,000
25	Blackstone Street	Meadow Brook	Repairs	$ -	$ -	$ -	$ 20,000	$ 5,000	$ 25,000
26**	River Road	Ironstone Brook	NA	$ -	$ -	$ -	$ -	$ -	$ -
			Totals	**$ 1,450,000**	**$ 380,000**	**$ 1,830,000**	**$ 1,364,000**	**$ 370,000**	**$ 1,734,000**

* 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-six 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 as follows:

Priority	Bridge Description	Bridge No.
1	Hartford Avenue East over Canal	U-02-028
2	Marywood Street over Drabbletail Brook	NA
3	Hollis Street over Meadow Brook	NA
4	West Street over Scadden Brook	NA
5	Ironstone Road over Ironstone Brook	U-02-003
6	Elm Street over Rivulet Brook	U-02-033
7	Henry Street over West River	U-02-015
8	Carney Street over Drabbletail Brook	NA
9	Hazel Street over Cold Spring	NA
10	South Street over Bacon Brook	U-02-060
11	Aldrich Street over Aldrich Brook	U-02-038
12	Elmwood Avenue over Aldrich Brook	NA
13	Hartford Avenue East over Mumford River	U-02-020
14	Mill Street over Emerson Brook	U-02-002
15	Hartford Avenue East over Blackstone Canal	U-02-019
16	Rockmeadow Road over Rock Meadow Brook	U-02-034
17	West Street over Laurel Brook	NA
18	Laurel Street over Laurel Brook	NA
19	Hecla Street over West River	U-02-014
20	Rivulet Street over Rivulet Brook	NA
21	Hartford Avenue East over Mumford Tail Race	NA
22	Hartford Avenue East over Blackstone River	U-02-018
23	Depot Street over Mumford River	U-02-008
24	Hartford Avenue East over West River	U-02-017
25	Blackstone Street over Meadow Brook	U-02-037
26	River Road over Ironstone Brook	U-02-030

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.

Due to the classification of these bridges, limited information was available on past inspections, original construction drawings, and load ratings for these structures. The

Town of Uxbridge and MassDOT were contacted to obtain the most recent information on each bridge structure. All relevant information, which was available, has been included as attachments to this bridge management plan.

OBJECTIVE

The objective of BETA's bridge engineering services 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-six 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-six 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.

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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-six bridges. BETA contacted both The Town of Uxbridge and MassDOT for available information concerning these structures. 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. A field summary report including photographs documenting existing conditions was prepared for each bridge. BETA's bridge inspection 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-six 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 by The Town. 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 there be any chance that 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-six 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.

Hartford Avenue East over Canal
(Bridge No. U-02-028)

Priority 1

AVAILABLE INFORMATION

Hartford Avenue East is classified as a Rural Major Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

The culvert is made up of a timber roof supported on stone masonry walls. At the downstream opening on the south side of Hartford Avenue, water meets a mortared stone masonry headwall. The canal then continues upstream underneath the roadway. As it reaches the north side of Hartford Avenue, the canal travels beneath 104 Hartford Avenue East "The Larkin Building" and becomes private property. Upstream of the building, still on private property, a mortared stone masonry headwall appears to be connected to the foundation of the building. The channel continues further north to meet with the Mumford River.

The culvert, measured from headwall to headwall is approximately 140' long. A hydraulic opening of 12' wide by 2'-6" high was roughly measured.

The roadway over the structure consists of an asphaltic wearing surface with a width of 25'-9" and 5'-4" sidewalks on either side. There are driveways in the west approach and an intersection with Whitin Street directly adjacent to the structure in the east approach.

There are overhead wires along the south side of Hartford Avenue East. A water line also crosses the structure. There is a 24" penetration in the southeast channel wall for drainage of the adjacent pond.

There are "6 Ton Limit" signs at both approaches. There are also "Road Narrows" and "Speed Limit 30"signs at the east approach.

FINDINGS

The inspection of the structure itself was limited. The existing opening is completely submerged and/or located on private property (See Photos 1 and 3). However, due to the roadway above certain assumptions can be made as to the structures overall condition. Directly over the culvert steel plates, asphaltic patching, Jersey barriers, and traffic barrels are present as result from a collapse of the structure in 2007. Given these circumstances, the structures primary load carrying elements are assumed to be severely compromised.

The stone channel walls located south of Hartford Avenue East are in good condition. Heavy vegetation growth and random missing chinking stones are typical.

Both approach roadways have a large amount of sealed linear cracking. The asphaltic patching over the culvert is in fair condition with minor transverse and longitudinal

cracking. While the guardrail itself is in good condition, the presence of Jersey barriers cause the eastbound lane to narrow considerably over the culvert (Photos 5 and 7).

RECOMMENDATIONS

Due to the existing roadway conditions, past culvert failure, and posted load rating, BETA recommends that the culvert be replaced with a new concrete box culvert while maintaining the existing hydraulic opening.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	$180,000
Engineering:	$45,000
Total:	$225,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HARTFORD AVENUE EAST
OVER
CANAL

BRIDGE NO.
U-02-028

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-028

General:

Street Name: Hartford Avenue East **Waterway:** Canal **Culvert ID:** U-02-028

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/21/2011 **Weather:** Partly Cloudy **Temp:** 90°F

General Culvert Information:

Culvert Type: N/A **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 24 **Length of Culvert Feet:** 0

Dimensions Of Hydraulic Opening Width (Inches): 60 **Depth of Fill Over Culvert Inches:** 0"

Depth of Flow During Inspection: 24 **Direction of Flow:** South

Utilities Carried By Structure: Overhead wires, water, sewer.

Drainage Structures: Outfall at SouthEast wall

Other: Downstream (South of street) water hits headwall. Canal continues upstream + becomes private property on North side of street. Upstream opening on other side of private building also hits headwall + moves under surface

Abutments/Culvert Sidewalls:

Abutment North Sidewall: See Culvert Notes

Abutment South Sidewall: See Culvert Notes

Abutment East Sidewall: See Culvert Notes

Abutment West Sidewall: See Culvert Notes

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: See Culvert Notes

Culvert Roof Rating: N/A

Culvert Floor, Entrance, Exit

Floor Rating: N/A

Floor Scour: None detected **Debris:** Minor/No debris

Floor Notes: None

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-028

Training/Wingwalls:

North East Wall: N/A **North West Wall Type:** N/A **North West Wall Rating:** N/A

North East Wall: Private Property

North West Wall: N/A **North West Wall Type:** N/A **North West Wall Rating:** N/A

North West Wall: Private Property

South East Wall: 24" Dia. Outfall **South East Wall Type:** Stone Masonry **South East Wall Rating:** N/A

South East Wall: Heavy veg. growth. Spotty loss of mortar and chink stones. Unmortared stones at WL w/Lots of voids

South West Wall: Channel (leading to Mumford) **South West Wall Type:** Dry Laid Stone **South West Wall Rating:** N/A

South West Wall: Heavy veg. Several voids

Head Wall: Headwall **Head Wall Type:** Stone Masonry - S **Head Wall Rating:** N/A

Head Wall Notes: Approx 1'x3' opening submerged at mud line

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Some cracks. Minor wear **East Roadway Inches:** 308

East Roadway Approach Settlement: None **East Roadway Rating:** 4

East Roadway Approach Alignement: Straight, Intersection

West Roadway Approach Condition: Minor cracks, repairs **West Roadway Inches:** 308

West Roadway Approach Settlement: None **West Roadway Rating:** 4

West Roadway Approach Alignement: Straight, Driveways

Safety Barrier

Guard Rail Type: Standard highway guardrail. Jersey barriers

Guard Rail Condition: Asphalted to roadway

Guard Rail Rating: 3

Guard Rail Notes: Metal plates and jersey barriers indicate past culvert failure.

Photo 1 Looking North: South Headwall Elevation

Photo 2 Looking East: Southeast Training Wall Elevation

Photo 3 Looking South: North Headwall Elevation Under Private Building

Photo 4 Looking East: West Approach

Photo 5 Looking West: Jersey Barriers and Steel Plates at South Sidewalk

Photo 6 Looking East: West Approach

Photo 7 Looking East: Jersey Barriers and Steel Plates at South Sidewalk

Marywood Street over Drabbletail Brook
(Bridge No. N/A)

Priority 2

AVAILABLE INFORMATION

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

BRIDGE DESCRIPTION

This structure consists of an 18" thick exposed concrete slab supported by stone abutments, which have been given a concrete facing. Due to the lack of existing data, it is assumed that the stone abutments were part of the original construction and later given a concrete facing as part of a substructure retrofit. Upstream and downstream of the structure are dry-laid stone training walls that are continuous with the abutments.

The structure has an out-to-out width of 23'-0" with a clear span of 7'-3". The hydraulic opening of the structure is approximately 3'-1" high by 7'-3" wide. The flow was 3" deep at the time of inspection and flowing eastward.

The roadway width over the structure is approximately 23'-0" with no sidewalk on either side. There is no fill over the structure as the concrete slab is exposed. Both approaches are narrow and straight with a slight vertical curve. Residential driveways are located directly adjacent to the structure at both approaches.

No utilities were noted being carried through the structure. There are drainage outfalls at the northeast, northwest, and southeast training walls. A drainage outfall is also present in the center of the north abutment.

The bridge guardrail consists only of a chain link fence with no approach guardrail.

No signs were noted at the approaches.

FINDINGS

During the inspection it was found that severe scour has rendered both abutments structurally deficient. There is severe full length deterioration of the base of both walls with a depth of scour measuring up to 6' (See Photos 2, 9, and 10). Settlement of the roadway adjacent to the structure at both approaches is present and is a direct result of the excessive scour conditions below.

Subsequent to the inspection, BETA recommended closing the bridge to vehicular traffic as soon as possible. The closing was by implemented by the Town shortly thereafter.

In addition to the deterioration of the abutments, it was found that the training walls on the west side and the northeast training wall all show signs of lateral displacement and are covered by heavy vegetation (Photos 7 and 8). Displacement in these walls and in the southwest embankment is causing settlement of the roadway at all four corners of the slab

(Photo 11). Roadway patching adjacent to the concrete slab at both approaches indicates a loss of material behind the abutments (Photos 12 and 13).

The chain-link fence is in poor shape and there is no approach guard rail.

RECOMMENDATIONS

The existing substructure is most likely past its design life and is exhibiting extensive section loss and deterioration. Also, the existing bridge railing is substandard for protection of vehicular traffic. BETA recommends a complete replacement of this bridge. We recommend that the bridge be replaced with a precast concrete box culvert or similar structure. Due to potential downstream impacts of an increased hydraulic opening, we recommend the replacement structure maintain the existing interior dimensions but include scour prevention measures.

As part of this bridge replacement plan, BETA also recommends reconstruction of the stone masonry training walls immediately adjacent to the bridge. These walls can either be re-built to match existing conditions or replaced with precast and/or cast-in-place concrete.

As the Town is moving forward with plans to replace this structure, no interim repair measures are recommended beyond closely monitoring the adjacent stone masonry training walls for further displacement or washout.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	$145,000
Engineering:	$40,000
Total:	$185,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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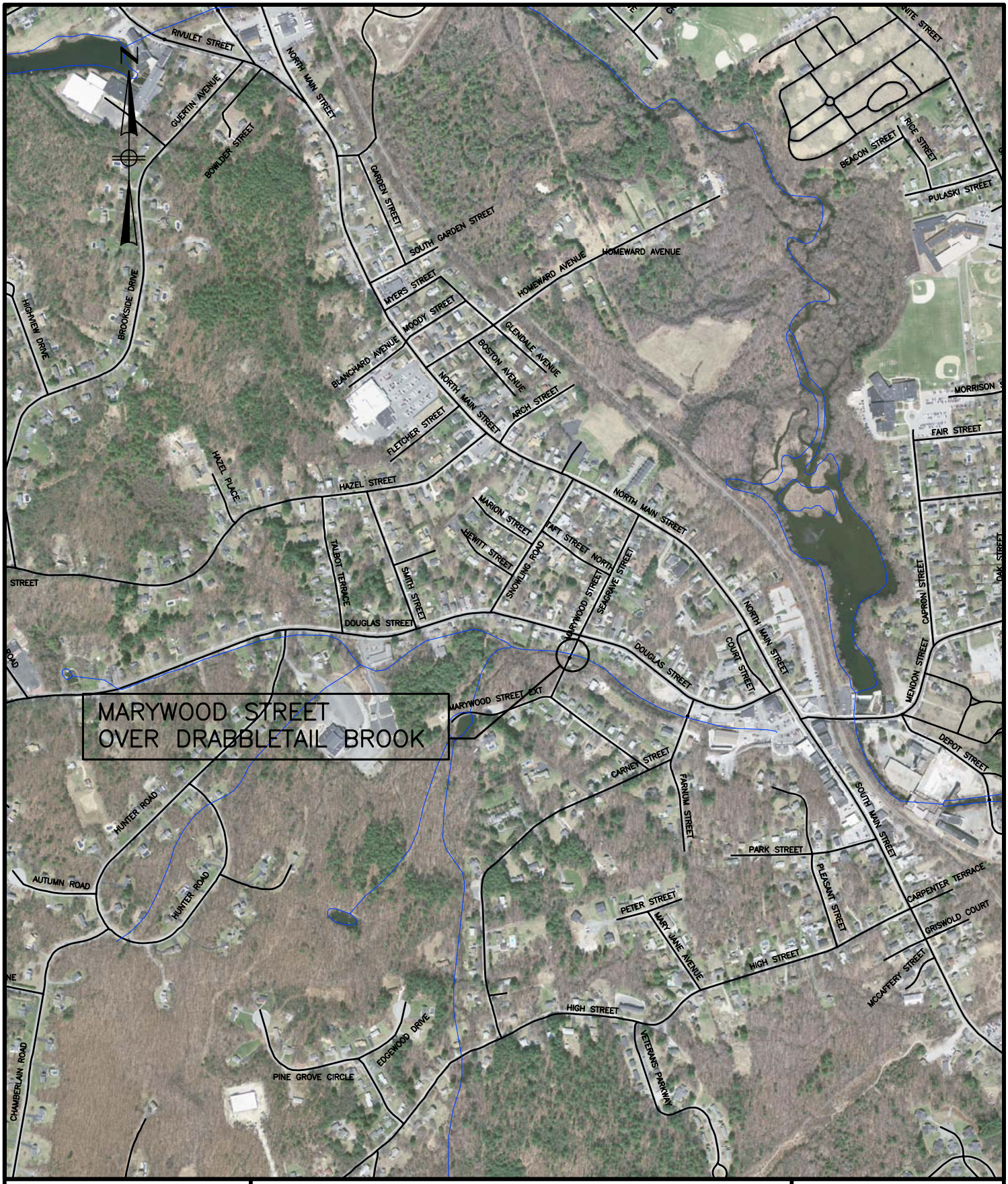

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

MARYWOOD STREET
OVER
DRABBLETAIL BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-4

General:

Street Name: Marywood Street **Waterway:** Drabbletail Brook **Culvert ID:** NA-4

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/21/2011 **Weather:** Partly Cloudy **Temp:** 85°F

General Culvert Information:

Culvert Type: Concrete Slab (18" thick)

Construction Date: N/A

Dimensions Of Hydraulic Opening Height (Inches): 37

Length of Culvert Feet: 23

Dimensions Of Hydraulic Opening Width (Inches): 87

Depth of Fill Over Culvert Inches: 0" - Exposed

Depth of Flow During Inspection: 3"

Direction of Flow: East

Utilities Carried By Structure: Sewer?

Drainage Structures: Outfalls at NorthWest, SouthEast + NorthEast training walls. Asphaltic drainage path at SouthEast and SouthWest corners of slab.

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Outfall at center. See scour + south abutment notes

Abutment South Sidewall: Severe deterioration at base. Full length scaling, Spalling, and scour >6' deep. Random efflo, moisture, rust (TYP).

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 1 **Abutment South Sidewall Rating:** 1

Abutment East Sidewall Rating: 1 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: 18" Slab: Few minor random spawls. Mostly covered in damp proofing. Some exposed areas. Some abrasions due to debris flow.

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: Severe scour of abutment walls. **Debris:** Minor/No debris

Floor Notes: Scour indicates hydraulic opening is too small. See south abutment notes for more on scour.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

Training/Wingwalls:

North East Wall: Training **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 2

North East Wall: Heavy vegetation. Large voids, Bulging (TYP).

North West Wall: Training **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 2

North West Wall: Heavy vegetation. Large voids, Bulging (TYP)

South East Wall: Training **South East Wall Type:** Dry Laid Stone **South East Wall Rating:** 2

South East Wall: Heavy vegetation. Large voids, Bulging (TYP). Approx 16" lateral movement.

South West Wall: Training Wall **South West Wall Type:** Dry Laid Stone **South West Wall Rating:** 2

South West Wall: No training wall. Severe deterioration of embankment. Exposed slab

Head Wall: Slab Fascia **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: None

Roadway Condition:

North Roadway Approach Condition: Cracking (TYP). Some repairs **North Roadway Inches:** 195

North Roadway Approach Settlement: Settlement of much of roadway **North Roadway Rating:** 1

North Roadway Approach Alignement: Narrow, Straight, Driveways, Intersection.

South Roadway Approach Condition: Alli cracking, patches, erosion at slab corners **South Roadway Inches:** 195

South Roadway Approach Settlement: Settlement at wheel lines. **South Roadway Rating:** 1

South Roadway Approach Alignement: Narrow, Straight, Driveways.

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Chainlink fence. No appraoch rail.

Guard Rail Condition: Fence bent and leaning away from roadway on both sides. Safety hazard

Guard Rail Rating: 1

Guard Rail Notes: None

Photo 1 Looking East: West Culvert Elevation

Photo 2 Looking Northeast: North Abutment Elevation

Photo 3 Looking South: Scour at West End of South Abutment

Photo 4 Looking East: Underside of Slab

Photo 5 Looking Northeast: North Abutment Elevation

Photo 6 Looking West: East Culvert Elevation

Photo 7 Looking Southwest: Crumbling of Southeast Training Wall

Photo 8 Looking Northwest: Northeast Training Wall Elevation

Photo 9 Looking Southwest: Severe Scour in South Abutment

Photo 10 Looking Northwest: Severe Scour in North Abutment

Photo 11 Looking Northeast: Typical Exposed Slab Corners

Photo 12 Looking West: Pavement Deterioration at South Bridge Joint

Photo 13 Looking East: Pavement Deterioration at North Bridge Joint

Photo 14 Looking South: North Approach

Photo 15 Looking Southeast: East Bridge Rail Elevation

Photo 16 Looking North: South Approach

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

Priority 3

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 is 9'-10". The rectangular hydraulic opening of the structure is approximately 3'-10" high by 9'-10" wide. The flow was 6" deep at the time of inspection and 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 directly adjacent to the structure at the southeast approach.

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

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. However, no rating report is on file with the Massachusetts Department of Transportation.

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. Additionally, the northeast abutment corner shows advanced scaling and spalling with voids up to 8" deep at the waterline. Deep spalling and heavy vegetation growth was also noted to be typical on both the upstream and downstream headwalls (Photo 13).

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 stone masonry walls on both sides of the brook show large voids and are crumbling due to erosion and scour (Photo 11). Visibility of the concrete wingwalls was limited but do appear to be in fair condition.

The upstream wingwalls are stone masonry and support both approach roadways; no training walls are present upstream of the culvert. The wingwalls are generally in critical-

to-poor condition with sizeable voids. The northeast wall is failing and shows over a foot of lateral displacement (Photo 8). Timber plywood shoring is located at the southeast wall and is covering approximately half its face (Photo 9) restricting visibility. Several large spalls were noted behind the plywood, but their depth could not be measured without complete removal of the shoring. There is also a 2" wide x 4" deep horizontal crack (Photo 10) on the exposed portion of the wall face. The culvert floor has large amounts of debris with random piles of boulders just upstream and downstream of the culvert (Photos 1 and 12).

The roadway over the culvert is extremely narrow. The south approach alignment has poor visibility due to a sharp horizontal curve. At the time of inspection, skid marks in the south approach were noted and indicate vehicular accidents due to poor visibly. The roadway wearing surface is in good condition. However, the timber post and railing system is failing and substandard. Portions of the railing at the northeast approach, mounted to the wingwall below, are crumbling.

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 guardrail at both approaches in accordance with current AASHTO design standards.

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

- Debris should be removed from the streambed.
- All voids noted in the existing abutments and wingwalls should be filled to prevent further loss of roadway fines and possible structural failure. **This should be considered a high priority.**
- Roadway width over the culvert is not adequate to carry two lanes of traffic. Additional “BE PREPARED TO STOP” approach signs should be added. The roadway centerlines should be striped accordingly. All signage and striping should be in accordance with current MUTCD standards.
- Signage in accordance current MUTCD standards is also recommended at the south approach indicating a sharp curve and/or reduced speed.

Inspections should be conducted at intervals not exceeding 12 months to monitor overall bridge conditions. Inspections should also be conducted on the bridge substructure and

wingwalls after extreme flood events to note any possible damage to the structure and/or roadway.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	$185,000
Engineering:	$50,000
Total:	$235,000

Interim Repairs

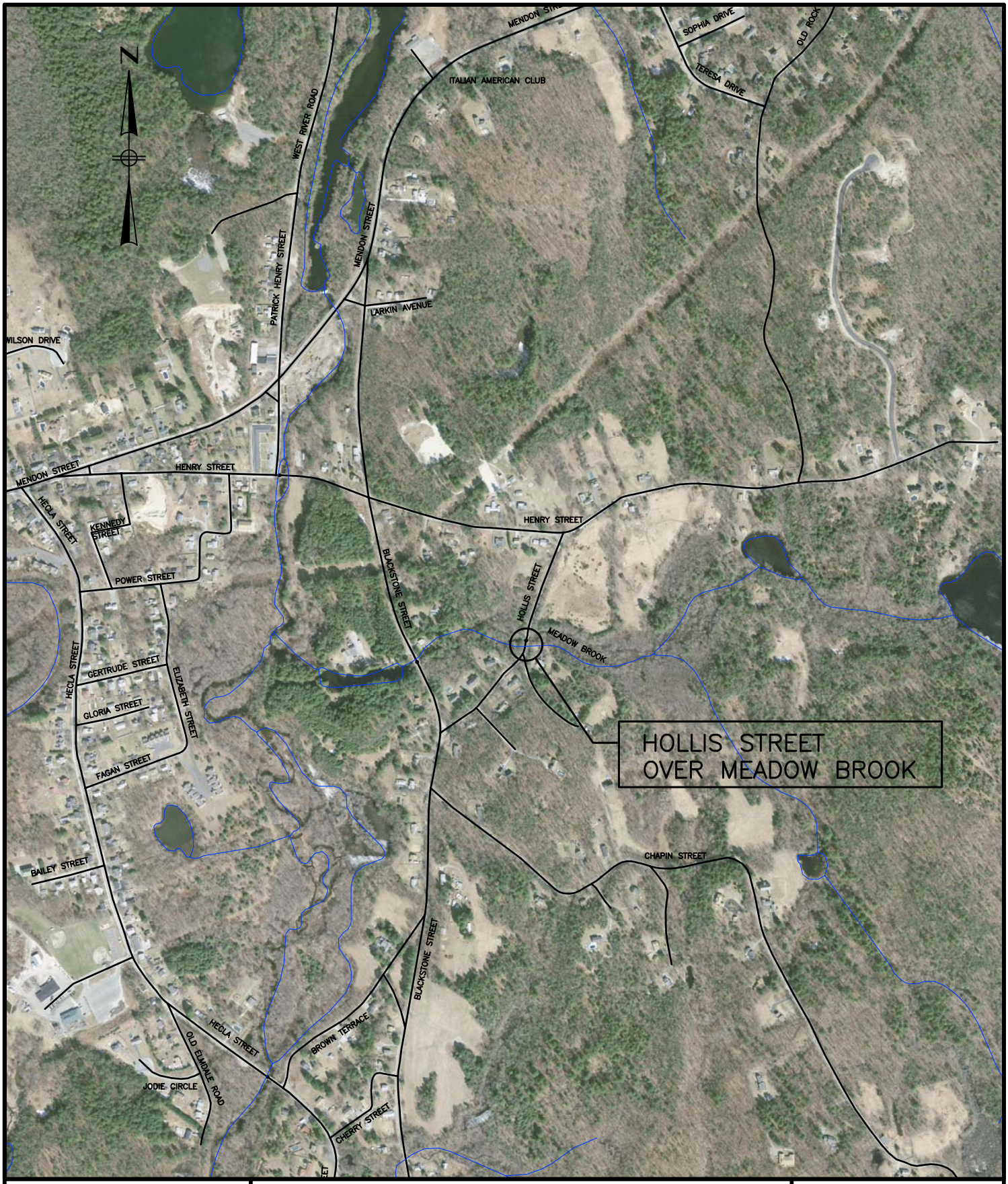
Construction:	$10,000
Engineering:	$3,000
Total:	$13,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos



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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HOLLIS STREET
OVER
MEADOW BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-6

General:

Street Name: Hollis Street **Waterway:** Meadow Brook **Culvert ID:** NA-6

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/13/2011 **Weather:** Mostly Sunny **Temp:** 70°F

General Culvert Information:

Culvert Type: Concrete Box Culvert **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 46 **Length of Culvert Feet:** 15.5

Dimensions Of Hydraulic Opening Width (Inches): 70 **Depth of Fill Over Culvert Inches:** N/A

Depth of Flow During Inspection: 6" **Direction of Flow:** West

Utilities Carried By Structure: None

Drainage Structures: Beaver dam just upstream. Outfall just upstream and SouthEast of bridge

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Severe scaling and spalling at WL. Moderate scaling of abutment faces (TYP for both). Complete deterioration of NE abutment corner. Up to 8" deep at WL.

Abutment South Sidewall: Severe scaling and spalling at WL. Moderate scaling of abutment faces (TYP for both). Complete deterioration of NE abutment corner. Up to 8" deep at WL.

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 3

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Light scaling. Otherwise good condition

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 2

Floor Scour: None detected **Debris:** Sand, Boulders, Cobbles

Floor Notes: Large amounts of debris in culvert channel. Random piles of boulders and sediment upstream and downstream

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-6

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Stone Masonry **North West Wall Rating:** 2

North East Wall: Large voids in stone and > 1' lateral displacement. Walls crumbling.

North West Wall: Training and Wingwall **North West Wall Type:** Unmortared Laid Masonry **North West Wall Rating:** 2

North West Wall: Unmortared laid masonry training wall covering wingwall. Crumbling with large voids.

South East Wall: Wingwall **South East Wall Type:** Stone Masonry **South East Wall Rating:** 2

South East Wall: Timber shoring. Large spalls behind shoring. Up to 4" deep. 2" wide Horiz. Crack

South West Wall: Training and Wingwall **South West Wall Type:** Laid Masonry **South West Wall Rating:** 2

South West Wall: Unmortared and crumbling with large voids. Training walls and fill cover wing walls.

Head Wall: Headwall **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: Heavy vegetation. Random deep spalling. Spalling at timber post base.

Roadway Condition:

North Roadway Approach Condition: Longitudinal crack. **North Roadway Inches:** 168

North Roadway Approach Settlement: None **North Roadway Rating:** 2

North Roadway Approach Alignement: Slight horiz curve.

South Roadway Approach Condition: Good **South Roadway Inches:** 168

South Roadway Approach Settlement: None **South Roadway Rating:** 1

South Roadway Approach Alignement: Sharp horiz curve. Poor visibility.

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Metal and wooden posts w/timber rail.

Guard Rail Condition: Mounted to top of headwall. Very poor shape (crooked). Leaning away from roadway. SE end mounted to tree.

Guard Rail Rating: 1

Guard Rail Notes: No approach rail. Safety hazard. South approach has skid marks heading toward brook. Approach ratings low due to lack of approach guard rails.

Photo 1 Looking West: East Culvert Elevation

Photo 2 Looking Northeast: North Abutment Elevation

Photo 3 Looking Southeast: South Abutment Elevation

Photo 4 Looking East: Underside of Slab

Photo 5 Looking Northwest: Spalling of North Abutment at Northeast Wingwall

Photo 6 Looking South: Spalling of South Abutment at East Opening

Photo 7 Looking Northwest: Northeast Wingwall Elevation

Photo 8 Looking South: Lateral Movement of Northeast Wingwall

Photo 9 Looking West: Southeast Wingwall Elevation with Timber Shoring

Photo 10 Looking West: Wide Horizontal Crack in Southeast Wingwall

Photo 11 Looking Northeast: Crumbling Masonry at Northwest Training Wall

Photo 12 Looking East: Heavy Debris Under Culvert

Photo 13 Looking Northwest: East Headwall Elevation

Photo 14 Looking South: Northeast Approach Rail

Photo 15 Looking South: Northwest Approach Rail

Photo 16 Looking North: South Approach

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 17" 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 guardrail consists of timber bridge rail with metal highway guardrail attached. 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 2 is fair with several deficiencies noted. Structure 1 is in poor condition with severe scour of the west abutment.

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 (See Photo 5). Slab 2 has random areas of rust staining and dampness. 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 its entire base. Excessive voids are present and were measured up to 12" deep (Photos 5 and 6). 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. Light scaling was typically up to a foot above the waterline. Random spalls at the construction joints were also noted.

Both wingwalls on the north side of the structures are mortared masonry and are completely covered with heavy vegetation but are in good condition with minor areas of missing pointing and chinking stones. The wingwalls on the south side of the structure are dry-laid masonry with large voids. The walls are starting to crumble causing erosion of the embankment immediately adjacent to the roadway (Photo 2).

The pavement over the culvert shows moderate linear cracking, patching, and debris in the shoulders. The sharp horizontal curve in the east approach greatly reduces visibility (Photo 9). The north guardrail over the culvert is leaning away from the roadway due to past vehicular collision (Photo 10). 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. While other components of the overall structure do not deem replacement, BETA recommends a complete replacement of this structure as a long-term solution. We recommend 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. In the interim, the scour void at structure 1's west abutment requires immediate repair. Similarly, all voids to the stone masonry abutments should be filled and both abutments re-faced with cast-in-place concrete. BETA also recommends the addition of guardrail at both approaches in accordance with current AASHTO design standards.

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

- Scour voids noted in the existing stone masonry abutment should be filled. All other voids, in both stone masonry abutments, should be filled and the abutments re-faced with cast-in-place concrete to reduce risk of future scour. **This should be considered a high priority.**
- Wingwalls voids should be filled to prevent further loss of roadway fines and possible structural failure. The southern dry-laid wingwalls may require compete reconstruction to prevent further erosion due to roadway runoff.

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:	$175,000
Engineering:	$45,000
Total:	$220,000

Interim Repairs

Construction:	$8,000
Engineering:	$2,000
Total:	$10,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

WEST STREET
OVER
SCADDEN BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-7

General:

Street Name: West Street **Waterway:** Scadden Brook **Culvert ID:** NA-7

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: Ronnie Guillotte **Position:** Engineering Intern

Inspection Conditions:

Date: 7/23/2011 **Weather:** Clear **Temp:** 95°F

General Culvert Information:

Culvert Type: Concrete Slab (18"T=South) (12"T=North)

Construction Date: N/A

Dimensions Of Hydraulic Opening Height (Inches): 57

Length of Culvert Feet: 29.6

Dimensions Of Hydraulic Opening Width (Inches): 117

Depth of Fill Over Culvert Inches: 22"

Depth of Flow During Inspection: 17"

Direction of Flow: South

Utilities Carried By Structure: Overhead utilities

Drainage Structures: 2 drainage paths at SouthWest and SouthEast corners of culvert

Other: Culvert Dimensions recorded are for South Slab. North Slab dimensions: 61" Height; 117" Wide.

Abutments/Culvert Sidewalls:

Abutment North Sidewall: NorthEast: Mortared masonry, missing mortar + chink stones. Several small voids at base of abut. Transition to Wingwall is missing mortar.

Abutment South Sidewall: South East: Light scaling up to 12" above WL, moderate scaling and spalling at construction joint, 2'x2' area of moderate scaling at center.

Abutment East Sidewall: NorthWest: Heavy deterioration of abutment face up to 10" deep. Missing stones and mortar at base (TYP). Check Photos

Abutment West Sidewall: SouthWest: Light scaling up to 12" above WL, moderate scaling and spalling at construction joint.

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 3

Culvert Roof:

Culvert Roof Notes: North: Damp proofing (depressions indicate Spalling), sev. exposed areas of concrete. Rated (3). South: 6"x6" spall at S abut, rust and dampness (small), few areas of concrete repair. (Rated 3)

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 4

Floor Scour: Sever scour of Masonry Wall (full lengt **Debris:** Sand + Cobbles

Floor Notes: Wall has crumbled + stones are missing (see photo) > Very large scour/void hole @ base of entire length > Immediate repair required. Some stones are intact but majority of wall base is missing.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 4

North East Wall: Heavy Vegetation

North West Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North West Wall: Missing mortar and chinkstones

South East Wall: Wingwall **South East Wall Type:** Dry Laid Stone **South East Wall Rating:** 3

South East Wall: Heavy vegetation, small voids (TYP)

South West Wall: Wingwall **South West Wall Type:** Dry Laid Stone **South West Wall Rating:** 3

South West Wall: Several small voids (TYP), concrete transition of headwall at top of wingwall crumbling.

Head Wall: Slab Fascia **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: None

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Mod. Patching, lin cracking and debris. **East Roadway Inches:** 312

East Roadway Approach Settlement: None **East Roadway Rating:** 2

East Roadway Approach Alignement: Sharp horiz. Curve, low vis, high speeds, driveway

West Roadway Approach Condition: Mod. Patching, lin cracking and debris. **West Roadway Inches:** 312

West Roadway Approach Settlement: None **West Roadway Rating:** 3

West Roadway Approach Alignement: Horiz. curve, high speeds

Safety Barrier

Guard Rail Type: Wooden bridge wall with metal guardrail.

Guard Rail Condition: Attached light, surface lust leaning away from road, minor collision damage of NE end.

Guard Rail Rating: 3

Guard Rail Notes: Erosion of settlement over culvert behind wingwalls causing depression of shoulder.

Photo 1 Looking North: South Culvert Elevation

Photo 2 Looking Northeast: Southeast Wingwall Elevation

Photo 3 Looking North: Structure 2 Underside of Slab

Photo 4 Looking South: Structure 1 East Abutment Elevation

Photo 5 Looking South: West Abutment Elevation

Photo 6 Looking South: Large Void at Base of Structure 1 West Abutment

Photo 7 Looking South: Structure 2 Underside of Slab

Photo 8 Looking Northeast: Void at Base of Structure 1 East Abutment

Photo 9 Looking East: West Approach

Photo 10 Looking Northeast: North Bridge Rail

Photo 11 Looking West: East Approach

Ironstone Road/ Old Providence Turnpike over Ironstone Brook (Bridge No. U-02-003)

Priority 5

AVAILABLE INFORMATION

Old Providence Turnpike is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of an 18" thick cast in place concrete slab on concrete abutments. The MassDOT date of construction for this structure is 1850. The structure has an out-to-out width of 24'-0" with a clear span of 11'-8". The hydraulic opening is approximately 9'-2" high by 11'-8" wide. The flow was 20" deep at the time of inspection and flowing northward.

Stone masonry wingwalls are present both upstream and downstream. The south walls are founded on a concrete footing while the foundation to the north walls is not evident.

The roadway width over the structure is approximately 18'-3" with no sidewalks. The roadway over the bridge has no wearing surface and is an exposed concrete slab. An industrial park is located immediately east of the structure and yields a high volume of heavy truck traffic. At the west approach, there is a sharp horizontal curve with low visibility. The intersection with Elmwood Avenue is approximately 160' west of the structure.

The only utilities crossing the structure are overhead wires that run along the south side of the roadway.

The bridge guardrail consists of a 4' high chain link fence on both sides. Type SS highway guardrail is present at the north side of both approaches. No approach guardrail is present at the south.

The only sign noted was a “Dead End” sign near the intersection with Elmwood Avenue.

FINDINGS

Due to advanced scour conditions at both abutments, the overall condition of this structure is poor with several deficiencies noted.

The concrete slab was found to be in fair condition. Its underside is covered with black felt, most likely used as a concrete form bond-breaker. Large exposed areas were typical throughout. Some concrete repair in the exposed areas indicates spalling (See Photo 6). The top-side of the slab is exposed and is exhibiting moderate-to-heavy wear and scaling.

The abutments are in poor condition. Both abutments are experiencing moderate-to-heavy scour. The west abutment was found to have scour along its entire length with depths ranging from 3"-24". Approximately half of the east abutment is showing scour with

depths ranging from 6"-24". Both abutments appear to have thin layer of concrete facing. The facing is intact at the east abutment, but the west abutment facing is peeling away full-length up to 4' above the mudline (Photos 4 and 8). The original concrete behind the facing is in poor condition with severe scaling at the waterline. Heavy spalling of the original west abutment concrete is visible as well.

The concrete footings for the south wingwalls both exhibit moderate scaling up to 12" above the waterline (Photo 7). The stone masonry portion of the southeast wingwall is in good condition. However, the stone masonry portion of the southwest wingwall is in poor condition and is crumbling (Photo 2). The north wingwalls both show missing mortar at the base and are heavily covered with vegetation but are in good condition overall.

The roadway over the bridge has heavy debris. The approach pavement shows up to 75% transverse and longitudinal cracking with several spots of settlement. There is a large area of settlement and asphaltic repair immediately adjacent to the bridge. This area of deterioration is a typical byproduct from scour below and can be referred to as “piping”. The chain link fence over the structure is not crash tested and poses a significant safety hazard.

RECOMMENDATIONS

BETA recommends a complete replacement of the structure based on the condition of the substructure and the active scour affecting the abutments. Additionally, uncertainty of the current slab make-up hinders the ability to accurately rate and confirm its ability to carry heavy truck loading.

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

- The scour voids noted at the east and west abutments should be filled to prevent further loss of roadway fines and possible structural failure. **This should be considered a high priority.**
- All voids noted in the existing southern stone masonry wingwalls should be filled to prevent further erosion of the embankment and loss of roadway fines. **This should be considered a high priority.**

Until the aforementioned interim repairs are complete, inspections should be conducted at intervals not exceeding 6 months to monitor the abutment scour conditions. Inspections should also be conducted on the bridge substructure after extreme flood events.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	$160,000
Engineering:	$40,000
Total:	$200,000

Interim Repairs

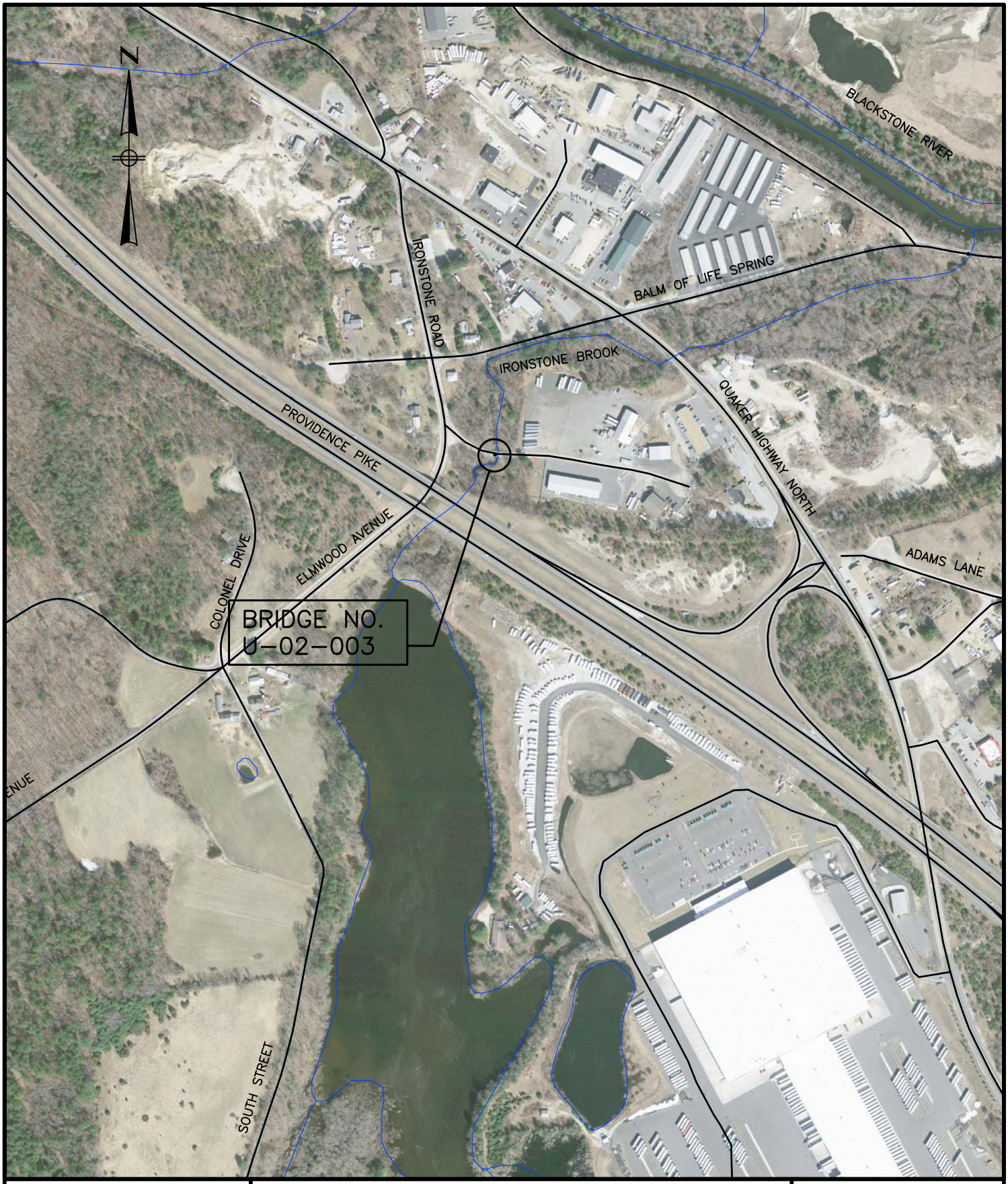
Construction:	$13,000
Engineering:	$4,000
Total:	$17,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos



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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

IRONSTONE ROAD
OVER
IRONSTONE BROOK

BRIDGE NO.
U-02-003

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-003

General:

Street Name: Old Providence Turnpike/Ironstone Roa **Waterway:** Ironstone Brook **Culvert ID:** U-02-003

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: Ronnie Guillotte **Position:** Engineering Intern

Inspection Conditions:

Date: 7/22/2011 **Weather:** Sunny and Hot **Temp:** 90°F

General Culvert Information:

Culvert Type: Concrete Slab (18" thick)

Construction Date: 1850

Dimensions Of Hydraulic Opening Height (Inches): 109

Length of Culvert Feet: 24

Dimensions Of Hydraulic Opening Width (Inches): 140

Depth of Fill Over Culvert Inches: 0"

Depth of Flow During Inspection: 20"

Direction of Flow: North

Utilities Carried By Structure: Overhead wires @ Fascia (Up @ SW Corner).

Drainage Structures: None

Other: Distribution center @ end of road. Heavy Truck Traffic - Semi/18 Wheelers

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Concrete. Typical Scaling, Up to 12 inch waterline. Both East & West abuts appear to have a newer thin conc. facing. Facing intact @ E. Abut; W. Abut facing is peeling away. Full length up to 4' from mudline. Original concrete behind facing in poor condition w/severe scaling @ waterline.Heavy spalling at original W. abut is visible behind facing.

Abutment West Sidewall: Concrete. Typical scaling, up to 12" waterline. Two Areas of Severe Scaling. 20" x 20" on original concrete

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 2

Culvert Roof:

Culvert Roof Notes: Damp proofing, Large areas exposed (TYP), some concrete repair indicates spalling

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 2

Floor Scour: Both Bridge Abuts mod-hvy scour - may **Debris:** Cobble and Boulders, Debris at both N&S entrances

Floor Notes: Both walls up to 2' deep undermined by both abutments. Needs attention, channel might be too narrow.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-003

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North East Wall: Moderate scaling up to 4' above water. 3"x3" spall with exposed reinforcement/stone: Dry lay, several voids.

North West Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North West Wall: Several voids, missing mortar

South East Wall: Wingwall **South East Wall Type:** Dry Laid Stone **South East Wall Rating:** 4

South East Wall: Moderate Scaling up to 12"

South West Wall: Mix **South West Wall Type:** Mortored Masonry **South West Wall Rating:** 3

South West Wall: Missing Mortor, Few voids, Heavy Vegetation, Stone on embankment crumbling

Head Wall: Slab Fascia **Head Wall Type:** Concrete **Head Wall Rating:** 4

Head Wall Notes: North and South Headwall - Areas of light scaling (TYP)

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Heavy debris **East Roadway Inches:** 218

East Roadway Approach Settlement: Minor wheel-line rutting and random transcracking **East Roadway Rating:** 3

East Roadway Approach Alignement: Straight

West Roadway Approach Condition: Poor (75% Trans & long cracking, sev. Patched) **West Roadway Inches:** 218

West Roadway Approach Settlement: Random spots of heaving + settlement. **West Roadway Rating:** 2

West Roadway Approach Alignement: Straight

Safety Barrier

Guard Rail Type: 4' C.C.F. w/app. S-shaped Highway Guardrail @ NE & NW Approaches.

Guard Rail Condition: Approach guardrail not transitional w/Boxing Glove @ Bridge (TYP). CCF: minor surface rusting - non std. or crash tested. Large area adjacent to bridge that looks like repair > maybe from scour issues

Guard Rail Rating: 1

Guard Rail Notes: Where approach meets slab > it is heavily deteriorated w/random depressions > most likely from piping/scour.

Photo 1 Looking South: North Bridge Elevation

Photo 2 Looking South: Northwest Wingwall Elevation

Photo 3 Looking North: South Bridge Elevation

Photo 4 Looking Northwest: West Abutment Elevation

Photo 5 Looking Northeast: East Abutment Elevation

Photo 6 Looking North: Underside of Deck

Photo 7 Looking West: Typical Scaling of Culvert Walls

Photo 8 Looking Southwest: Concrete Facing on West Abutment

Photo 9 Looking East: West Approach

Photo 10 Looking East: Typical Guardrail Transition

Photo 11 Looking West: East Approach

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

Priority 6

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 flow was 3" deep at the time of inspection and flowing eastward. 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. Pavement consists of. 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 both approaches. 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 slab is in fair condition. The underside of the slab has several longitudinal cracks up to ⅛" thick with efflorescence in both spans (See Photo 10). There are also large areas of severe scaling at midspan with exposed aggregate (Photo 4).

The headwalls are in poor condition and typically exhibit severe scaling with exposed course aggregate at both fascias. The exposed steel reinforcement at these locations is experiencing a section loss of up to 80% (Photos 7 and 8). The concrete bridge rails, which are mounted to the headwalls, typically exhibit scaling and spalling at their bases (Photo 14).

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 (Photos 2 and 6). The center wall pier is in poor-to-critical condition with full length severe scaling and random 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 (Photo 3). All four wingwall surfaces also exhibit 100% delamination.

Waterway debris was heavy at the upstream opening adjacent to the center pier.

RECOMMENDATIONS

Based on the age of the structure and extent of concrete deterioration to both the superstructure and substructure, repairing existing concrete deficiencies would not prove practical. Also, advanced deterioration of the headwalls at all bridge railing bases has compromised the railing's capacity to keep vehicular traffic on the roadway.

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.

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:	$310,000
Engineering:	$80,000
Total:	$390,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

ELM STREET
OVER
RIVULET BROOK

BRIDGE NO.
U-02-033

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-033

General:

Street Name: Elm Street **Waterway:** Rivulet Brook **Culvert ID:** U-02-033

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/14/2011 **Weather:** Partly Cloudy **Temp:** 75°F

General Culvert Information:

Culvert Type: 2-span concrete slab **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 54 **Length of Culvert Feet:** 40.67

Dimensions Of Hydraulic Opening Width (Inches): 108 **Depth of Fill Over Culvert Inches:** 24"

Depth of Flow During Inspection: 3" **Direction of Flow:** East

Utilities Carried By Structure: Overhead utilities, sewer line down middle of street. Overhead pole in SW on bridge.

Drainage Structures: Concrete outfalls at N. Abutment wall and SE of bridge

Other: Catch basins North of bridge leading to outfalls

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Mod. To heavy scaling up to 6" above waterline. Random narrow crack with efflo. Both faces.

Abutment South Sidewall: Random Spalling at all abutment corners. Rated 2 because of SE corner

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 2

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Typical: Several longitudinal cracks up to 1/8" w/efflo in both spans. Large areas of severe scaling at midspan w/aggregate exposed

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 4

Floor Scour: None detected **Debris:** Lots (Sediment + Rock)

Floor Notes: Debris blocking upstream entrance.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-033

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 2

North East Wall: Delam and/or severe scaling (TYP)

North West Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 2

North West Wall: Delam and/or severe scaling (TYP)

South East Wall: Wingwall **South East Wall Type:** Concrete **South East Wall Rating:** 2

South East Wall: Delam and/or severe scaling (TYP)

South West Wall: Wingwall **South West Wall Type:** Concrete **South West Wall Rating:** 2

South West Wall: Delam and/or severe scaling (TYP)

Head Wall: Slab Fascia **Head Wall Type:** Concrete **Head Wall Rating:** 2

Head Wall Notes: Severe scaling + spalling 3" deep up to 2' above WL. Narrow cracking w/efflo. 100% section loss of rein. Complete deterioration of both ends of pier 2' from entrance. Exposed course aggregate. Headwalls: Severe scaling of both headwalls. Up to 80% section loss of steel rein. Headwalls Rated 1!

Roadway Condition:

North Roadway Approach Condition: Good **North Roadway Inches:** 303

North Roadway Approach Settlement: None **North Roadway Rating:** 4

North Roadway Approach Alignement: Driveways but straight

South Roadway Approach Condition: Good **South Roadway Inches:** 303

South Roadway Approach Settlement: None **South Roadway Rating:** 4

South Roadway Approach Alignement: Driveways but straight

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Concrete rail mounted to headwall

Guard Rail Condition: No approach guardrail. Scaling, spalling

Guard Rail Rating: 2

Guard Rail Notes: Safety rated 2 due to condition of headwalls.

Photo 1 Looking West: East Bridge Elevation

Photo 2 Looking Southwest: Deterioration of Southeast Abutment Corner

Photo 3 Looking North: East End of Center Pier

Photo 4 Looking Northwest: Scaling on Underside of Slab in South Span

Photo 5 Looking East: West Bridge Elevation

Photo 6: Typical Wingwall Elevation

Photo 7 Looking East: West Headwall Elevation

Photo 8 Looking South: Deterioration of West Headwall

Photo 9 Looking Northeast: North Abutment Elevation

Photo 10: Typical Underside of Slab

Photo 11 Looking North: South Approach

Photo 12: Typical Bridge Rail

Photo 13 Looking South: North Approach

Photo 14: Typical Bridge Rail Base Deterioration

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

Priority 7

AVAILABLE INFORMATION

MassDOT's current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 92.9.

A bridge inspection and rating report dated June 18, 1982 was provided by MassDOT. The report notes that no posting is required as the structure has an inventory rating of 26.1, 33.8, and 51.1 tons for a Type H, Type 3, and Type 3S2 truck, respectively.

The most recent MassDOT bridge inspection report on record is dated June 7, 2010.

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 24" 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 limited deficiencies noted. Rust staining and water seepage was noted at the beams' shear key joints indicating minor joint deterioration (See Photo 7). The 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 18).

Despite the substructure being given a high rating on MassDOT's Routine Inspection report, BETA found the abutments to be in fair-to-poor condition. Both masonry abutment walls show severe loss of mortar and chinking stones with several areas of repair. The concrete abutment caps/beam seats typically exhibit random hairline cracking with rust (Photos 8 and 10). Additionally, both concrete footings show heavy scaling throughout with severe deterioration at the water line (Photo 4). Scour is typical at the east abutment and can be measured up to 8" deep (Photo 2). A full height vertical crack was also noted at the east abutment, which extends up from the concrete footing to the beam seat (Photo 5). As a result of scour, the west abutment footing is slightly undermined. However, scour is not as widespread as with the east abutment (Photo 9).

Excessively 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. The northeast wall is slightly out of plumb. A large void was also noted at joint between the west abutment and northwest wingwall (Photo 11).

Both approaches show moderate full width cracking and minor breakup. There is also patching at the pavement sawcut joints (Photo 14) and a 4'x6' pothole that has been filled at the southeast corner. 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. The utility supports also have moderate surface rusting.

RECOMMENDATIONS

Overall this structure is in fair condition despite its exceptionally high AASHTO Sufficiency Rating. BETA recommends that the following repairs be completed to extend the structure's anticipated service life:

- Scour voids noted at the east and west abutments should be filled to prevent further loss of roadway fines and possible structural failure. **This should be considered a high priority.**
- 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, 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:	$80,000
Engineering:	$20,000
Total:	$100,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

National Bridge Inventory Sheet Dated November 2, 2011

MassDOT Routine Inspection Report Dated June 7, 2010

BETA
ENGINEERING SUCCESS TOGETHER
315 NORWOOD PARK SOUTH
NORWOOD, MA 02062
781.255.1982
EMAIL: BETA@BETA-INC.COM

BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HENRY STREET
OVER
THE WEST RIVER

BRIDGE NO.
U-02-015

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-015

General:

Street Name: Henry Street **Waterway:** West River **Culvert ID:** U-02-015

Inspectors:

Name: Peter Kotowski **Position:** Engineer

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/20/2011 **Weather:** Partly Cloudy **Temp:** 80°F

General Culvert Information:

Culvert Type: Prestressed Slab (Prestressed deck beams)

Construction Date: 1930, Rebuilt 1965

Dimensions Of Hydraulic Opening Height (Inches): 114

Length of Culvert Feet: 20

Dimensions Of Hydraulic Opening Width (Inches): 373

Depth of Fill Over Culvert Inches: 3" - Pavement

Depth of Flow During Inspection: 24"

Direction of Flow: South

Utilities Carried By Structure: 18" Sewer? Attached to South fascia

Drainage Structures: None

Other: Sewer manhole on West approach 50', Watergate 45', Overhead wires on South

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Granite Mortar, Random missing pointing + chink stones. Deterior of mortor on both. Exposed footing. Full length hairline crack under BM1. Moderate Scaling

Abutment West Sidewall: Exposed footing, moderate/heavy scaling undermined, random missing pointing + chink stones (Same as east minus the vert. crack)

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 3

Culvert Roof:

Culvert Roof Notes: Bottom Slab: Random rust and waterstains under joints. Post tension holes never grouted, nuts& bults have heavy corrosion

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: @ Abutment fittings **Debris:** Lots (stones, old pipes, masonry blocks, timber)

Floor Notes: Need to address scour at fittings.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-015

Training/Wingwalls:

North East Wall:	Wingwall	**North West Wall Type:**	Stone Mason Wall	**North West Wall Rating:**	3
North East Wall:	No Morter + Large Voids, slightly out of plumb (TYP all). HVY veg. growth (TYP). Large depresssion in roadway @ NE approach, Likely from shift in WW				
North West Wall:	Wingwall	**North West Wall Type:**	Stone Mason Wall	**North West Wall Rating:**	3
North West Wall:	Large void between wall + abut. See photo				
South East Wall:	Wingwall	**South East Wall Type:**	Stone Mason Wall	**South East Wall Rating:**	3
South East Wall:	None				
South West Wall:	Wingwall	**South West Wall Type:**	Stone Mason Wall	**South West Wall Rating:**	3
South West Wall:	None				
Head Wall:	Headwall	**Head Wall Type:**	Concrete	**Head Wall Rating:**	3
Head Wall Notes:	None				

Roadway Condition:

North Roadway Approach Condition:	N/A	**North Roadway Inches:**	N/A
North Roadway Approach Settlement:	N/A	**North Roadway Rating:**	N/A
North Roadway Approach Alignement:	N/A		
South Roadway Approach Condition:	N/A	**South Roadway Inches:**	N/A
South Roadway Approach Settlement:	N/A	**South Roadway Rating:**	N/A
South Roadway Approach Alignement:	N/A		
East Roadway Approach Condition:	Long and Trans crack on SE w/patching.	**East Roadway Inches:**	216
East Roadway Approach Settlement:	On NE behind backwall.	**East Roadway Rating:**	2
East Roadway Approach Alignement:	Straight and Clear		
West Roadway Approach Condition:	Some long/trans cracking	**West Roadway Inches:**	216
West Roadway Approach Settlement:	None	**West Roadway Rating:**	3
West Roadway Approach Alignement:	Clear, Patrick Henry Rd to the North		

Safety Barrier

Guard Rail Type: Chainlink fence connected to steel "I" beams

Guard Rail Condition: Rusting severe on steel I-beams and Chainlink fence (CLF). CLF used as approach guardrail

Guard Rail Rating: 1

Guard Rail Notes: I beam disconnected on NW CLF. 6" void between pavement + safety curb on South side. Veg growth between pavement and safety curb. Utility supports have severe corrosion.

Photo 1 Looking South: North Bridge Elevation

Photo 2 Looking Down: Scour at Base of East Abutment Footing

Photo 3 Looking East: East Abutment Elevation

Photo 4 Looking East: Scaling and Scour of East Abutment Footing

Photo 5 Looking East: Vertical Crack in East Abutment Footing

Photo 6 Looking West: West Abutment Elevation

Photo 7 Looking West: General Underside of Deck

Photo 8 Looking East: Deterioration of East Abutment Concrete Cap

Photo 9 Looking Northwest: Scaling and Scour of West Abutment Footing

Photo 10 Looking West: Deterioration of West Abutment Concrete Cap

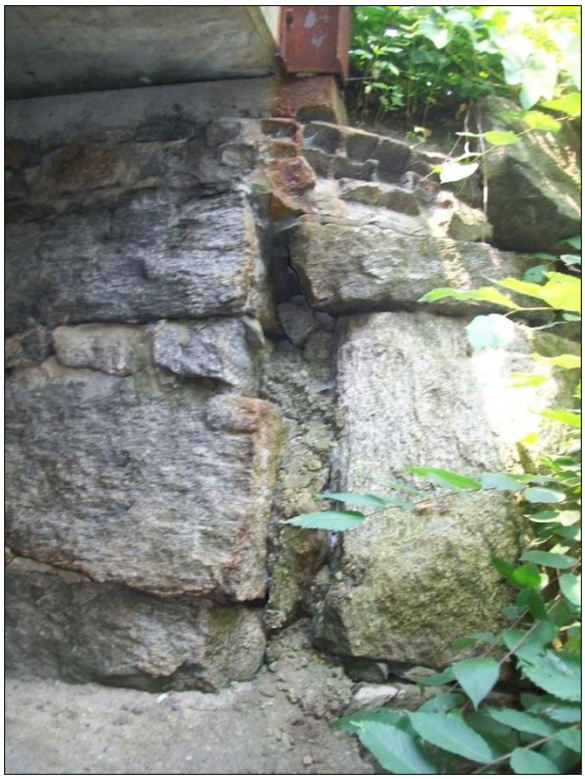

Photo 11 Looking South: Large Void Where West Abutment Meets Northwest Wingwall

Photo 12 Looking South: North Bridge Elevation

Photo 13 Looking West: East Approach

Photo 14 Looking South: Cracking at South Bridge Joint

Photo 15 Looking West: Deterioration of Pavement Over Bridge

Photo 16 Looking East: West Approach

Photo 17 Looking Northeast: Typical Bridge Rail

Photo 18 Looking North: Typical Non-Grouted Post-Tensioning Port

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Report Date: November 2, 2011

State Information

BDEPT#= U02015 Agency Br.No.

Town= Uxbridge L.O.

B.I.N= 1J4 AASHTO= 092.9

FHWA Select List= N

Identification

(8) Structure Number U020151J4MUNNBI

(5) Inventory Route 151000000

(2) State Highway Department District 03

(3) County Code 027 (4) Place code 71620

(6) Features Intersected **WATER WEST RIVER**

(7) Facility Carried **HWY HENRY ST**

(9) Location @ CORNER OF W. RIVER RD

(11) Kilometerpoint 0000.402

(12) Base Highway Network N

(13) LRS Inventory Route & Subroute 000000000000

(16) Latitude 42 DEG 04 MIN 50.40 SEC

(17) Longitude 71 DEG 36 MIN 32.64 SEC

(98) Border Bridge State Code Share %

(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Prestressed Concrete Code 501

Slab Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit 001

(46) Number of approach spans 0000

(107) Deck Structure Type - Concrete Precast Panels Code 2

(108) Wearing Surface / Protective System:

A) Type of wearing surface - Bituminous Code 6

B) Type of membrane - Unknown Code 8

C) Type of deck protection - Unknown Code 8

Age and Service

(27) Year Built 1930

(106) Year Reconstructed 1965

(42) Type of Service: On - Highway

Under - Waterway Code 15

(28) Lanes: On Structure 01 Under structure 00

(29) Average Daily Traffic 000780

(30) Year of ADT 2010 (109) Truck ADT 01 %

(19) Bypass, detour length 002 KM

Geometric Data

(48) Length of maximum span 0009.4 M

(49) Structure Length 00010.7 M

(50) Curb or sidewalk: Left 00.0 M Right 00.2 M

(51) Bridge Roadway Width Curb to Curb 005.8 M

(52) Deck Width Out to Out 006.1 M

(32) Approach Roadway Width (w/shoulders) 005.8 M

(33) Bridge Median - No median Code 0

(34) Skew 00 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear 99.99 M

(47) Inventory Route Total Horiz Clear 05.8 M

(53) Min Vert Clear Over Bridge Rdwy 99.99 M

(54) Min Vert Underclear ref N 00.00 M

(55) Min Lat Underclear RT ref N 00.0 M

(56) Min Lat Underclear LT 00.0 M

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0

(111) Pier Protection Code

(39) Navigation Vertical Clearance 000.0 M

(116) Vert-lift Bridge Nav Min Vert Clear M

(40) Navigation Horizontal Clearance 0000.0 M

Classification

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class - Urban Local	19
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - One lane for 2-way traffic	3
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance undetermined	

Condition

	Code
(58) Deck	7
(59) Superstructure	7
(60) Substructure	7
(61) Channel & Channel Protection	7
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - Other/Unknown	0
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	62.5
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	32.1
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	7
(68) Deck Geometry	2
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	7
(72) Approach Roadway Alignment	7
(36) Traffic Safety Features	0 0 0 0
(113) Scour Critical Bridges	U

Inspections

(90) Inspection Date 06/07/10 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	05/01/87
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection (Flood)	Y	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

Rating Loads

Report Date 03/01/82	H20	Type 3	Type 3S2	Type HS
Operating	50.0	65.0	99.0	0.0
Inventory	26.0	33.0	51.0	0.0

Field Posting

Status LEGAL Posting Date 06/18/82

	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

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		
N / N	Inspector 50	N / N	Police		

Inspection Hours: 008

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STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1J4	U-02-015

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
UXBRIDGE	U02015-1J4-MUN-NBI	000.402	A:OPEN	JUN 7, 2010

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY HENRY ST		1930	1965	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER WEST RIVER	Urban Local	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
501 : Prestressed Concrete Slab	Town Agency	Town Agency	P. M. Amorello

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
2 : Concrete Precast Panels	SUNNY	19°C	J. G. NICHOLSON

ITEM 58 — 7

DECK

		DEF
1. Wearing surface	6	M-P
2. Deck Condition	7	-
3. Stay in place forms	N	-
4. Curbs	7	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	5	S-P
9. Anti Missile Fence	N	-
10. Drainage System	N	-
11. Lighting Standards	N	-
12. Utilities	7	-
13. Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	N	S
	275	275

APPROACHES

		DEF
a. Appr. pavement condition	5	S-P
b. Appr. Roadway Settlement	6	M-P
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

SUPERSTRUCTURE

		DEF
1. Stringers	N	-
2. Floorbeams	N	-
3. Floor System Bracing	N	-
4. Girders or Beams	7	-
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	7	-
10. Diaphragms/Cross Frames	N	-
11. Rivets & Bolts	5	S-A
12. Welds	N	-
13. Member Alignment	8	-
14. Paint/Coating	N	-
15.	N	-

Year Painted	N

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

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

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

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 — 7

SUBSTRUCTURE

	Dive	Cur		DEF
1. Abutments			7	
a. Pedestals	N	N		-
b. Bridge Seats	N	7		-
c. Backwalls	N	H		-
d. Breastwalls	N	7		M-P
e. Wingwalls	N	7		-
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	7		-
h. Footings	N	6		S-P
i. Piles	N	N		-
j. Scour	N	7		-
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		-

UNDERMINING (Y/N) If YES please explain N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): N *I-60 (This Report):* 7

93B-U/W (DIVE) Insp 00/00/00

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J4**	**U-02-015**	**U02015-1J4-MUN-NBI**	**JUN 7, 2010**

ITEM 61 — CHANNEL & CHANNEL PROTECTION

7

	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: 00/00/00

ITEM 36 — *TRAFFIC SAFETY*

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

WEIGHT POSTING

Not Applicable **X**

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

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

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Other Advance E	Other Advance W

CLEARANCE POSTING

Not Applicable **X**

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

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge N	At bridge S	Advance N	Advance 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:		
	N	N

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: 03/01/1982

Inspection data at time of existing rating

I 58: **7** I 59: **7** I 60: **7** Date : 05/06/1981

(To be filled out by DBIE)

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

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

REASON: LAG

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	Advance 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	Advance 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 stablility. 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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J4**	**U-02-015**	**U02015-1J4-MUN-NBI**	**JUN 7, 2010**

REMARKS

BRIDGE ORIENTATION
From the rating report. The approaches are West and East and the elevations are South and North. There are five beams and four longitudinal beam joints numbered from South to North. The river flows from North to South.

ITEM 58 - DECK

Item 58.1 - Wearing surface
There are several bit. concrete patches at the Southeast corner, with minor cracking and break up approx. 6 feet long x 4 feet wide. **See photo 1.** The remainder shows several isolated areas of minor transverse and longitudinal cracks throughout.

Item 58.2 - Deck Condition
See item 59.4.

Item 58.8 - Railing
Both bridgerails consist of steel (H) posts, secured to the fascia beams, with chain link fencing attached.

All (H) posts on the North bridge rail are heavily surface rusted. The chain link fence is not connected to the top pipe rail at post #1, resulting in the fencing being loose between posts #2 and 3 on the North rail. **See photo 2.**

All of the (H) posts on the South rail show minor to moderate surface rusting.

APPROACHES

Approaches a - Appr. pavement condition
Both of the bit. concrete approach to deck transitions show moderate full width cracking and minor break up, some sealed.

The West bit. concrete approach pavement shows moderate transverse and longitudinal cracking throughout.

The East bit. concrete approach pavement has an approx. 40 ft. long x 6 ft. wide area of heavy bit. concrete patches in the Eastbound travel lane, with some break up. **See photo 3.** This pop and patch area is uneven and starting to break up slightly.

Approaches b - Appr. Roadway Settlement
Both approaches show minor unevenness.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams
There are some 1 foot diameter light rust/water stains at the center of beam joints #2 and 3.

Item 59.11 - Rivets & Bolts
The post tension holes were never grouted over. The post tensioning nuts, bolts and plates show heavy rusting and corrosion. **See photo 4.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J4**	**U-02-015**	**U02015-1J4-MUN-NBI**	**JUN 7, 2010**

REMARKS

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
Both breastwalls consist of granite mortared block, with a concrete cap. Both show minor pointing missing.

Item 60.1.e - Wingwalls
The original stone masonry wingwalls show several small voids and are slightly out of vertical plumb. The wings are stable and unchanged.

Item 60.1.h - Footings
The West exposed concrete footing shows moderate to some severe abrasion and honeycombing throughout. **See photo 5.** The West footing is slightly undermined in areas of concrete deterioration.

The East exposed concrete footing has a full height hairline crack that extends through top of footing, under beam #1. The East footing also shows minor to moderate honeycombing and abrasion throughout. **See photo 6.**

SubStructure Undermining Notes
See item 60.1d.

TRAFFIC SAFETY

Item 36a - Bridge Railing
See item 58.8.

Item 36b - Transitions
The transitions consist of steel pipe rails and posts with chain link fencing. The transition fencing is a continuation of the bridge rail chain link fence.

Item 36c - Approach Guardrail
There are no approach guardrails in place at all four corners.

Item 36d - Approach Guardrail Ends
The chain link end treatment fence is not turned from traffic at the Northeast corner.

Photo Log
Photo 1 : Pop and patch to the Southeast corner of the bit. concrete wearing surface.
Photo 2 : Northeast vertical with heavy surface rust and not connected to the horizontal.
Photo 3 : Moderate pop and patch at the Southeast corner approach.
Photo 4 : Rusting and corrosion to the Southeast post tensioning nut and bolt.
Photo 5 : Abrasion and honeycombing to the Southwest corner footing.
Photo 6 : Abrasion and honeycombing to the Southeast corner footing.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J4**	**U-02-015**	**U02015-1J4-MUN-NBI**	**JUN 7, 2010**

PHOTOS

Photo 1: **Pop and patch to the Southeast corner of the bit. concrete wearing surface.**

Photo 2: **Northeast vertical with heavy surface rust and not connected to the horizontal.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J4**	**U-02-015**	**U02015-1J4-MUN-NBI**	**JUN 7, 2010**

PHOTOS

Photo 3: **Moderate pop and patch at the Southeast corner approach.**

Photo 4: **Rusting and corrosion to the Southeast post tensioning nut and bolt.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J4**	**U-02-015**	**U02015-1J4-MUN-NBI**	**JUN 7, 2010**

PHOTOS

Photo 5: **Abrasion and honeycombing to the Southwest corner footing.**

Photo 6: **Abrasion and honeycombing to the Southeast corner footing.**

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Carney Street over Drabbletail Brook
(Bridge No. N/A)

Priority 8

AVAILABLE INFORMATION

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

BRIDGE DESCRIPTION

This structure consists of a 24" deep cast-in-place concrete slab supported on stone masonry abutments. The structure has an out-to-out width of 34'-6" with a clear span of 11'-9". The hydraulic opening of the structure is approximately 6'-1" high by 11'-9" wide. The flow was 3" deep at the time of inspection and flowing eastward.

The roadway width over the structure is approximately 28'-0" with a 5'-0" sidewalk on the east side. The roadway surface is an exposed concrete slab with no fill over the structure. There are driveways on both sides of the roadway at both approaches, and the intersection with Douglas Street (Route 16) is approximately 150' north of the structure.

There are overhead utilities along the east side of the roadway crossing the culvert. Additionally, there are two exposed utilities that span between the abutments. A 5" cast iron sewer pipe crosses approximately 18" above the stream bed and a 2½" cast iron gas line crosses approximately 6" below the culvert underside. There are also two drainage outfalls that penetrate the south abutment. A 24" and 20" diameter pipe both drain from catch basins located in the south approach.

The bridge railing consists of a chain link fence mounted to the headwall on the west side and a metal bridge rail mounted to the headwall on the east side. There is no approach guardrail or transition. However, a 24" high mortared stone masonry wall is present on the east side of the south approach.

No signs were noted at the approaches.

FINDINGS

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

The concrete slab is in poor condition. The underside of the slab is covered with a black felt, most likely used as a concrete form bond-breaker. The areas where the slab is exposed show few random repairs. However, there are two full-depth longitudinal cracks located in the center of the slab (Photo 7) and at its western edge. The full depth crack at the slabs midpoint can be seen from the roadway and has been previously repaired with asphaltic patching. Hairline longitudinal cracks, spaced approximately 32" apart, are also typical at the slab's underside and all randomly exhibit efflorescence and rust staining.

The abutments are in fair condition. The north abutment masonry wall is crumbling at the west opening (Photo 3). The south abutment masonry wall randomly shows lateral

movement of stones. The south abutment beam seat above the eastern-most drainage penetration is deteriorated with loss of stones at the bearing area (Photo 13). Both abutment walls show random loss of mortar and chinking stones at the waterline. The northwest and southwest stone wingwalls display large voids and heavy vegetation growth. The northeast training wall also displays large voids up to 2' deep. This wall is beginning to experience global failure and is exhibiting severe bulging up to 1' outward (Photo 10). There is heavy debris at the west entrance that includes branches and logs (Photo 12).

The hydraulic channel is moderately congested through the culvert. There are concrete splash pads beneath the outfalls and random boulders. Two exposed cast iron utilities also cross the channel and restrict to ability for debris to move downstream.

The roadway over the culvert shows settlement with patching at both ends of the exposed slab (Photos 18 and 19). The location of this settlement and patching indicates some degree of water infiltration behind the stone abutment walls, causing roadway fines to wash out. The top of the slab has moderate wear at the wheel lines and the two longitudinal cracks previously noted (Photo 16).

The east bridge rail shows moderate surface rust and a missing post. The west side chain link fence is in poor condition. Neither railing is a crash-tested system. The existing bridge rails and lack of approach guardrail presents a significant safety hazard.

As noted above, the clear span of this structure is greater than 10'-0". The Town should follow up with MassDOT in regards to assigning a bridge number to this structure.

RECOMMENDATIONS

In general, the structure has numerous structural deficiencies. Because of the apparent age of the culvert, inadequacy of the existing bridge railings, and the relatively high cost/benefit of slab and substructure repairs, we recommend that this culvert be scheduled for replacement as a long-term solution.

In the event that replacement cannot be scheduled for the near future, BETA recommends that these deficiencies be repaired:

- The full penetration cracks in the concrete slab should be cleaned of all asphaltic patching and repaired with a proper epoxy injection crack repair or approved equal. **This should be considered a high priority.**
- The bulge in the northeast training wall should be repaired and supported against further failure.
- All vegetation should be removed from behind stone masonry walls.
- Abutment and wingwall voids should be filled with chinking stones and repointed.

Annual inspections should be conducted to monitor overall bridge conditions including scour, undermining, and movement of stone masonry training walls. Inspections should

also be conducted during and following extreme flood events to ensure that the training walls and abutments are performing adequately and that there are no flow obstructions in the channel.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	$190,000
Engineering:	$50,000
Total:	$240,000

Interim Repairs

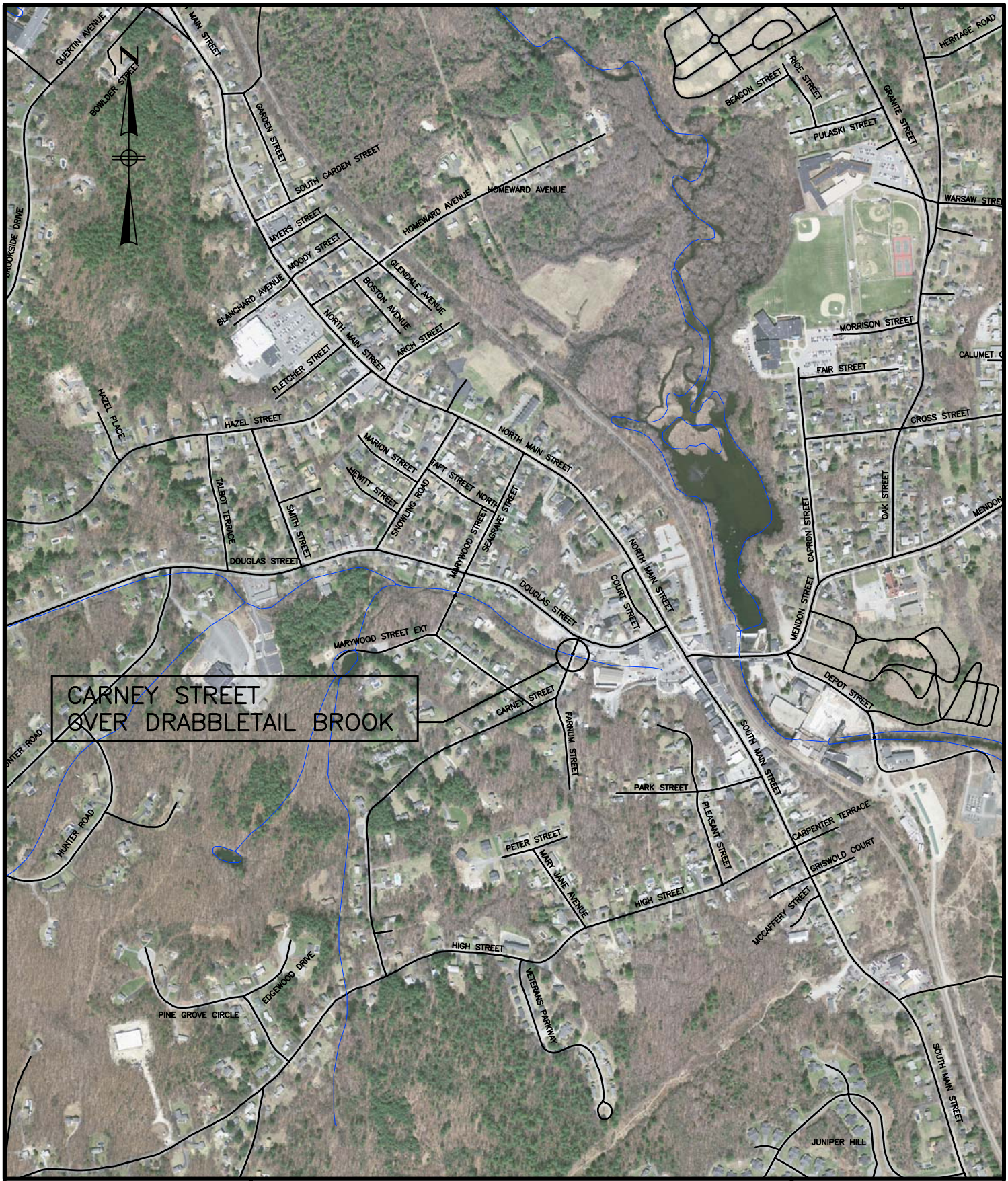
Construction:	$24,000
Engineering:	$6,000
Total:	$30,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos



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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

CARNEY STREET
OVER
DRABBLETAIL BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-5

General:

Street Name: Carney Street **Waterway:** Drabbletail Brook **Culvert ID:** NA-5

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/21/2011 **Weather:** Partly Cloudy **Temp:** 80°F

General Culvert Information:

Culvert Type: Concrete slab 24" deep **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 73 **Length of Culvert Feet:** 34.5

Dimensions Of Hydraulic Opening Width (Inches): 141 **Depth of Fill Over Culvert Inches:** 0" - Exposed Slab

Depth of Flow During Inspection: 3" **Direction of Flow:** East

Utilities Carried By Structure: Overhead utilities, 5" Sewer? to East, 2.5" Gas to West.

Drainage Structures: 2 Outfalls, South abutment 2' diameter at midspan, 20" diameter at East end.

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Mortared stone masonry. Missing mortar and chink stones at WL (TYP). Crumbling at openings. Moderate graffiti. Rated 3 because of crumbling corners

Abutment South Sidewall: Mortared masonry. Missing mortar and chink stones at WL. Random lateral movement of stones. Beam seat above outfall gone. Loss of bearing.

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 3

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Slab: Covered w/membrane waterproofing. Few random repairs. Areas of exposed slab. Long cracks spaced 32" (TYP) w/efflo and rust.(HL to 1/8" thick) > Large crack 1/8" wide at center long (rust and efflo) Asphalt patching. 2 cracks full penetration. Visible from top. Recommendation: Remove dam proofing and repair all cracks. Especially full penetration cracks.

Culvert Roof Rating: 2

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Heavy (Branches, logs, boulders, splash pads)

Floor Notes: Heavy debris at West entrance. Random boulders and splash pads.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-5

Training/Wingwalls:

North East Wall: Training **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 2

North East Wall: Loss of mortar and chink stones at WL. Large voids up to 2' deep in center. Severe bulging at center up to 1' outward.

North West Wall: Wingwall/embankment **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 3

North West Wall: Large voids, Heavy vegetation

South East Wall: Training **South East Wall Type:** Mortared Masonry **South East Wall Rating:** 4

South East Wall: Loss of mortar and chink stones at WL.

South West Wall: Wingwall/embankment **South West Wall Type:** Dry Laid Stone **South West Wall Rating:** 3

South West Wall: Large voids, Heavy vegetation

Head Wall: Slab Fascia **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: None

Roadway Condition:

North Roadway Approach Condition: Random cracks and few potholes. **North Roadway Inches:** 312

North Roadway Approach Settlement: None **North Roadway Rating:** 3

North Roadway Approach Alignement: Driveway, Intersection

South Roadway Approach Condition: Good, No curb to west **South Roadway Inches:** 300

South Roadway Approach Settlement: None **South Roadway Rating:** 4

South Roadway Approach Alignement: Driveways, straight

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: West: Chainlink fence mounted to headwall w/no approach rail. East: metal bridge rail w/ mortared stone wall to south.

Guard Rail Condition: West: Moderate surface rust. Missing post. No transition from wall to rail. Rated 1 East: fence leaning away from road, very bent. Rated 2

Guard Rail Rating: 2 - East; 1 - West

Guard Rail Notes: No Curb at all on West side of roadway. Over culvert has moderate slab wear at wheel lines and light scaling (TYP). Slab has one large crack up to 1/8" wide at center (long.) Rust and efflo. Asphalt patching on top in same spot. Full depth penetration split in slab. Recommendation: Remove damp proofing and repair all cracks (especially full penetration cracks).

Photo 1 Looking West: East Culvert Elevation

Photo 3 Looking Northwest: North Abutment Elevation

Photo 3 Looking Northwest: Crumbling of North Abutment Base at West End

Photo 4 Looking Southeast: South Abutment Elevation

Photo 5 Looking East: Underside of Slab

Photo 6 Looking West: South Abutment Elevation

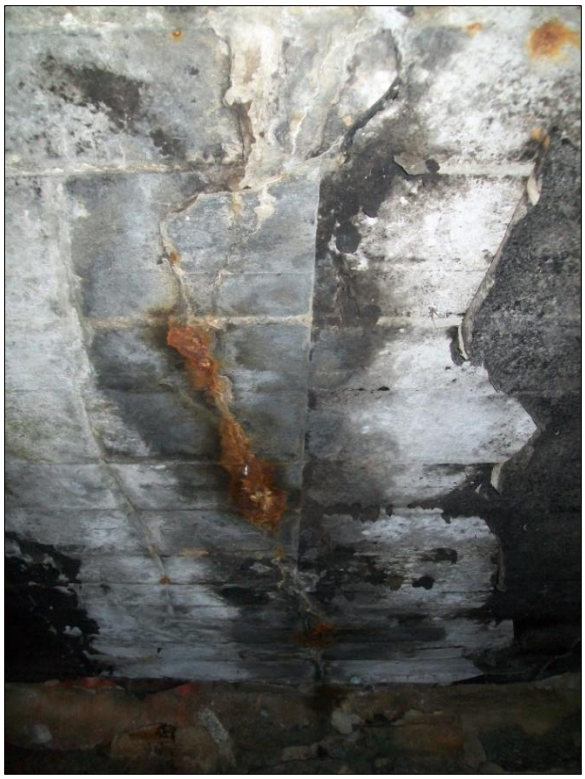

Photo 7 Looking South: Full Penetration Crack in Center of Slab

Photo 8 Looking South: Full Penetration Crack at Western Edge

Photo 9 Looking South: Loss of Slab Bearing at South Apartment

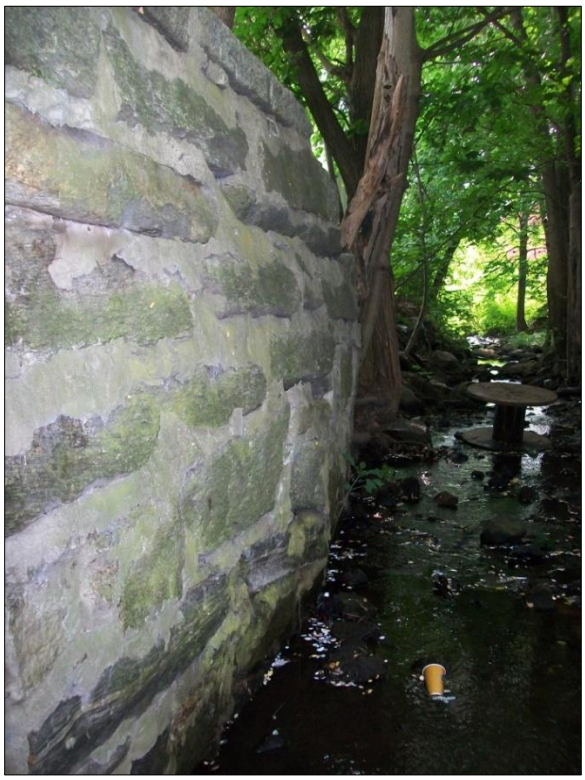

Photo 10 Looking East: Bulging of Northeast Training Wall

Photo 11 Looking West: Bulging of Northeast Training Wall

Photo 12 Looking East: West Culvert Elevation

Photo 13: Typical Wingwall Vegetation Growth

Photo 14 Looking South: North Approach

Photo 15 Looking Southeast: East Bridge Rail Elevation

Photo 16 Looking South: Crack Repair in Center of Slab

Photo 17 Looking Southwest: West Bridge Rail Elevation

Photo 18 Looking East: Settlement and Repair at North Bridge Joint

Photo 19 Looking East: Settlement and Cracking at South Bridge Joint

Photo 20 Looking North: South Approach

Hazel Street over Cold Spring Brook
(Bridge No. N/A)

Priority 9

AVAILABLE INFORMATION

Hazel 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 with dry-laid stone abutments and wingwalls. The date of construction for this structure is unknown. The structure has an out-to-out width of 25'-0" and a clear span of 10'-0". The hydraulic opening of the arch structure is approximately 4'-10" high by 10'-0" wide. The flow was 24" deep at the time of inspection and flowing northward. The depth of fill over the structure is 29".

The roadway width over the structure is approximately 19'-0" and consists of an asphaltic wearing surface. There are no sidewalks on either side. A sharp horizontal curve and blind intersection with Cross Road is located at the east approach. The west approach roadway consists of a wider horizontal curve with residential driveways.

Overhead wires run along the north side of the roadway. There is also a drainage outfall in the waterway embankment northeast of the structure.

The bridge railing consists of timber rails mounted to metal posts. There is no approach guardrail.

There is a “Speed Limit 30” sign posted at the east approach.

FINDINGS

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

The stone arch underside was found to exhibit several moderate size voids and missing chinking stones. Approximately 50% of the arch’s underside is covered with a mortar patching repair (See Photo 2). The patching shows several random spalls, cracking, and efflorescence throughout. A few large spalled areas were also observed.

The abutments are also in fair condition but do show some minor problems. The abutment walls typically exhibit random voids between stones. Missing chinking stones are also typical and both abutments show minor crumbling at the north opening (Photos 5 and 6). The culvert floor has random large boulders at both entrances.

The north spandrel wall shows heavy mortar deterioration with small voids and loss of chinking stones (Photo 7). There is also heavy vegetation growth at this location. The south spandrel wall also shows small voids and missing chinking stones with a few cracked stones This wall is also crumbling at the wall base on the east end.

The stone training walls are generally in fair condition with the exception of the southwest wall. The northeast, northwest, and southeast walls are mortared stone and support the adjacent roadway. These three walls all typically exhibit deterioration of existing mortar joints, random voids, missing chinking stones, and heavy vegetation growth. The southwest dry-laid stone training wall, which follows Cold Spring Brook, has several large voids. Lateral displacement (Photo 8) of this wall was also found and indicates lack of stability.

The roadway condition is fair with minor cracking and wheel-line rutting. While the roadway is fairly narrow, very high speeds were observed despite a lack of visibility at both approaches. While the wooden bridge rail is in fair condition, it not a crash tested system. The railings makeup and lack of approach guardrail makes this a safety hazard.

RECOMMENDATIONS

Due to the structure's apparent age and condition, BETA recommends a complete replacement of this structure as a long-term solution. Alternatively, it may be feasible to rehabilitate the structure by slip-lining with a corrugated metal pipe/arch. If slip-lining was found to be technically feasible, this alternative could provide significant cost savings while minimizing construction impacts to traffic and neighboring residents. In either the case of replacement and/or rehabilitation, a new bridge railing will be required. In addition, approach guardrail is recommended with the appropriate transitions.

The following recommendations should be implemented in the interim until a culvert replacement/rehabilitation can be scheduled:

- Fill all voids with chinking stones and repoint.
- Repair the east and west abutment walls at the north opening where partial collapse is present.
- Fill all voids with chinking stones at both abutment walls.
- Repoint the northeast, northwest, and southeast training walls. All voids noted in the walls should be filled to prevent further erosion of the embankment and loss of roadway fines.
- Signage in accordance current MUTCD standards is also recommended at the west approach indicating a sharp curve, narrow roadway, blind intersection, and/or reduced speed.

Annual inspections should be conducted to monitor overall bridge conditions including abutment walls and movement of the southwest stone masonry training wall. Inspections should also be conducted during and following extreme flood events to ensure that the training walls and abutments are performing adequately and that there are no flow obstructions in the channel.

BUDGETARY COST ESTIMATE

Full Replacement:

Construction:	$160,000
Engineering:	$40,000
Total:	$200,000

Rehabilitation via Slip-Lining:

Construction:	$105,000
Engineering:	$30,000
Total:	$135,000

Interim Repairs

Construction:	$19,000
Engineering:	$5,000
Total:	$24,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HAZEL STREET
OVER
COLD SPRING BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-3

General:

Street Name: Hazel Street **Waterway:** Cold Spring **Culvert ID:** NA-3

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/21/2011 **Weather:** Clear **Temp:** 85°F

General Culvert Information:

Culvert Type: Stone Masonry Arch **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 58 **Length of Culvert Feet:** 25

Dimensions Of Hydraulic Opening Width (Inches): 120 **Depth of Fill Over Culvert Inches:** 29"

Depth of Flow During Inspection: 24" **Direction of Flow:** North

Utilities Carried By Structure: Overhead wires on North side.

Drainage Structures: Outfall at NorthEast embankment

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Majority underwater. No mortar. Some random voids. Minor crumbling of both abutments at North (downstream) end.

Abutment West Sidewall: Majority underwater. No mortar. Some random voids. Minor crumbling of both abutments at North (downstream) end.

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 3

Culvert Roof:

Culvert Roof Notes: 50% covered with concrete repair. Random spalls. Random efflo. Few large spalled areas. Loss of chink stones.

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Boulders

Floor Notes: Random large boulders under culvert and at entrances.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-3

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North East Wall: Heavy mortar deterioration and small voids. Loss of chink stones. Heavy veg. (TYP).

North West Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North West Wall: Heavy mortar deterioration and small voids. Loss of chink stones. Heavy veg. (TYP).

South East Wall: Wingwall **South East Wall Type:** Mortared Masonry **South East Wall Rating:** 3

South East Wall: Some loss of mortor. Crumbling of wall base. Voids.

South West Wall: Training **South West Wall Type:** Dry Laid Stone **South West Wall Rating:** 3

South West Wall: Several large voids. Some lateral displacement.

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Minor cracking **East Roadway Inches:** 228

East Roadway Approach Settlement: Minor settlement in tire lines **East Roadway Rating:** 3

East Roadway Approach Alignement: Driveways. Horiz. curb. Blind intersection.

West Roadway Approach Condition: Minor cracking, some repairs **West Roadway Inches:** 228

West Roadway Approach Settlement: Minor settlement in tire lines **West Roadway Rating:** 3

West Roadway Approach Alignement: Driveways, Horiz. curb, High speeds

Safety Barrier

Guard Rail Type: Wooden bridge rail on metal posts. No approach rail.

Guard Rail Condition: Slight rust

Guard Rail Rating: 1

Guard Rail Notes: Lateral stream migration upstream

Photo 1 Looking North: South Elevation

Photo 2 Looking North: Underside of Arch

Photo 3 Looking North: West Abutment

Photo 4 Looking North: East Abutment

Photo 5 Looking Northwest: Crumbling of West Abutment Wall at North End

Photo 6 Looking Northeast: Crumbling of East Abutment Wall at North End

Photo 7 Looking Southeast: Voids in North Spandrel Wall

Photo 8 Looking Northwest: Southwest Training Wall Elevation

Photo 9 Looking North: Cracks in South Spandrel Wall

Photo 10 Looking East: West Approach

Photo 11 Looking Southeast: South Bridge Rail

Photo 12 Looking Northeast: North Bridge Rail

Photo 13 Looking East: Condition of Roadway Over Culvert

Photo 14 Looking West: East Approach

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South Street over Bacon Brook
(Bridge No. U-02-060)

Priority 10

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 14" 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 good condition showing some minor problems. Its underside is covered in moderately deteriorated damp proofing (See Photo 11). Where visible, the slab’s overall condition appears good but exhibits few random hairline cracks. Two rows of concrete blocks run transversely across the slab (Photo 10). 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 (Photo 26).

The abutments are in fair condition showing minor deterioration. Both abutments exhibit moderate concrete deterioration at the west opening. At these locations, heavy spalling and delamination is typical (Photos 2 and 8). Random hairline cracks are typical on both abutment walls. In addition, a medium width (⅜") full height vertical crack was found at the center of the north abutment (Photo 9). There is also an 18" section of exposed footing at the north abutment (Photo 5); however, no scour was detected at either abutment.

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 a loss of mortar and random voids at the waterline, but are in good condition. The two wingwalls at the west opening are concrete and are integrated with a stone retaining wall that supports the roadway. Both 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 (Photos 6 and 7). Directly upstream of the culvert is a cattle feeding area. The congregation of cattle at this location has caused the stream to migrate away from its natural shape (Photo 12), thus altering flow and introducing potential scour issues.

The approach roadway is in poor condition. The pavement joints at the concrete slab have been patched and show advanced deterioration. Both approaches typically exhibit alligator cracking, roadway debris, and moderate wheel line rutting (Photos 15 and 19). A narrow horizontal curve at the north approach makes for poor visibility (Photo 16).

There is currently no bridge railing. A chain link fence over the bridge is bent with heavy vegetation growth on the east side. The lack of bridge rail and approach guardrail is a safety hazard.

RECOMMENDATIONS

This structure is in fair condition with several deficiencies noted. BETA recommends that the following repairs are completed to extend the structures anticipated service life:

- 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.
- Remove all deteriorated concrete at the northwest and southwest wingwalls, fill the scour hole at the southwest wingwall, and re-face both walls.
- Place stone riprap at exposed concrete abutment footing to prevent future scour.

BETA also recommends the addition of guardrail at all approaches and over the structure. If proven feasible, details are available to span standard guardrail systems over water crossings.

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

BUDGETARY COST ESTIMATE

Repairs

Construction:	$60,000
Engineering:	$15,000
Total:	$75,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

SOUTH STREET
OVER
BACON BROOK

BRIDGE NO.
U-02-060

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-060

General:

Street Name: South Street **Waterway:** Bacon Brook **Culvert ID:** U-02-060

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/13/2011 **Weather:** Partly Cloudy **Temp:** 80°F

General Culvert Information:

Culvert Type: Concrete Slab on Concrete Abutment

Construction Date: 1940

Dimensions Of Hydraulic Opening Height (Inches): 58

Length of Culvert Feet: 22

Dimensions Of Hydraulic Opening Width (Inches): 137

Depth of Fill Over Culvert Inches: 24" Exposed conc. Sl

Depth of Flow During Inspection: 14.5"

Direction of Flow: East

Utilities Carried By Structure: Overhead wires

Drainage Structures: Drainage swales at NorthEast and SouthWest approaches (natural)

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: 18" exposed footing. No scour detected. Fill in front of footing. + all notes from South wall.

Abutment South Sidewall: 3/8" wide crack full height middle of abut. West end ~4ft of delam + spalling at SW Wingwall. Several hairline cracks (TYP). Ran minor honeycombing (TYP). Mod scaling 6" above WL (TYP), Delam at WL

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 2

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Covered w/damp proofing > moderate deterioration. Few hairline cracks visible. Several conc. repairs on underside of culvert. Repair appears to be concrete block stuck in spalled areas.

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Stones

Floor Notes: No scour but exposed tooting at N. abutment. Upstream migration serves as feeding area for cattle.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-060

Training/Wingwalls:

North East Wall: Training **North West Wall Type:** Mortared Stone Retaining **North West Wall Rating:** 4

North East Wall: Loss of mortar and voids at WL.

North West Wall: Wingwall **North West Wall Type:** Mortared Stone Retaining Wall **North West Wall Rating:** 4

North West Wall: Mostly cosmetic damage

South East Wall: Training **South East Wall Type:** Mortared Stone Retaining Wall **South East Wall Rating:** 4

South East Wall: Loss of mortar and voids at WL.

South West Wall: Wingwall **South West Wall Type:** Mortared Stone Retaining Wall **South West Wall Rating:** 1

South West Wall: Heavy delam Spalling and efflo (TYP). Large void and undermining > deep

Head Wall: Headwall **Head Wall Type:** Concrete **Head Wall Rating:** 4

Head Wall Notes: Minor scaling (TYP). Otherwise good

Roadway Condition:

North Roadway Approach Condition: Hvy debris, frag pvmt at shoulders. Alli cracking **North Roadway Inches:** 180

North Roadway Approach Settlement: Moderate rutting **North Roadway Rating:** 3

North Roadway Approach Alignement: Poor visibility, horiz curve. Narrow

South Roadway Approach Condition: Hvy debris, Frag pvmt at shoulders. Alli cracking **South Roadway Inches:** 180

South Roadway Approach Settlement: Moderate rutting **South Roadway Rating:** 3

South Roadway Approach Alignement: Poor visibility. Horizontal curve. Narrow

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: No barrier. Chainlink fence over culvert

Guard Rail Condition: Bad condition. Bent, no approach guardrail. Metal wired fence at SW and NW approaches. Not rated> non-standard system

Guard Rail Rating: NR

Guard Rail Notes: Joint fragmenting at slab @ N approach (Patched, TYP). Debris on shoulders and moderate scaling on over culvert.

Photo 1 Looking East: West Culvert Elevation

Photo 2 Looking Southeast: West End of South Abutment

Photo 3 Looking Southwest: Scaling Above Waterline at South Abutment

Photo 4 Looking West: East Culvert Elevation

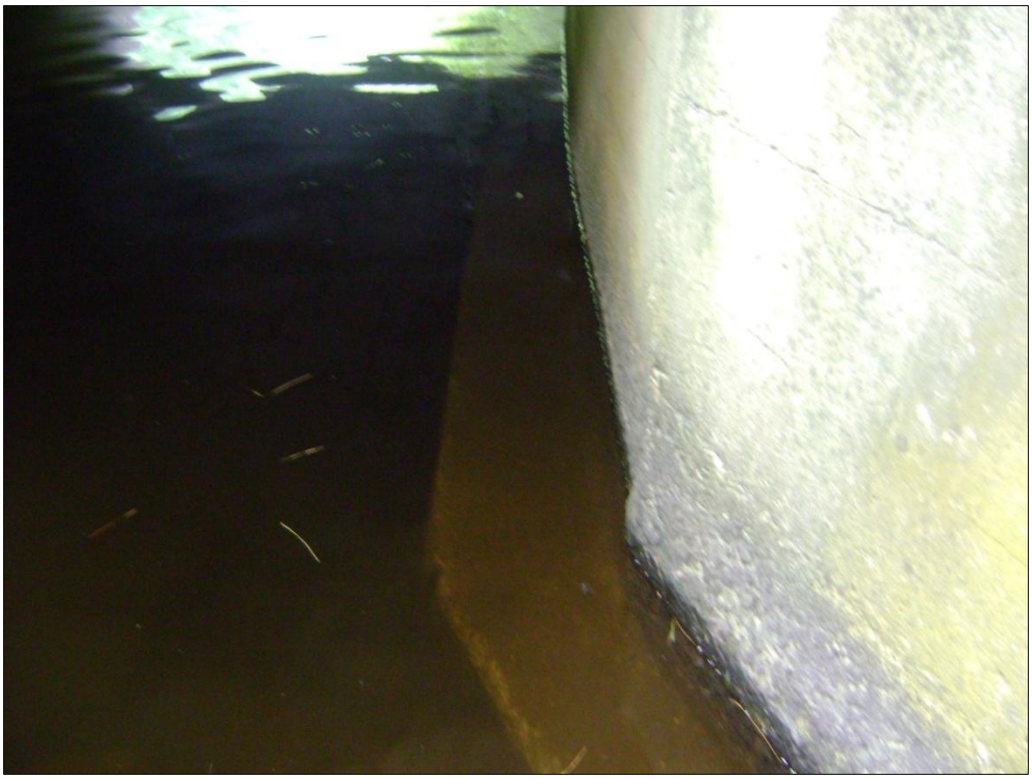

Photo 5 Looking West: Exposed Footing at North Abutment

Photo 6 Looking East: Undermining of Southwest Wingwall

Photo 7 Looking East: Southwest Wingwall Elevation

Photo 8 Looking East: Northwest Wingwall Elevation

Photo 9 Looking North: Vertical Crack in North Abutment

Photo 10 Looking East: Recessed Blocks in Culvert Roof

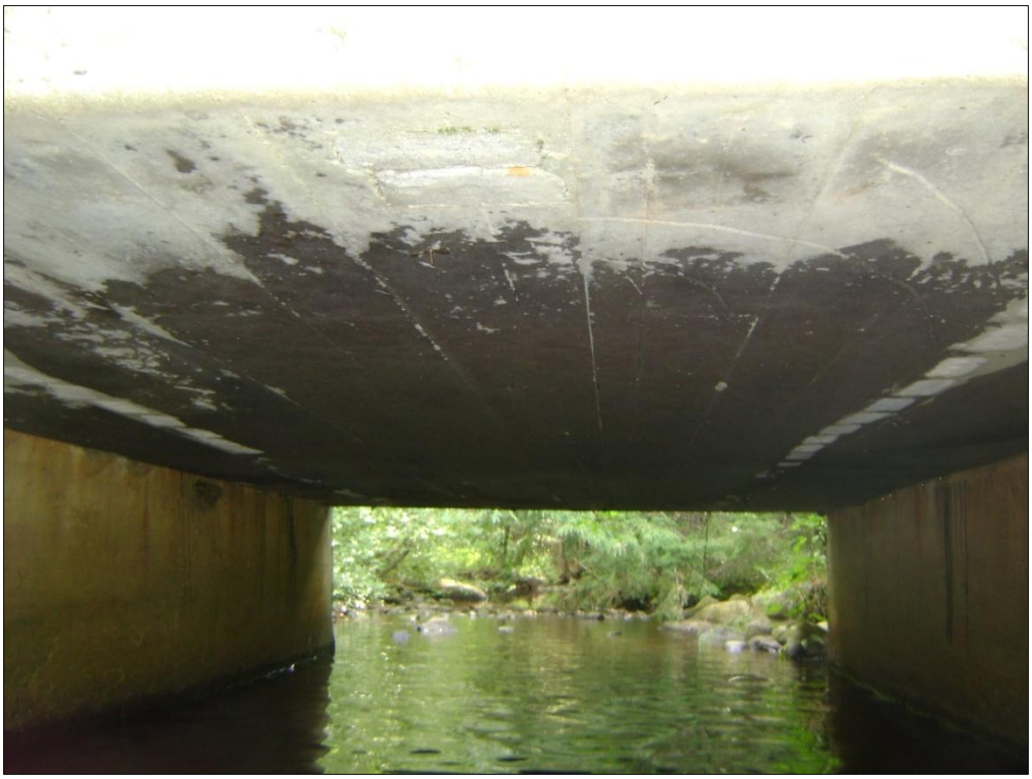

Photo 11 Looking East: Underside of Slab

Photo 12 Looking West: Upstream Migration of Brook

Photo 13 Looking Northwest: Drainage Path at Northeast Approach

Photo 14 Looking South: North Approach

Photo 15 Looking South: Top of Slab

Photo 16 Looking North: South Approach

Photo 17: Typical Bridge Rail

Photo 18 Looking West: Scaling at Top of Slab

Photo 19: Typical Roadway Joint

Aldrich Street over Aldrich Brook
(Bridge No. U-02-038)

Priority 11

AVAILABLE INFORMATION

Aldrich Street is classified as a Rural Minor Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a rectangular concrete box culvert with a construction date circa 1941. The structure has an out-to-out width of 33'-7" and a clear span of 10'-0". The hydraulic opening of the structure is approximately 5'-3" high by 10'-0" wide. The depth of flow at the time of inspection under culvert was approximately 36". The depth of fill over the structure is approximately 18".

The roadway width over the structure is approximately 27'-7" with no sidewalks on either side and consists of an asphaltic wearing surface. There are slight horizontal curves at both approaches and a residential driveway directly adjacent to the bridge at the southwest approach.

Overhead wires run diagonally across the bridge to utility poles at both the northwest and southeast corners. A man-made dam constructed of sawn lumber and asphaltic patching was observed immediately downstream of the structure.

The bridge safety barrier consists of a concrete railing mounted to the culvert headwall. There are standard SS highway guardrails at both approaches; however, Jersey barriers are present along the entire north side of roadway to protect the approach guardrail and bridge railing.

The only sign noted was one at the east approach that reads “Caution Narrow Bridge”.

FINDINGS

The condition of the concrete box culvert is fair. However, the adjacent wingwalls, headwalls, and bridge rails are experiencing advanced concrete deterioration. As a result the overall structure condition should be considered poor.

The box culvert interior is generally in fair condition. Only minor scaling at the waterline and a few minor spalls on the roof were recorded (See Photo 10). However, heavy spalling, delamination, and scaling are present at the north opening and extend approximately 6' into the culvert. The deteriorated concrete is continued along both northern wingwalls. At these areas, there is exposed reinforcement, hairline cracking with efflorescence, and heavy delamination (Photos 7-11). Severe section loss to exposed reinforcing is also typical at these locations. Two training walls on the south side are constructed of dry-laid stone. Both walls are in poor condition with several large voids

and appear to be crumbling (Photos 5). The south headwall and parapet show heavy scaling and spalling with exposed reinforcement (Photo 4).

The roadway is in good condition with some sealed linear cracking. The north concrete bridge rail typically shows heavy scaling at the post bases and heavy deterioration throughout (Photos 12, 19, and 20). Jersey barriers are present along the northern curb line to protect the deteriorated bridge rail (Photo 17). As a result of severe embankment erosion on the north side of the culvert, larger voids and undermining is present under the Jersey barriers (Photo 18). The south ridge rail is in better condition with only minor scaling at the base. Collision damage to the northeast approach guardrail was also noted (Photo 16).

RECOMMENDATIONS

This structure is in poor condition with several deficiencies noted. Despite the overall condition, the concrete box culvert is in fair condition and does not require replacement. BETA recommends that the following repairs are completed to extend the structures anticipated service life:

- Repair all spalls, cracks, and delaminated areas in the concrete box culvert.
- Demolish and rebuild the northern wingwalls and headwall. The new wingwalls and headwall shall incorporate an approved MassDOT bridge railing system and guardrail transition, preferably to match existing.
- Repair all spalls and delaminated area to the southern headwall and bridge rail.
- Repair the eroded roadway embankment at the northern curb line. **This should be considered a high priority.**
- Provide adequate drainage of Aldrich in the vicinity of culvert to prevent further erosion of the adjacent embankments.
- Repair the southern training walls. All voids noted in the walls should be filled to prevent further erosion of the embankment and loss of roadway fines.

Conduct annual inspections to monitor overall bridge conditions and further erosion of the northern embankment.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$110,000
Engineering:	$30,000
Total:	$140,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

ALDRICH STREET
OVER
ALDRICH BROOK

BRIDGE NO.
U-02-038

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-038

General:

Street Name: Aldrich Street **Waterway:** Aldrich Brook **Culvert ID:** U-02-038

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/13/2011 **Weather:** Partly Cloudy **Temp:** 80°F

General Culvert Information:

Culvert Type: Concrete Box **Construction Date:** 1941

Dimensions Of Hydraulic Opening Height (Inches): 63 **Length of Culvert Feet:** 33.5

Dimensions Of Hydraulic Opening Width (Inches): 120 **Depth of Fill Over Culvert Inches:** 18"

Depth of Flow During Inspection: 36" **Direction of Flow:** South

Utilities Carried By Structure: Utility poles at NW and SW of culvert

Drainage Structures: None

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Minor scaling at waterline, otherwise ok (TYP). Spalling from North wingwalls extends 6' from North opening (TYP).

Abutment West Sidewall: Minor scaling at waterline, otherwise OK (TYP). Spalling from North wingwalls extends 6' from North opening (TYP).

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 4

Culvert Roof:

Culvert Roof Notes: Few minor random spalls. South parapet heavy scaling and Spalling. Rebar exposed (TYP). Heavy vegetation.

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: N/A

Floor Scour: None detected **Debris:** Minor/No Debris

Floor Notes: Water too deep to check for scour.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-038

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 2

North East Wall: Heavy spalling up to 6" above waterline. Exposed reinf. Delam w/efflo (TYP). Training wall leading to NE wingwall heavy deterioration

North West Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 2

North West Wall: Heavy Spalling up to 6" above waterline. Exposed reinf. Delam w/efflo (TYP).

South East Wall: Training **South East Wall Type:** Dry Laid Stone **South East Wall Rating:** 2

South East Wall: No mortar, large voids (TYP). Crumbling

South West Wall: Training **South West Wall Type:** Dry Laid Stone **South West Wall Rating:** 3

South West Wall: No mortar, Large voids (TYP)

Head Wall: Concrete Box Headwall **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: North headwall has minor scaling and hairline cracking.

Roadway Condition:

North Roadway Approach Condition:	N/A	**North Roadway Inches:**	N/A
North Roadway Approach Settlement:	N/A	**North Roadway Rating:**	N/A
North Roadway Approach Alignement:	N/A		
South Roadway Approach Condition:	N/A	**South Roadway Inches:**	N/A
South Roadway Approach Settlement:	N/A	**South Roadway Rating:**	N/A
South Roadway Approach Alignement:	N/A		
East Roadway Approach Condition:	Ok, sealed linear cracking	**East Roadway Inches:**	330
East Roadway Approach Settlement:	None	**East Roadway Rating:**	4
East Roadway Approach Alignement:	Good		
West Roadway Approach Condition:	Ok, sealed linear cracking	**West Roadway Inches:**	330
West Roadway Approach Settlement:	None	**West Roadway Rating:**	4
West Roadway Approach Alignement:	Good		

Safety Barrier

Guard Rail Type: Concrete bridge rail mounted on headwall. Approach guardrails + additional concrete basin.

Guard Rail Condition: North: Heavy scaling of base, heavy deterioration. North rated 1 South: Minor scaling at base. South Rated 3

Guard Rail Rating: 1 - North; 3 - South

Guard Rail Notes: Non standard bridge rail. Bridge railbase to Jersey barrier base on over culvert (Varies). Heavy spalling at base of Jersey barriers. Areas of severe undermining of road + jersey barriers at NE corner of bridge. Concrete deteriorated (up to 75% section loss of rebar). Reinforcement fully exposed.

Photo 1 Looking North: South Culvert Elevation

Photo 2 Looking North: East Culvert Wall

Photo 3 Looking North: West Culvert Wall

Photo 4 Looking North: South Headwall

Photo 5 Looking East: Large Void in Southeast Training Wall

Photo 6 Looking North: Man-Made Dam Elevation

Photo 7 Looking West: Northwest Wingwall

Photo 8 Looking Southeast: Northeast Wingwall

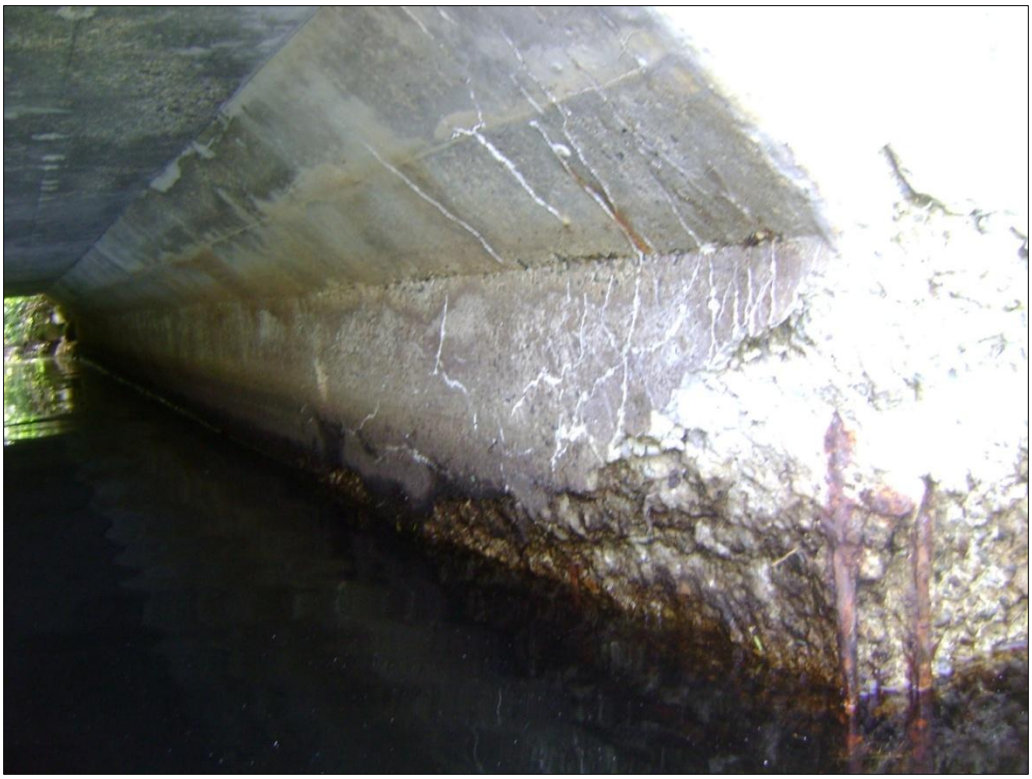

Photo 9 Looking South: West Culvert Wall Deterioration at North Corner

Photo 10 Looking South: East Culvert Wall Deterioration at North Corner

Photo 11 Looking South: Culvert Roof

Photo 12 Looking Southeast: Deterioration of North Bridge Rail Base

Photo 13 Looking West: East Approach

Photo 14 Looking East: West Approach

Photo 15 Looking Southeast: South Bridge Rail

Photo 16 Looking West: Northeast Guardrail Collision Damage

Photo 17 Looking West: North Bridge Rail and Jersey Barriers

Photo 18 Looking West: Void Under Jersey Barrier at Northeast Approach

Photo 19 Looking West: Deterioration of North Bridge Rail Base

Photo 20 Looking West: Deterioration of North Bridge Rail Base

Elmwood Avenue over Aldrich Brook
(Bridge No. N/A)

Priority 12

AVAILABLE INFORMATION

Elmwood Avenue is classified as a Local roadway according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of an 18" cast-in-place concrete slab on mortared stone masonry abutments. The structure has an out-to-out width of 21'-4" with a clear span of 9'-5". The hydraulic opening of the structure is approximately 8'-9" high by 9'-5" wide. Flow was 9" deep at the time of inspection and flowing southward. Depth of fill over the structure is approximately 20".

The roadway width over the structure is 14'-7" and consists of an asphaltic wearing surface. There are no sidewalks on either side of the roadway. A residential driveway is located directly adjacent to the bridge at the southwest approach. The bridge railing consists of a chain link fence on both sides with no approach guardrail.

Overhead wires run along the south fascia of the bridge.

There are currently no posted signs in the vicinity of the bridge.

FINDINGS

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

The concrete slab is in fair condition with a few minor problems. Transverse cracking on the underside of the slab is present and appears to be sealed and/or repaired. There are also several concrete blocks recessed into the underside of slab. 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 abutments are also in fair condition with a few minor problems. Both abutments exhibit missing pointing and chinking stones at the waterline. A full height vertical crack was recorded at the west abutment. Additionally, three wide vertical cracks in the beam seat were located at the west abutment (See Photo 2). There is also a large void at the north end of the east abutment, which extends 33" into the wall. Similarly, a void at the south end of the west abutment was recorded and measured 12" × 2" × 24" deep (Photo 7).

Two stone masonry wingwalls on the south side, although heavily covered in vegetation, are in good condition with some missing pointing and chinking stones. Two stone masonry wingwalls on the north side are also covered with heavy vegetation. A tree was found growing from the northeast wall (Photo 9) in addition to several large voids. Additionally, the top of the northwest wall is crumbling.

The roadway over the bridge is extremely narrow and nearly 100% covered in map cracking. There is heavy wheel line rutting in both approaches and some potholes. The bridge joints show settlement and cracking (Photo 13). The chain-link fence bridge rail is wobbly and not crash tested. There is a steep embankment and the lack of approach guardrail makes this a safety hazard.

RECOMMENDATIONS

This structure is in fair condition with several deficiencies noted. BETA recommends that the following repairs are completed to extend the structures anticipated service life:

- Repair all spalls and cracks to the concrete slab. Also, finish and smooth all recessed block locations at the slab underside.
- Fill all voids, repair all cracks and repoint the existing stone masonry abutments.
- Remove all vegetation from the existing wingwall. Fill all voids and repoint as required. All voids noted in the walls should be filled to prevent further erosion of the embankment and loss of roadway fines.
- Resurface immediate approaches and strip deteriorated wearing surface from concrete slab. Repair any visible concrete deterioration and apply new wearing surface.
- Place proper signage such as "BE PREPARED TO STOP," as the roadway width over the structure is not adequate to carry two lanes of traffic. The roadway centerlines should be striped accordingly. All signage and striping should be fabricated and placed in accordance with current MUTCD standards.

BETA also recommends the addition of guardrail at all approaches and over the structure. If proven feasible, details are available to span standard guardrail systems over water crossings.

Conduct bi-annual inspections to monitor overall bridge conditions.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$75,000
Engineering:	$20,000
Total:	$95,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

ELMWOOD AVENUE
OVER
ALDRICH BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-10

General:

Street Name: Elmwood Ave **Waterway:** Aldrich Brook **Culvert ID:** NA-10

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/26/2011 **Weather:** Cloudy **Temp:** 70°F

General Culvert Information:

Culvert Type: Concrete Slab over Stone Abutments

Construction Date: N/A

Dimensions Of Hydraulic Opening Height (Inches): 105

Length of Culvert Feet: 21.3

Dimensions Of Hydraulic Opening Width (Inches): 113

Depth of Fill Over Culvert Inches: 20"

Depth of Flow During Inspection: 9"

Direction of Flow: South

Utilities Carried By Structure: Overhead utilities

Drainage Structures: None

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Full height vertical crack. 3 other wide vertical cracks in beam seat. Large void N. end (33" deep). Mortared stone masonry w/missing mortar and chink stones at WL.

Abutment West Sidewall: Large void at South end 12" x 24" x 2' deep. Mortared stone masonry w/missing mortar and chink stones at WL.

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 3

Culvert Roof:

Culvert Roof Notes: Several concrete repairs. Otherwise good condition. What looks like a full length, transverse crack that's been sealed. Possible construction joint.

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Cobbles, Boulders, Sediment

Floor Notes: Sediment at North opening. Voids at base of wall.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-10

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Unmortared **North West Wall Rating:** 3

North East Wall: Several voids. Heavy vegetation. 1 Large void, Tree growing out w/large voids up to 2'

North West Wall: Wingwall **North West Wall Type:** Unmortared **North West Wall Rating:** 2

North West Wall: Several voids. Top of wall crumbling. Heavy vegetation

South East Wall: Wingwall **South East Wall Type:** Mortar **South East Wall Rating:** 4

South East Wall: Some missing mortar and chink stones.

South West Wall: Wingwall **South West Wall Type:** Mortar **South West Wall Rating:** 4

South West Wall: Some missing mortar and chink stones. Heavy Vegetation

Head Wall: Slab Fascia **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: None

Roadway Condition:

North Roadway Approach Condition:	N/A	**North Roadway Inches:**	N/A
North Roadway Approach Settlement:	N/A	**North Roadway Rating:**	N/A
North Roadway Approach Alignement:	N/A		
South Roadway Approach Condition:	N/A	**South Roadway Inches:**	N/A
South Roadway Approach Settlement:	N/A	**South Roadway Rating:**	N/A
South Roadway Approach Alignement:	N/A		
East Roadway Approach Condition:	Map cracking	**East Roadway Inches:**	174
East Roadway Approach Settlement:	Heavy wheel-line rutting	**East Roadway Rating:**	3
East Roadway Approach Alignement:	Straight, narrow, driveways		
West Roadway Approach Condition:	100% covered with map cracking	**West Roadway Inches:**	174
West Roadway Approach Settlement:	Heavy wheel-line rutting	**West Roadway Rating:**	3
West Roadway Approach Alignement:	Straight, narrow, driveways		

Safety Barrier

Guard Rail Type: Chainlink fence. No approach rails.

Guard Rail Condition: Moderate surface rust on approach rails. Leaning away from roadway slightly. Steep embankment (Safety Hazard).

Guard Rail Rating: 1

Guard Rail Notes: None

Photo 1 Looking South: North Culvert Elevation

Photo 2 Looking East: Vertical Crack at East Abutment

Photo 3 Looking Up: Crack in Slab Underside at North Opening

Photo 4 Looking Southeast: East Abutment Elevation

Photo 5 Looking South: Underside of Slab

Photo 6 Looking Southwest: West Abutment Elevation

Photo 7 Looking West: Void at Base of West Abutment

Photo 8: Typical Wingwall Elevation

Photo 9 Looking Southeast: Void in Northeast Wingwall at Tree

Photo 10 Looking South: Void in Northeast Wingwall

Photo 11 Looking East: West Approach

Photo 12: Typical Bridge Rail Elevation

Photo 13: Typical Approach Roadway Joint

Photo 14 Looking Northwest: Condition of Pavement over Culvert

Photo 15 Looking West: East Approach

Hartford Avenue East over the Mumford River (Bridge No. U-02-020)

Priority 13

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 50.1.

A bridge inspection and rating report dated July 27, 1993 was provided by MassDOT. The report notes that a posting is required for a rating of 20, 25, and 36 tons for a Type H, Type 3, and Type 3S2 truck, respectively. The report indicates the reason for the bridge not meeting statutory requirements is the placement of an additional 2" of bituminous concrete on the wearing surface. It is also indicated that the removal of this additional layer would approximately bring the structure back to its statutory capacity.

The most recent MassDOT routine bridge inspection report on record is dated December 17, 2010.

MassDOT also made available a routine underwater inspection report dated January 30, 2009. The purpose of this report is to quantify and monitor scour at the east abutment.

Hartford Avenue is classified as a Rural Major Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of six W33x130 non-composite beams with an 8" reinforced concrete slab on concrete abutments. Bridge construction can be dated circa 1955. The bridge has an out-to-out width of 38'-6" with a clear span of approximately 43'-0". The hydraulic opening of structure is approximately 14'-3" high, measured at mid-span, by 43'-0" wide. The depth of flow at the time of inspection varied greatly between abutments. A large deposit of sediment at the west abutment has narrowed the channel and directed flow to the east abutment face. Flow at the east abutment is approximately 3' deep while the west abutment is dry. Flow was traveling southward.

The roadway width over the structure is 25'-9" with 5'-4" sidewalks on either side. The roadway consists of an asphaltic wearing surface with driveways at both approaches. There is an intersection with Whitin Street approximately 200' east of the bridge.

There are overhead wires along the south fascia of the bridge and water and sewer mains crossing under the bridge in bay #5.

The bridge railing consists of a metal bridge rail. The approach guardrail consists of standard highway guardrail that terminates at the bridge. There is currently no transition from the concrete endpost to either the approach guardrail or metal bridge railing.

There are “6 Ton Limit Ahead”, “Road Narrows”, and “Speed Limit 30” at both approaches. All signs are for the Hartford Avenue East over Canal crossing located approximately 100' east.

FINDINGS

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

The underside of the concrete deck slab was found to be in fair condition. Several areas of moderate map cracking were noted with efflorescence and moisture (See Photo 2).

The steel beams were in generally fair condition with some deterioration noted. Heavy paint failure is typical on all steel beam flanges. The loss of protective coating is causing moderate surface rusting. However, there is no evidence of section loss (Photo 4) to the steel members. The steel diaphragms are in similar condition (Photo 3). The beam webs only exhibit minor paint failure and surface rust.

The bearings are in fair condition but do exhibit some deterioration. Bearing plates and anchor bolts at both abutments typically show moderate paint failure and surface rusting (Photo 5). However, bearing plates at beams #1 and #2 at the west abutment (Photo 6) show more advanced signs of deterioration.

The abutment concrete is in good condition with only minor problems noted. However, the presence of scour at the east abutment would reduce the overall abutment condition to fair. An area of moderate scaling was noted at the west abutment face under bay #1 (Photo 9). Full height water stains are also present under bay #5. Moderate amounts of debris were typically found on the beam seats. The east abutment has minor honeycombing throughout as well as minor scaling at the waterline (Photo 9). The channel has shifted and flows swiftly in front of the east abutment, leaving most of the abutment susceptible to scour.

The northeast and northwest training walls show loss of pointing and chinking stones at the waterline. Approximately 60' upstream, the northeast wall has a 6'x3'x2' deep void at the base that is causing the wall above it to crumble (Photo 12). The southeast and southwest walls exhibit heavy loss of mortar and chinking stones along with heavy vegetation growth. The southeast wall is also crumbling at the end.

Overall, the roadway is in good condition with minor cracking and few asphalt repairs. The guardrail has moderate surface rusting and paint failure (Photo 16). Also, the approach guard rail ends at a terminal section rather than a standard transition.

RECOMMENDATIONS

According the load rating calculations, this bridge does not meet minimum statutory loading for a Type H, Type 3, and Type 3S2 truck. BETA does not recommend posting this bridge due to the limiting capacity of the culvert structures immediately east and west of this bridge.

The overall condition of the structure is fair. BETA recommends that the following items be addressed to prolong the service life of the structure:

- Clean and paint all structural steel to prevent further deterioration and/or section loss. This work shall include all beams, diaphragms, and bearing assemblies.
- Repair all cracks, spalls, and delaminated areas to the concrete deck.
- Remove sediment in front of the west abutment and fill scour hole at east abutment. **This should be considered priority** as undermining of the east abutment is imminent.
- Repair void at base of northeast training wall to prevent crumbling of wall above.

As part of the 1993 rating report, it is recommended that removal of the bituminous wearing surface and replace with a ⅜" layer flexogrid would approximately bring the structure back to its statutory capacity. Therefore, BETA recommends the Town consider this before posting this bridge. If the removal of the additional layer is performed, a new load rating would be required to ensure the structure meets minimum statutory loading.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$365,000
Engineering:	$95,000
Total:	$460,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

National Bridge Inventory Sheet Dated November 2, 2011

MassDOT Routine Inspection Report Dated December 17, 2010

MassDOT Routine Underwater Inspection Report Dated January 30, 2009

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HARTFORD AVENUE EAST
OVER
THE MUMFORD RIVER

BRIDGE NO.
U-02-020

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-020

General:

Street Name: Hartford Avenue East **Waterway:** Mumford River **Culvert ID:** U-02-020

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/15/2011 **Weather:** Clear **Temp:** 80°F

General Culvert Information:

Culvert Type: Multi-steel Beams **Construction Date:** 1955

Dimensions Of Hydraulic Opening Height (Inches): 170 **Length of Culvert Feet:** 38.5

Dimensions Of Hydraulic Opening Width (Inches): 516 **Depth of Fill Over Culvert Inches:** 8"

Depth of Flow During Inspection: 0-36" - see Culvert notes **Direction of Flow:** South

Utilities Carried By Structure: Overhead utilities on South side. 2 utilities in Bay 5.

Drainage Structures: Outfall NorthEast training wall

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Minor honeycombing (TYP). Minor scaling at waterline. 13' of footing exposed from water scour. Mod. Paint fail and surface rust of bearing plates + anchor bolts (TYP)

Abutment West Sidewall: Mod Scaling under Bay1. Water stains under Bay5. Minor scaling at WL. Mod debris on beam seat. Mod paint fail + surface rust of bearing plates + anchor bolts (TYP). 1+ 2 bearings: Minor corrosion(TYP)

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 4

Culvert Roof:

Culvert Roof Notes: Deck Slab: Several areas of hairline map cracking w/efflo and moisture (TYP)

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: Water scour on East Abutment **Debris:** Minor/No Debris

Floor Notes: See East abutment notes. Current stronger at East abutment. Depth at W abutment 0'. Depth at E abutment 3'

Town of Uxbridge, Massachusetts

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Training/Wingwalls:

North East Wall: Training **North West Wall Type:** Stone Masonry **North West Wall Rating:** 2

North East Wall: Loss of pointing + chink stones, TYP @ waterline. 6'x3'x2' deep void @ base of wall. Wall starting to crumble above. Fix void before wall above crumbles

North West Wall: Training **North West Wall Type:** Stone Masonry **North West Wall Rating:** 4

North West Wall: Loss of pointing + chink stones (TYP) @ WL. No voids

South East Wall: Training **South East Wall Type:** Stone Masonry **South East Wall Rating:** 2

South East Wall: Heavy veg. Wall crumbles immediately downstream.

South West Wall: Training **South West Wall Type:** Mortared Masonry **South West Wall Rating:** 3

South West Wall: Heavy loss of mortar + chink stones. Heavy veg. south

Head Wall: Beam Fascia **Head Wall Type:** Steel **Head Wall Rating:** 3

Head Wall Notes: Beams: Heavy paint failure + mod. surface rusting in top + bottom flanges. No section loss. Minor paint fail + surface rust of webs (TYP). No sec loss. Diaphragms: Heavy paint fail + surface rusting (TYP)

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Minor cracking, several patches **East Roadway Inches:** 308

East Roadway Approach Settlement: None **East Roadway Rating:** 4

East Roadway Approach Alignement: Straight

West Roadway Approach Condition: Minor cracking, several patches **West Roadway Inches:** 308

West Roadway Approach Settlement: Minor settlement on S. shoulder **West Roadway Rating:** 4

West Roadway Approach Alignement: Straight

Safety Barrier

Guard Rail Type: Steel bridge rail w/highway guardrail approach

Guard Rail Condition: Approach guard rails end at boxing glove instead of transition to bridge rail. Moderate surface rust + paint failure of guardrail.

Guard Rail Rating: 3

Guard Rail Notes: None

Photo 1 Looking North: South Bridge Elevation

Photo 2 Looking East: Underside of Deck

Photo 3 Looking East: Typical Steel Diaphragm

Photo 4 Looking Southeast: Typical Bottom Flange of Steel Beam

Photo 5 Looking Northwest: Typical Steel Bearing

Photo 6 Looking East: Steel Bearing Deterioration of Beams #1 and #2 at West Abutment

Photo 7 Looking West: Utility Bay Underside

Photo 8 Looking West: West Abutment Elevation

Photo 9 Looking South: Typical Scaling of Abutment at Waterline

Photo 10 Looking South: North Bridge Elevation

Photo 11 Looking East: East Abutment Elevation

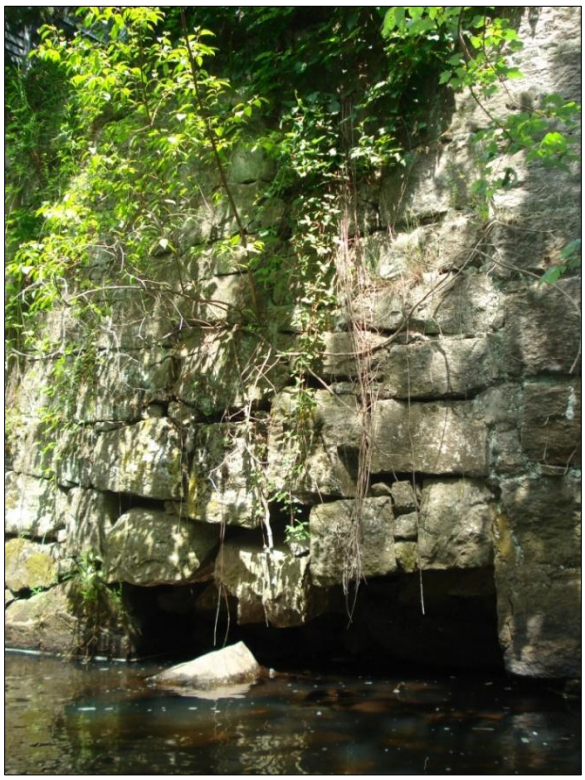

Photo 12 Looking Northeast: Crumbling of Wall Above Void in Northeast Training Wall

Photo 13 Looking West: East Approach

Photo 14: Typical Guardrail Transition

Photo 15 Looking East: West Approach

Photo 16: Typical Bridge Rail Elevation

Photo 17 Looking West: Posted Signs at East Approach

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Report Date: November 2, 2011

State Information

BDEPT#= U02020 Agency Br.No.

Town= Uxbridge L.O.

B.I.N= 1DM AASHTO= 050.1

FHWA Select List= Y

Identification

(8) Structure Number	U020201DMMUNNBI
(5) Inventory Route	151000000
(2) State Highway Department District	03
(3) County Code 027 (4) Place code	71620
(6) Features Intersected	**WATER MUMFORD RIVER**
(7) Facility Carried	**HWY HARTFORD AVE**
(9) Location	.4 MI E OF RTE 122
(11) Kilometerpoint	0000.612
(12) Base Highway Network	N
(13) LRS Inventory Route & Subroute	000000000000
(16) Latitude	42 DEG 05 MIN 34.46 SEC
(17) Longitude	71 DEG 38 MIN 12.25 SEC
(98) Border Bridge State Code	Share %
(99) Border Bridge Structure No.	#

Structure Type and Material

(43) Structure Type Main: Steel Code 302

Stringer/Girder Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit	001
(46) Number of approach spans	0000

(107) Deck Structure Type - Concrete Cast-in-Place Code 1

(108) Wearing Surface / Protective System:

A) Type of wearing surface - Bituminous Code 6

B) Type of membrane - Built-up Code 1

C) Type of deck protection - Unknown Code 8

Age and Service

(27) Year Built	1955
(106) Year Reconstructed	0000

(42) Type of Service: On - Highway-Ped

Under - Waterway Code 55

(28) Lanes: On Structure 02	Under structure 00
(29) Average Daily Traffic	009200
(30) Year of ADT 2010	(109) Truck ADT 03 %
(19) Bypass, detour length	003 KM

Geometric Data

(48) Length of maximum span	0014.0 M
(49) Structure Length	00014.9 M
(50) Curb or sidewalk: Left 01.6 M	Right 01.6 M
(51) Bridge Roadway Width Curb to Curb	007.8 M
(52) Deck Width Out to Out	011.8 M
(32) Approach Roadway Width (w/shoulders)	007.9 M

(33) Bridge Median - No median Code 0

(34) Skew 00 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear	99.99 M
(47) Inventory Route Total Horiz Clear	07.8 M
(53) Min Vert Clear Over Bridge Rdwy	99.99 M
(54) Min Vert Underclear ref N	00.00 M
(55) Min Lat Underclear RT ref N	00.0 M
(56) Min Lat Underclear LT	00.0 M

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0

(111) Pier Protection Code

(39) Navigation Vertical Clearance	000.0 M
(116) Vert-lift Bridge Nav Min Vert Clear	M
(40) Navigation Horizontal Clearance	0000.0 M

Classification

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class - Urban Minor Arterial	16
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance built after 1949 presumed to be not eligi	Z

Condition

	Code
(58) Deck	5
(59) Superstructure	6
(60) Substructure	5
(61) Channel & Channel Protection	5
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - H 20=M 18	4
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	36.6
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	20.6
(70) Bridge Posting	5
(41) Structure - Posted for load	P

Appraisal

	Code
(67) Structural Evaluation	5
(68) Deck Geometry	2
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	7
(72) Approach Roadway Alignment	7
(36) Traffic Safety Features	0 0 0 0
(113) Scour Critical Bridges	4

Inspections

(90) Inspection Date 12/17/10 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	Y	36	MO B)	01/30/09
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection (FLOOD)	N	00	MO *)	04/05/10
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 07/27/93	H20	Type 3	Type 3S2	Type HS
Operating	30.0	37.0	58.0	40.0
Inventory	17.0	20.0	32.0	22.0

Field Posting

Status POSTED Posting Date 02/02/95

	2 Axle	3 Axle	5 Axle
Actual	06	06	06
Recommended	20	25	36

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	N / N	Other
Y / Y	Ladder	N / N	Staging		
N / N	Boat	N / N	Traffic Control		
Y / Y	Wader	N / N	RR Flagperson		
N / N	Inspector 50	N / N	Police		

Inspection Hours: 008

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STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1DM	U-02-020

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
UXBRIDGE	U02020-1DM-MUN-NBI	000.612	P:POSTED	DEC 17, 2010

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY HARTFORD AVE		1955	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER MUMFORD RIVER	Urban Minor Arterial	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
302 : Steel Stringer/Girder	Town Agency	Town Agency	D. Smith

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Sunny	0°C	D. SIMKHOVICH

ITEM 58 — DECK — 5

		DEF
1. Wearing surface	6	M-P
2. Deck Condition	5	M-P
3. Stay in place forms	N	-
4. Curbs	7	-
5. Median	N	-
6. Sidewalks	7	-
7. Parapets	7	-
8. Railing	6	M-P
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	-

CURB REVEAL (In millimeters)	N	S
	200	205

APPROACHES

		DEF
a. Appr. Pavement Condition	5	M-P
b. Appr. Roadway Settlement	7	-
c. Appr. Sidewalk Settlement	5	M-A
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 — SUPERSTRUCTURE — 6

		DEF
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	6	M-P
8. Cover Plates	N	-
9. Bearing Devices	6	M-P
10. Diaphragms/Cross Frames	6	M-P
11. Rivets & Bolts	7	-
12. Welds	7	-
13. Member Alignment	7	-
14. Paint/Coating	5	S-P
15.	N	-

Year Painted	X

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

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

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

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

Any Cracks: **(Y/N)** N

ITEM 60 — SUBSTRUCTURE — 5

	Dive	Cur		DEF
1. Abutments			7	
a. Pedestals	N	N		-
b. Bridge Seats	N	7		-
c. Backwalls	N	7		-
d. Breastwalls	7	7		-
e. Wingwalls	7	7		-
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	N		-
h. Footings	7	7		M-P
i. Piles	N	N		-
j. Scour	5	5		M-P
k. Settlement	7	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		-

UNDERMINING (Y/N) If YES please explain N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None ( ) Minor ( ) Moderate (X) Severe ( )

I-60 (Dive Report): 5 *I-60 (This Report):* 7

93B-U/W (DIVE) Insp 01/30/2009

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

ITEM 61 — CHANNEL & CHANNEL PROTECTION

5

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

STREAM FLOW VELOCITY:

Tidal ( ) High ( ) Moderate (**X**) Low ( ) None ( )

ITEM 61 (Dive Report): **5** ***ITEM 61 (This Report)*** **5**

93b-U/W INSP. DATE: 01/30/2009

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	6	M-P
B. Transitions	0	7	-
C. Approach Guardrail	0	7	M-P
D. Approach Guardrail Ends	0	7	M-P

WEIGHT POSTING

Not Applicable ☐

	H	3	3S2	Single
Actual Posting	06	06	06	06
Recommended Posting	20	25	36	N

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

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Other Advance E	Other Advance W
	Y	Y	Y	Y
	7/7	7/7	7/7	7/7

CLEARANCE POSTING

Not Applicable **X**

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

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge N	At bridge S	Advance N	Advance S

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	Y	Y
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 **8**

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

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

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): **Y**

Date: 07/27/1993

Inspection data at time of existing rating

I 58: **6** I 59: **6** I 60: **8** Date : 12/01/1992

(To be filled out by DBIE)

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

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

REASON: _____

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	Advance 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	Advance 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 stablility. 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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

REMARKS

BRIDGE ORIENTATION
According to the plans the approaches are West and East and the elevations are South and North. This is a single span steel beam bridge with 6 beams and 5 bays numbered South to North. The river flows North to South.

GENERAL REMARKS
Weight Posting: The bridge has been posted for 6 tons. **See Photo 1.**

ITEM 58 - DECK

Item 58.1 - Wearing surface
The bituminous concrete wearing surface has minor transverse, longitudinal, and map cracking with minor unevenness throughout.

Item 58.2 - Deck Condition
The underside of the concrete deck has several areas of minor to moderate transverse and map cracking with efflorescence and minor moisture staining throughout. **See Photo 2.**

Item 58.4 - Curbs
The North curb has a small spall at the East end. See Item 58.6.

Item 58.6 - Sidewalks
Both sidewalks show moderate scaling throughout. There are several minor full width transverse cracks throughout the South sidewalk that extend through the curb. There are small spalls at both ends of the North sidewalk. The North sidewalk has 2 full width hairline cracks that extend through the curb at the utility access at midspan and at the East end.

Item 58.7 - Parapets
Both parapets have moderate scaling throughout.

Item 58.8 - Railing
Both bridge rails have moderate paint peeling, surface rusting, and pitting throughout. There is severe corrosion with up to 50% section loss of the anchor bolt nuts at both bridge rails. **See Photo 3.**

Item 58.12 - Utilities
At the East end in bay #5 there is metal sheathing missing with sagging insulation wrap.

APPROACHES

Approaches a - Appr. Pavement Condition
Both approach to deck transitions have minor full width transverse cracking. Both approaches have moderate transverse and longitudinal cracking throughout. The East approach has a 15 ft. long x 4 ft. wide area of bituminous concrete patches and shallow potholes in the Eastbound lane.

Approaches c - Appr. Sidewalk Settlement
There is up to 2 in. of settlement at all 4 corners of the bridge. Both ends of the South sidewalk are ramped with bituminous concrete that is now partially to mostly missing. **See Photo 4.**

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UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

REMARKS

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams
All beams have many areas of moderate to heavy paint peeling, surface rusting, and minor pitting throughout, heaviest on the top and bottom flanges. **See Photos 2 & 5.**

Item 59.7 - Conn Plt's, Gussets & Angles
All connection plates have several areas of minor to moderate spot rusting.

Item 59.9 - Bearing Devices
All bearing devices have minor to moderate surface rusting. **See Photo 6.** A few of the anchor bolts for the East bearings are slightly bent.

Item 59.10 - Diaphragms/Cross Frames
All the diaphragms have moderate surface rusting in many areas throughout. **See Photo 5.**

Item 59.14 - Paint/Coating
The superstructure paint has many areas of moderate to heavy paint peeling, surface rusting, and minor pitting throughout. **See Photo 5.**

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
The West breastwall has a small area of moderate scaling at the top under bay #1. There is full height moderate water stains under bay #5. The East breastwall has minor honeycombing at the top under beam #5. Both breastwalls have minor to moderate abrasion from the high waterline down.

Item 60.1.h - Footings
See Item 60.1.j.

Item 60.1.j - Scour
According to the *Routine Underwater Inspection Report* dated 1/30/09: The main force of the river current is along the East abutment. The top of the footing is exposed for a length of 13 ft. at the center of the East abutment. Timber sheeting is exposed at the face of the footing from the North end of the Northeast wingwall continuing along the entire abutment up to 1.3 ft. deep.

SubStructure Scour Notes
See Item 60.1.j.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
See Item 60.1.j.

Item 61.2 - Embankment Erosion
See Item 61.9.

Item 61.4 - Vegetation
There is a tree and brush growing at the Southwest corner of the bridge. **See Photo 7.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

REMARKS

Item 61.9 - Channel Wall
There is 25 ft. of the Southeast channel wall that has collapsed with embankment erosion behind the wall. **See Photo 8.** A similar condition exists at the Northwest channel wall.

TRAFFIC SAFETY

Item 36a - Bridge Railing
The bridge rails consist of 3 steel channel rails, steel posts, and concrete end posts. See Item 58.8.

Item 36b - Transitions
There are no traffic safety features at the Northeast corner of the bridge due to an adjacent parking area. The transitions at the Southwest, Southeast, and Northwest corners are single panel SS steel guardrails with boxing glove type ends, not connected to the concrete end posts. The posts are not properly spaced.

Item 36c - Approach Guardrail
The Southwest approach guardrail has minor collision damage.

Item 36d - Approach Guardrail Ends
The guardrail ends at the Southwest, Southeast, and Northwest corners are boxing glove type and are not turned from traffic. Both South ends have minor collision damage.

Photo Log
Photo 1 : Weight posting sign.
Photo 2 : Typical deck cracks with efflorescence.
Photo 3 : Typical bridge rail rust with section loss to anchor bolt nuts.
Photo 4 : Southeast sidewalk settlement with partial bituminous ramp.
Photo 5 : Superstructure paint peel and rust.
Photo 6 : Typical bearing surface rust.
Photo 7 : Tree and brush growth at Southwest channel.
Photo 8 : Collapsed wall at Southeast channel.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

PHOTOS

Photo 1: **Weight posting sign.**

Photo 2: **Typical deck cracks with efflorescence.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

PHOTOS

Photo 3: **Typical bridge rail rust with section loss to anchor bolt nuts.**

Photo 4: **Southeast sidewalk settlement with partial bituminous ramp.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

PHOTOS

Photo 5: **Superstructure paint peel and rust.**

Photo 6: **Typical bearing surface rust.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**DEC 17, 2010**

PHOTOS

Photo 7: **Tree and brush growth at Southwest channel.**

Photo 8: **Collapsed wall at Southeast channel.**

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MASSACHUSETTS HIGHWAY DEPARTMENT

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

2-DIST	B.I.N.	BR. DEPT. NO.
03	1DM	U-02-020

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
UXBRIDGE	U02020-1DM-MUN-NBI	II	JAN 30, 2009

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
HWY HARTFORD AVE	EMBANKMENT	JOHN B. DESMOND

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
WATER MUMFORD RIVER	1.5 m	1.5 m	JOHN A. MANKOWSKY	

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
BOULDERS, GRAVEL, SAND	MODERATE	S. A. BEGLEY, R. WYKES, E. P. TERNOSKY

ITEM 60 *SUBSTRUCTURE*

		DEF
1. Abutments	5	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	7	-
e. Wingwalls	7	-
f. Slope Paving/Rip-Rap	N	-
g. Pointing	N	-
h. Footings	7	-
i. Piles	N	-
j. Scour	5	-
k. Settlement	7	-
l. Timber Sheeting	7	-
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

DEF: 5

ITEM 61 *CHANNEL & CHANNEL PROTECTION*

		DEF
1. Channel Scour	5	-
2. Embankment Erosion	7	-
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	-

DEF: 5

ITEM 59 *SUPERSTRUCTURE*

		DEF
	N	-
	N	-
	N	-

ITEM 62 *CULVERTS*

		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

DEF: 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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**JAN 30, 2009**

REMARKS

GENERAL REMARKS

Bridge is a single span concrete structure, dated 1955.

Orientation:

Abutments are labeled left and right, looking downstream. Sta 10+00 is at the downstream end.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

Left Abutment:

There is minor concrete abrasion in the vicinity of the waterline.

Right Abutment:

There is minor concrete abrasion in the vicinity of the waterline.

Item 60.1.h - Footings

Left Abutment:

The main force of the current is along the left abutment.
The top of the concrete footing is exposed from Sta 10+13.1 to 10+26.3 and appears in good condition.

Right Abutment:

The footing is not exposed.

Item 60.1.j - Scour

Left Abutment:

The main force of the current is along the left abutment.
The top of the concrete footing is exposed from Sta 10+13.1 to 10+26.3.
Vertical timber sheeting in front of the footing is exposed from Sta 9+95.1 to the upstream end of the upstream wingwall. Maximum exposed height of the sheeting is approximately 1.3'.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.6 - Rip-Rap/Slope Protection

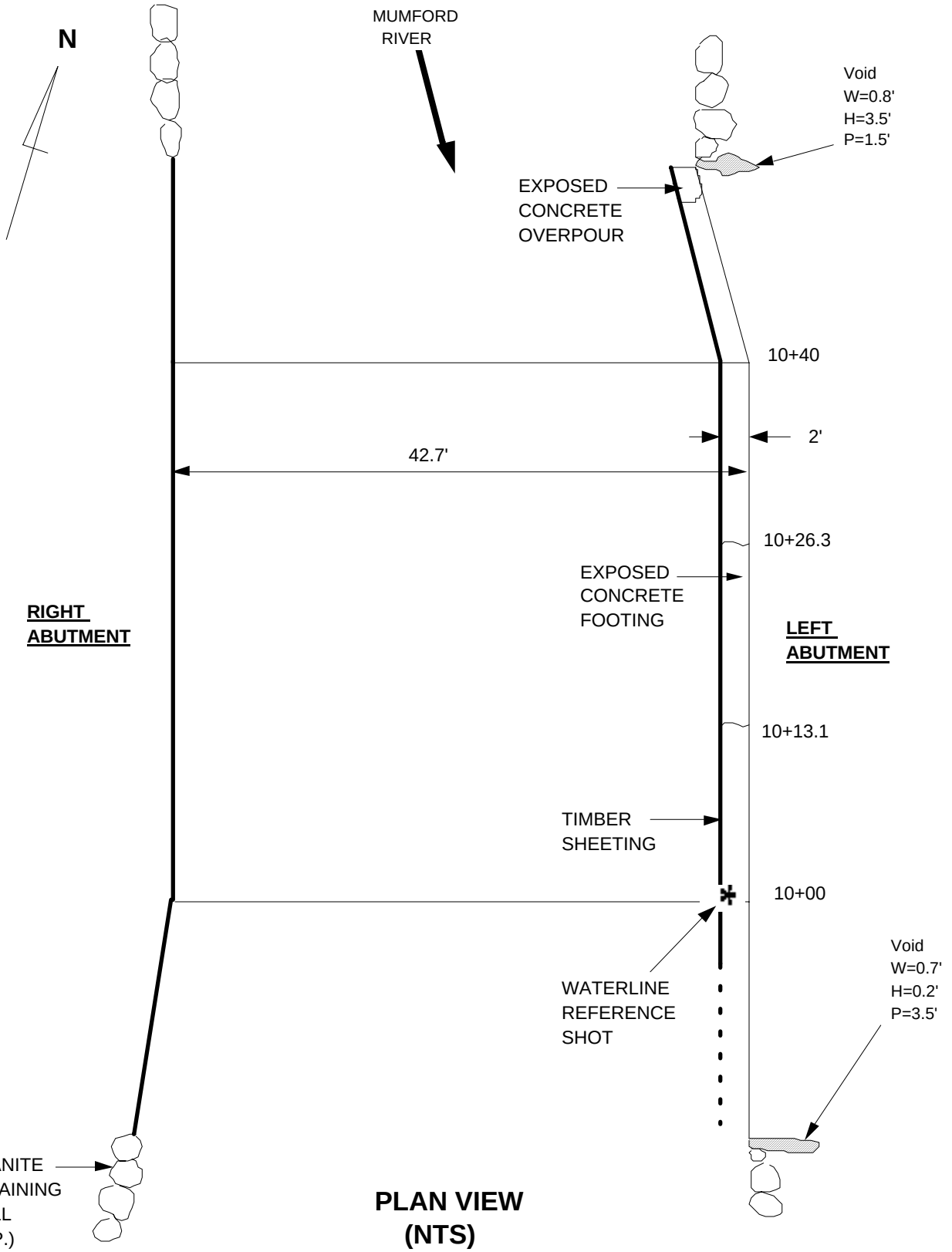
There are cut granite block retaining walls upstream and downstream of the bridge. There are some voids at the interface with the wingwalls. See sketch.

Sketch / Chart Log

Sketch 1 : PLAN VIEW
Chart 1 : SCOUR MONITORING

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**JAN 30, 2009**

SKETCHES



PLAN VIEW
(NTS)

Sketch 1: PLAN VIEW

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DM**	**U-02-020**	**U02020-1DM-MUN-NBI**	**JAN 30, 2009**

CHARTS

SCOUR MONITORING CHART @ STA 10+20

ENGLISH MEASUREMENTS (feet)

OFFSETS	1/18/91	3/11/94	4/4/97	4/14/00	3/5/03	3/9/06	1/30/09
RIGHT ABUTMENT	1.2	1.2	1.1	1.0	1.3	1.2	1.2
1/4 SPAN	2.2	2.0	1.8	1.6	2.0	1.8	1.8
1/2 SPAN	2.4	2.4	2.3	2.0	3.0	2.3	2.5
3/4 SPAN	3.8	3.8	3.9	3.6	3.9	4.1	3.8
LEFT ABUTMENT							
OUTSIDE SHEETING	4.5	4.5	4.4	3.9	4.6	4.5	4.3
TOP OF SHEETING	3.5	3.5	3.5	3.0	3.6	3.5	3.4
TOP OF FOOTING	4.1	4.1	4.1	3.6	3.9	4.1	4.0
Y	11.1	10.2	10.3	11.3	11.4	11.8	11.3
CORRECTION	-	-0.9	-0.8	+0.2	+0.3	+0.7	+0.2

Notes

1. Water control shot (Y) = waterline to bottom of beam @ Sta 10+00, Left Abutment.
2. For comparison all soundings are adjusted to 1991 water level.
3. Station 10+00 is located at downstream end.

Chart 1: **SCOUR MONITORING**

Mill Street over Emerson Brook
(Bridge No. U-02-002)

Priority 14

AVAILABLE INFORMATION

Mill 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 with a date of construction circa 1850. The structure has an out-to-out width of 21'-6" with a clear span of 10'-0". The hydraulic opening of the arch structure is approximately 9'-10" high by 10'-0" wide. The flow was 3" deep at the time of inspection and flowing southward. The depth of fill over the structure is approximately 4'-9".

The roadway width over the structure is 18'-0" and consists of an asphaltic wearing surface. The width of roadway narrows from the east and west approaches, which have approximate widths of 22'-0" and 21'-0", respectively. There are no sidewalks on either side. A sharp horizontal curve is present at the west approach and an intersection with Pond Street is located approximately 120' east of the structure.

Overhead wires run along the south side of the roadway. There is also a riprap drainage waterway at the northwest corner of the structure.

The bridge railing consists of timber bridge rail behind standard guardrail. The embankments are very steep and the only approach guardrail is a single segment of Jersey barrier at the south side of the west approach.

No signs were noted at the approaches.

FINDINGS

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

Inspection of the masonry arch revealed that there is a concrete facing on the underside that has random cracking with efflorescence throughout (See Photo 6). There is also a larger longitudinal crack on the south side of the arch with two 12" diameter x 3" deep spalls (Photos 5 and 7). This crack extends across the entire arch and down the east abutment wall.

Abutment walls are stone masonry with footings completely exposed and are in fair condition. The east footing shows heavy deterioration (Photo 2). Random mortar patches and moisture spots throughout both walls were found to be typical.

The northwest and southwest spandrel walls are in good condition with only few missing cobbles. The northeast training wall has a full height 1" crack where it meets the abutment (Photo 9). The southeast training wall has large voids at the waterline (Photo 8).

The floor of the culvert is 75% deteriorated concrete and 25% stones. There is minor scour at the east wall footing, and heavy scour at the downstream end of the floor where the depth of the water drops from 3" to about 4'-0".

Although the pavement over the culvert is in good shape, the alignment is very poor at the west approach. There is a sharp horizontal and vertical curve with poor visibility. The guard rail is in poor condition and is leaning away from the roadway on the south side. There is slight collision damage at the southeast approach. The roadway geometry, poor condition of the guardrails, and lack of any approach rail make this a safety hazard.

RECOMMENDATIONS

The overall condition of this structure is fair. BETA recommends the following to extend the life of the structure and improve public safety:

- Fill all voids with chinking stones and repoint.
- Encase east abutment footing with concrete.
- Repair cracks and spalls to stone abutment walls and arch.
- Repair all scour holes.
- Install traffic barrier on all approaches and over the culvert in accordance with current AASHTO design standards.
- Roadway width over the culvert is not adequate to carry two lanes of traffic. Add additional “BE PREPARED TO STOP” approach signs stripe roadway centerlines accordingly. All signage and striping should be in accordance with current MUTCD standards.
- Signage in accordance current MUTCD standards is also recommended indicating a sharp curve and/or reduced speed.

Routine inspections should be conducted at intervals not exceeding two years.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$95,000
Engineering:	$25,000
Total:	$120,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

MILL STREET
OVER
EMERSON BROOK

BRIDGE NO.
U-02-002

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-002

General:

Street Name: Mill Street **Waterway:** Emerson Brook **Culvert ID:** U-02-002

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 6/13/2011 **Weather:** Partly Cloudy **Temp:** 80°F

General Culvert Information:

Culvert Type: Stone Masonry Arch **Construction Date:** 1850

Dimensions Of Hydraulic Opening Height (Inches): 118 **Length of Culvert Feet:** 21.5

Dimensions Of Hydraulic Opening Width (Inches): 120 **Depth of Fill Over Culvert Inches:** 118"

Depth of Flow During Inspection: 3" **Direction of Flow:** South

Utilities Carried By Structure: Utility pole at SE Corner. Overhead utilities

Drainage Structures: Natural rip-rap waterway at NorthWest

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Heavy deterioration of footing conc. Large vertical crack extends up East wall through arch to top of West wall. Moisture spots. Rated 2 because of footing deterioration.

Abutment West Sidewall: Both East and West Sidewalls: Stone Masonry walls w/exposed footings. Random mortar patching (TYP); Otherwise Stone OK

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 3

Culvert Roof:

Culvert Roof Notes: Random cracking w/efflo on mortar/conc. facing (TYP). Large crack across arch with 2 12" dia x 3" deep spalls. Add'l 1' 7" dia x 2" deep spall.

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 2

Floor Scour: Minor Scour of East Wall Footing **Debris:** 75% Deteriorated Concrete, 25% Stones

Floor Notes: Rated 2 because of scour at end of slab.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-002

Training/Wingwalls:

North East Wall: Training **North West Wall Type:** Stone Masonry Wall **North West Wall Rating:** 3

North East Wall: Shares east abut wall. Wall in good condintion; 1" wide full height crack at train… abut joint cont. Rated 3 because of Monitor crack. Heavy erosion at slope behind wall.

North West Wall: Wingwall **North West Wall Type:** Stone Mason Wall **North West Wall Rating:** 4

North West Wall: Good Condition; Some Missing Cobbles

South East Wall: Training **South East Wall Type:** Stone Masonry w/o Footing **South East Wall Rating:** 3

South East Wall: Decent shape w/Large voids at Waterline. Rated 3 because of Voids

South West Wall: Wingwall **South West Wall Type:** Stone Masonry **South West Wall Rating:** 4

South West Wall: Good Condition; Some Missing Cobbles

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Good **East Roadway Inches:** 264

East Roadway Approach Settlement: None **East Roadway Rating:** 4

East Roadway Approach Alignement: Intersection, Tough Visibility

West Roadway Approach Condition: Minor debris on shoulder. Pavement OK. **West Roadway Inches:** 252

West Roadway Approach Settlement: None **West Roadway Rating:** 4

West Roadway Approach Alignement: Tough visibility

Safety Barrier

Guard Rail Type: Metal Pipe w/wood rail and guard rail

Guard Rail Condition: Rails leaning away from roadway; slight collision damage at SE approach.

Guard Rail Rating: 1

Guard Rail Notes: No approach guardrail but steep drop. Jersey barrier at SW approach. Non-standard rail nor crash tested.

Photo 1 Looking North: South Culvert Elevation

Photo 2 Looking South: East Abutment Footing

Photo 3 Looking South: East Culvert Wall

Photo 4 Looking South: West Culvert Wall

Photo 5 Looking Up: Large Longitudinal Crack Across Arch

Photo 6 Looking North: Underside of Arch

Photo 7 Looking South: Large Spalls at Arch Underside

Photo 8 Looking Northeast: Southeast Wall Elevation

Photo 9 Looking East: Crack Between East Culvert Wall and Northeast Training Wall

Photo 10 Looking South: North Culvert Elevation

Photo 11 Looking East: Rip-Rap Drainage Path at Northwest Approach

Photo 12 Looking East: West Approach

Photo 13 Looking East: Southwest Approach with Jersey Barrier

Photo 14: Typical Bridge Rail

Photo 15 Looking West: East Approach

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

Priority 15

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 72.7.

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 8, 2010 and a routine underwater inspection on February 3, 2009.

Hartford Avenue is classified as a Rural Major Collector 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 depth of flow at the time of inspection was 48" and flowing southward.

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 has a number missing chinking stones and small voids up to 35" deep. Also, random hairline cracks and areas of efflorescence were typical in the mortared joints (See Photos 2 and 5).

Both abutments are also in fair condition but did exhibit random voids and a moderate loss of mortar. The east abutment also has a full height crack on the north end and a fractured stone at the center of the abutment (Photo 8).

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 heavy vegetation growth. The southeast wall also has a large 7"x12"x66" deep void where it meets the arch structure (Photo 7).

Overall, the roadway is in good condition with moderate pavement cracking. The west approach has limited visibility. The stone bridge railing on the south side has moderate mortar loss with voids and an area of full penetration (Photo 10). Also, the approach guard rail ends at a terminal section rather than transitioning to the masonry bridge railing (Photo 13).

RECOMMENDATIONS

The overall condition of the structure is fair. Based on recent BETA inspection findings, the April 2010 rating report, the 2010 routine arch inspection, and the 2009 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.
- Repair all cracked stones in the stone arch and abutments.
- Repoint all joints to the stone arch, abutments, spandrel walls, training walls, and wingwalls.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$85,000
Engineering:	$25,000
Total:	$110,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

National Bridge Inventory Sheet Dated November 2, 2011

MassDOT Routine Arch Inspection Report Dated October 8, 2010

MassDOT Routine Underwater Inspection Report Dated February 3, 2009

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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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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-019

General:

Street Name: Hartford Avenue East **Waterway:** Blackstone Canal **Culvert ID:** U-02-019

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/15/2011 **Weather:** Clear **Temp:** 70°F

General Culvert Information:

Culvert Type: Stone Masonry Arch

Construction Date: 1870

Dimensions Of Hydraulic Opening Height (Inches): 219

Length of Culvert Feet: 24

Dimensions Of Hydraulic Opening Width (Inches): 720

Depth of Fill Over Culvert Inches: 24"

Depth of Flow During Inspection: 48"

Direction of Flow: South

Utilities Carried By Structure: Overhead wires on North side.

Drainage Structures: Stone waterway near SouthEast approach

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Full height crack in top stone at North end. Fractured stone at center of abutment. Several full height cracks of stone.

Abutment West Sidewall: Moderate loss of mortar/pointing. Both abuts are typical.

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 4

Culvert Roof:

Culvert Roof Notes: Arch: Random small voids up to 35" deep. Random efflo (TYP). Random hairline cracking (TYP). Missing pointing/loss of mortar (TYP). Missing chink stones (TYP). Recommendation: Replace missing chink stones and repoint.

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 4

Floor Scour: Too deep to assess scour **Debris:** Sand/Some Boulders

Floor Notes: Dam approximately 200 ft downstream from arch

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-019

Training/Wingwalls:

North East Wall: Training **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North East Wall: Mortar missing + missing chink stone up to 5' above waterline

North West Wall: Training **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 3

North West Wall: Several medium sized voids and loose chink stones

South East Wall: Wingwall **South East Wall Type:** Mortared Masonry **South East Wall Rating:** 3

South East Wall: Heavy vegetation and large void at arch 7"x 12"x 66" deep.

South West Wall: Wingwall **South West Wall Type:** Mortared Masonry **South West Wall Rating:** 3

South West Wall: Heavy vegetation growing from wall. Some missing mortar and loose chink stone.

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Minor cracking at shoulder. **East Roadway Inches:** 254

East Roadway Approach Settlement: None **East Roadway Rating:** 3

East Roadway Approach Alignement: Straight

West Roadway Approach Condition: Minor cracking **West Roadway Inches:** 254

West Roadway Approach Settlement: None **West Roadway Rating:** 4

West Roadway Approach Alignement: Slight Horiz curve, some driveways

Safety Barrier

Guard Rail Type: Granite stone masonry walls 16"w x 30"h

Guard Rail Condition: South rail: Moderate mortar loss and mod sized voids. Some complete penetration. Sev. Loose stones. Northrail: isolated cracks, missing mortar, light graffiti, standard heavy guardrail.

Guard Rail Rating: 3

Guard Rail Notes: Approach rails end at boxing gloves. Not attached to bridge rail. Potholes and cracking at bridge joint.

Photo 1 Looking North: South Bridge Elevation

Photo 2 Looking East: Underside of Arch and East Abutment

Photo 3 Looking East: East Abutment Elevation

Photo 4 Looking West: West Abutment Elevation

Photo 5 Looking East: Typical Voids in Arch Underside

Photo 6 Looking Southwest: North Bridge Elevation

Photo 7 Looking North: Void in Arch at Southeast Wingwall

Photo 8 Looking East: Cracked Stones at East Abutment

Photo 9 Looking West: East Approach

Photo 10 Looking South: Void in South Bridge Rail

Photo 11 Looking South: Looking Downstream at Dam

Photo 12 Looking East: West Approach

Photo 13: Typical Guardrail Transition

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Report Date: November 2, 2011

State Information

BDEPT#= U02019 Agency Br.No.

Town= Uxbridge L.O.

B.I.N= 1DK AASHTO= 072.7

FHWA Select List= Y

Identification

(8) Structure Number U020191DKMUNNBI

(5) Inventory Route 151000000

(2) State Highway Department District 03

(3) County Code 027 (4) Place code 71620

(6) Features Intersected **WATER BLACKSTONE CANAL**

(7) Facility Carried **HWY HARTFORD AVE**

(9) Location 200 FT EAST OF OAK ST

(11) Kilometerpoint 0001.899

(12) Base Highway Network N

(13) LRS Inventory Route & Subroute 000000000000

(16) Latitude 42 DEG 05 MIN 52.10 SEC

(17) Longitude 71 DEG 37 MIN 25.69 SEC

(98) Border Bridge State Code Share %

(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Masonry Code 811

Arch - Deck Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit 001

(46) Number of approach spans 0000

(107) Deck Structure Type - Not applicable Code N

(108) Wearing Surface / Protective System:

A) Type of wearing surface - Not applicable=no deck Code N

B) Type of membrane - Not applicable=no deck Code N

C) Type of deck protection - Not applicable=no deck Code N

Age and Service

(27) Year Built 1870

(106) Year Reconstructed 0000

(42) Type of Service: On - Highway

Under - Waterway Code 15

(28) Lanes: On Structure 02 Under structure 00

(29) Average Daily Traffic 014500

(30) Year of ADT 2010 (109) Truck ADT 06 %

(19) Bypass, detour length 006 KM

Geometric Data

(48) Length of maximum span 0018.3 M

(49) Structure Length 00018.3 M

(50) Curb or sidewalk: Left 00.0 M Right 00.0 M

(51) Bridge Roadway Width Curb to Curb 006.3 M

(52) Deck Width Out to Out 007.2 M

(32) Approach Roadway Width (w/shoulders) 006.4 M

(33) Bridge Median - No median Code 0

(34) Skew 00 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear 99.99 M

(47) Inventory Route Total Horiz Clear 06.3 M

(53) Min Vert Clear Over Bridge Rdwy 99.99 M

(54) Min Vert Underclear ref N 00.00 M

(55) Min Lat Underclear RT ref N 00.0 M

(56) Min Lat Underclear LT 00.0 M

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0

(111) Pier Protection Code

(39) Navigation Vertical Clearance 000.0 M

(116) Vert-lift Bridge Nav Min Vert Clear M

(40) Navigation Horizontal Clearance 0000.0 M

Classification

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class - Urban Minor Arterial	16
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance undetermined	

Condition

	Code
(58) Deck	N
(59) Superstructure	6
(60) Substructure	6
(61) Channel & Channel Protection	7
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - Other/Unknown	0
(63) Operating Rating Method - No rating analysis performed	5
(64) Operating Rating	44.1
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	37.7
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	6
(68) Deck Geometry	2
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	7
(72) Approach Roadway Alignment	7
(36) Traffic Safety Features	0 0 0 0
(113) Scour Critical Bridges	U

Inspections

(90) Inspection Date 10/08/10 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	Y	36	MO B)	02/03/09
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection (FLOOD)	N	00	MO *)	04/05/10
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 04/01/10	H20	Type 3	Type 3S2	Type HS
Operating	0.0	0.0	0.0	0.0
Inventory	27.0	37.0	63.0	42.0

Field Posting

Status LEGAL Posting Date 06/21/10

	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	N / N	Other
N / N	Ladder	N / N	Staging	FLOATTUBE	
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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STRUCTURES INSPECTION FIELD REPORT

ROUTINE ARCH INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1DK	U-02-019

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
UXBRIDGE	U02019-1DK-MUN-NBI	001.899	A:OPEN	OCT 8, 2010

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY HARTFORD AVE		1870	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER BLACKSTONE CANAL	Urban Minor Arterial	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
811 : Masonry Arch - Deck	Town Agency	Town Agency	R. C. Angell

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
N : Not applicable	Sunny	14°C	D. TRAINEE

ITEM 58 — DECK — N

		DEF
1. Wearing surface	7	M-P
2. Deck Condition	N	-
3. Spandrel Fill	7	-
4. Curbs	N	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	6	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)	N	S
	N	N

APPROACHES

		DEF
a. Appr. pavement condition	7	M-P
b. Appr. Roadway Settlement	7	-
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 — SUPERSTRUCTURE — 6

		DEF
1. Arch/Arch Ring	6	M-P
2. Keystone Area	6	M-P
3. Stringers	N	-
4. Floorbeams	N	-
5. Spandrel Walls	6	M-P
6. Spring Lines	6	M-P
7. Diaphragms/Cross Frames	N	-
8. Conn Plt's, Gussets & Angles	N	-
9. Pin & Hangers	N	-
10. Masonry Joints	5	M-P
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Deformation/Flattening	7	-
14. Member Alignment	7	-
15. Paint/Coating	N	-
16.	N	-

Year Painted	N

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

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

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

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 — SUBSTRUCTURE — 6

	Dive	Cur		DEF
1. Abutments			6	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	6	6		-
e. Wingwalls	6	N		-
f. Slope Paving/Rip-Rap	7	7		-
g. Pointing	5	6		M-P
h. Footings	H	H		-
i. Piles	N	N		-
j. Scour	7	7		-
k. Settlement	7	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		-

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

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): 6 *I-60 (This Report):* 6

93B-U/W (DIVE) Insp 02/03/2009

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**OCT 8, 2010**

ITEM 61 — CHANNEL & CHANNEL PROTECTION

7

	Dive	Cur	DEF
1.Channel Scour	7	7	-
2.Embankment Erosion	6	7	-
3.Debris	7	7	-
4.Vegetation	7	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	7	N	-
7.Aggradation	7	7	-
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: 02/03/2009

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	6	M-P
B. Transitions	0	7	-
C. Approach Guardrail	0	7	-
D. Approach Guardrail Ends	0	7	-

WEIGHT POSTING

Not Applicable **X**

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

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

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Other Advance E	Other Advance W

CLEARANCE POSTING

Not Applicable **X**

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

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge N	At bridge S	Advance N	Advance 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:		
FLOATTUBE	Y	Y

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: 04/01/2010

Inspection data at time of existing rating

I 58: **-** I 59: **6** I 60: **6** Date : 10/29/2008

(To be filled out by DBIE)

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

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

REASON: _____

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	Advance 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	Advance 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 stablility. 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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**OCT 8, 2010**

REMARKS

BRIDGE ORIENTATION
The approaches are West to East and the Elevations are South to North. This bridge is a single span stone masonry deck arch. The river flows from North to South.

ITEM 58 - DECK

Item 58.1 - Wearing surface
The bituminous concrete (bit. conc.) wearing surface and Approach pavement shows moderate transverse, longitudinal, and map cracking, heaviest to the Westbound travel lane and the approach pavement at the East end of the bridge.

Item 58.8 - Railing
There is cracked missing pointing in several areas throughout the South masonry rail. There are several moderate sized voids throughout the South railing, some completely through the rail. **See photo #1.** The South rail shows several loose and missing chink stones. **See photo #2.** The North rail shows only small isolated areas of minor cracked, loose and missing pointing.

APPROACHES

Approaches a - Appr. pavement condition
Re: Item #58.1.

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring
There are many missing chink stones throughout the arch ring underside, causing small voids with a maximum penetration of 35 inches. The underside of the arch ring shows many areas of efflorescence and small efflorescence icicles throughout. **See photo #3.** There are several cracked stones throughout the underside of the arch ring.

Item 59.2 - Keystone Area
Re: Item #59.1.

Item 59.5 - Spandrel Walls
There is minor vegetation growth from the masonry joints of the spandrel walls, heaviest at the Southeast corner. **See photo #4.** There are several chink stones missing and loose to both spandrel walls. There is a 7 in. high x 1 ft. wide x 66 in. deep void to the Southeast spandrel wall. **See photo #4.**

Item 59.6 - Spring Lines
Re: Item #59.1.

Item 59.10 - Masonry Joints
There is moderate efflorescence and icicles at many joint locations throughout the underside of the Arch. **See photo #3.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**OCT 8, 2010**

REMARKS

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
There is a full height crack to the top stone, at the outside South end of the East breastwall. **See photo #5.** There is one fractured stone at the center of the East breastwall. **See photo #6.** There is minor to moderate missing pointing throughout both breastwalls.

Item 60.1.f - Slope Paving/Rip-Rap
There has been rip rap placed at the Northeast embankment to repair scour/embankment erosion from the 2005 flood.

Item 60.1.g - Pointing
There is minor to moderate missing pointing throughout both breastwalls.

TRAFFIC SAFETY

Item 36a - Bridge Railing
The bridge railings consist of solid granite stone masonry walls approx. 16 in. wide x 24 in. to 30 in. high. Re: Item #58.8 for condition remarks.

Item 36b - Transitions
The transition ends are boxing glove shaped ends butted up to the bridge rails, but not connected, at the Northeast, Northwest, and Southeast corners. The Northeast, Northwest, and Southeast transitions are single panel steel "SS" guardrail that is not sufficiently stiffened. The Southwest traffic safety feature consists of continuous masonry bridge rail that is sufficiently turned from the traffic.

Item 36c - Approach Guardrail
The Southwest traffic safety feature (approach guardrail area) consists of continuous masonry bridge rail.

Item 36d - Approach Guardrail Ends
The Northwest terminal end is a boxing glove shaped end, not turned from the traffic, or buried. Both East traffic safety features are continuous to another structure just East of this bridge.

Photo Log
Photo 1 : Void completely through the South masonry bridge rail, typical of several.
Photo 2 : Missing chink stone to the South masonry bridge rail, typical of several throughout.
Photo 3 : Typical missing chink stones, voids, efflorescence, and efflorescence icicles throughout the arch underside.
Photo 4 : Void to the Southeast spandrel wall. Vegetation growth to the spandrel wall masonry joints, typical at all four corners.
Photo 5 : Cracked stone to the outside South end of the East breastwall.
Photo 6 : Fractured stone at the center of the East masonry breastwall.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**OCT 8, 2010**

PHOTOS

Photo 1: **Void completely through the South masonry bridge rail, typical of several.**

Photo 2: **Missing chink stone to the South masonry bridge rail, typical of several throughout.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**OCT 8, 2010**

PHOTOS

Photo 3: **Typical missing chink stones, voids, efflorescence, and efflorescence icicles throughout the arch underside.**

Photo 4: **Void to the Southeast spandrel wall. Vegetation growth to the spandrel wall masonry joints, typical at all four corners.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**OCT 8, 2010**

PHOTOS

Photo 5: **Cracked stone to the outside South end of the East breastwall.**

Photo 6: **Fractured stone at the center of the East masonry breastwall.**

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MASSACHUSETTS HIGHWAY DEPARTMENT

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

2-DIST	B.I.N.	BR. DEPT. NO.
03	1DK	U-02-019

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
UXBRIDGE	U02019-1DK-MUN-NBI	II	FEB 3, 2009

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
HWY HARTFORD AVE	S.W. EMBANKMENT	JOHN B. DESMOND

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
WATER BLACKSTONE CANAL	2 m	1.5 m	EDWARD P. TERNOSKY	

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
BOULDERS, SILT	NIL	J. B. DESMOND, R. E. BONICA, G. BROZ

ITEM 60 *SUBSTRUCTURE*

		DEF
1. Abutments	6	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	6	-
e. Wingwalls	6	-
f. Slope Paving/Rip-Rap	7	-
g. Pointing	5	M-P
h. Footings	H	-
i. Piles	N	-
j. Scour	7	-
k. Settlement	7	-
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*

		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*

		DEF
	N	-
	N	-
	N	-

ITEM 62 *CULVERTS*

		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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**FEB 3, 2009**

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-20-018 which is about 200 ft to the east. A dam is located approximately 150 ft downstream.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
Left Abutment:
There are several small voids between granite blocks from missing chinking stones with up to 3.3 ft penetration.

Right Abutment:
Generally in good condition. There is timber sheeting exposed from Sta 10+17 ft to 10+24. See sketch.

Item 60.1.e - Wingwalls
Left Abutment:
Upstream wing and retaining wall has several loose chinking stones.

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:
Most of the pointing in the joints below waterline is missing.

Right Abutment:
Some pointing in joints below waterline is missing.

Item 60.1.k - Settlement
Left Abutment:
There are several hairline cracks in 1st block below springline and one 1/2 in crack in 2nd block below springline at Sta 10+14.7. There is one 1/4 in wide vertical crack and one1/2 in vertical crack in 1st block below springline of upstream wing and one 1/8 in vertical crack in block of downstream wing at waterline.

Right Abutment:
There are four hairline cracks in 1st block above springline at downstream corner.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.2 - Embankment Erosion
Both downstream embankments have some moderate undercutting.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**FEB 3, 2009**

REMARKS

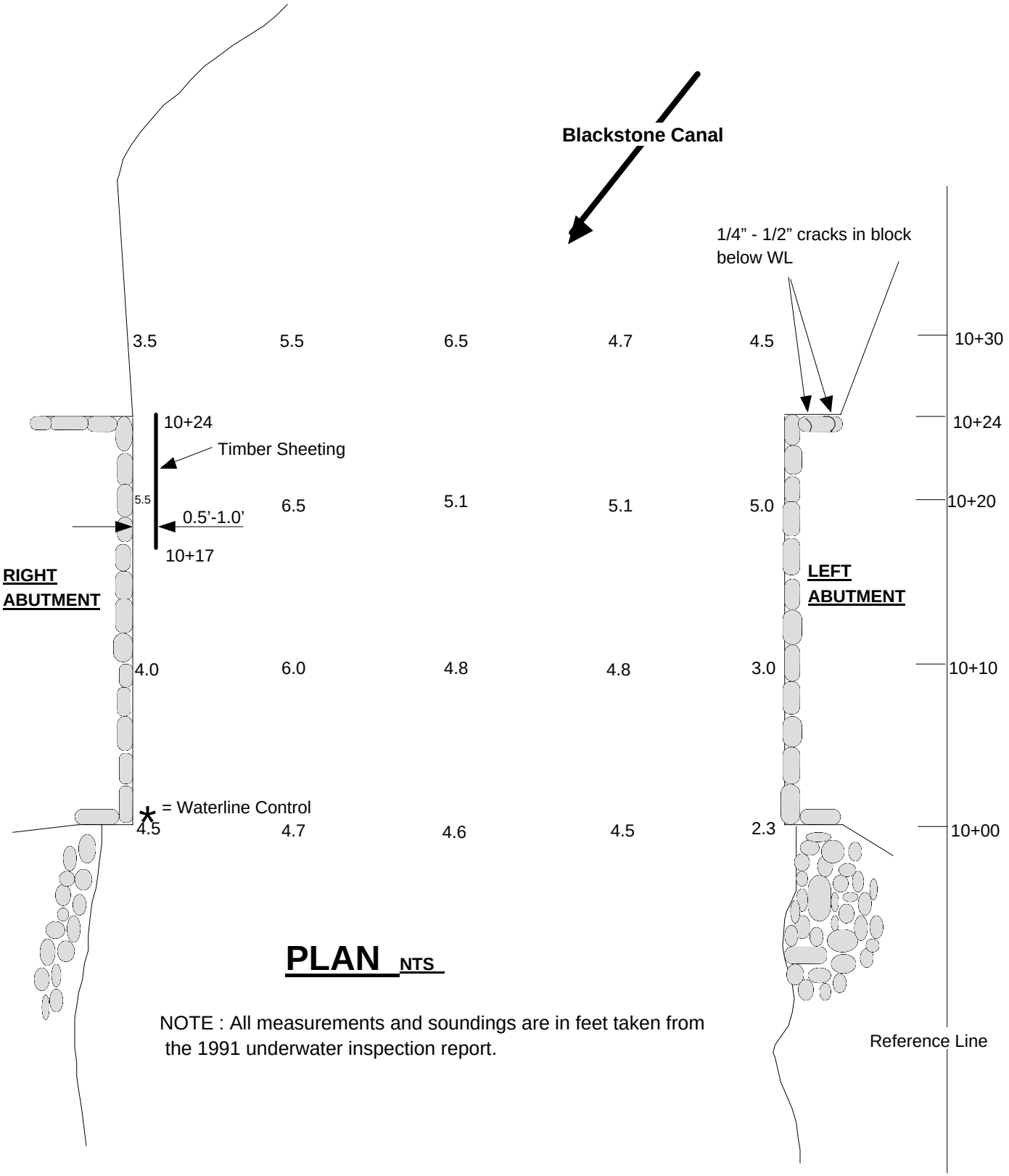
Sketch / Chart Log

Sketch 1 : PLAN

Chart 1 : SCOUR MONITORING

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**FEB 3, 2009**

SKETCHES



PLAN NTS

NOTE : All measurements and soundings are in feet taken from the 1991 underwater inspection report.

Sketch 1: PLAN

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DK**	**U-02-019**	**U02019-1DK-MUN-NBI**	**FEB 3, 2009**

CHARTS

SCOUR MONITORING CHART @ STA 10+20 ft

ENGLISH MEASUREMENTS (feet)

OFFSETS	1/1991	3/1994	4/1997	4/2000	3/2003	3/2006	2/2009
RIGHT ABUTMENT	5.6	5.6	5.6	5.6	5.9	5.5	5.5
1/4 SPAN	6.6	7.2	6.6	6.2	6.2	6.0	6.2
1/2 SPAN	5.2	4.3	4.3	4.3	4.9	3.5	5.0
3/4 SPAN	5.2	4.9	4.9	4.9	4.9	4.5	4.7
LEFT ABUTMENT	4.9	4.9	5.2	4.9	5.2	5.3	5.2
Y	1.1	(0.3)	0.4	1.2	1.0	1.6	1.5
CORRECTION	-	-1.4	-0.7	+0.1	-0.1	+0.5	+0.4

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

Priority 16

AVAILABLE INFORMATION

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 1850. 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. There was no flow at the time of inspection; however, it was determined that typical flow is westward. 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. However, no rating report is on file with the Massachusetts Department of Transportation. There is also a sign reading “Slow Children” at the north approach.

FINDINGS

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

The corrugated pipe sidewalls and roof are in good condition with no deficiencies noted. However, the pipe floor typically shows heavy corrosion with 100% section loss in some areas. Several holes in the floor (See Photos 2 and 7) were found to be typical due to advanced corrosion.

The pipe rests on concrete toewalls at each opening. The walls were found to be in good condition. The wall at the west side opening is exposed full length and has spots of undermining (Photo 5). At the east opening, the wall is buried beyond view.

The channel upstream and downstream consists of sand and boulders (Photos 1 and 4).

Roadway embankments at both openings show moderate to severe erosion. The erosion is causing guardrail posts to shift and lean (Photo 10). Additionally, the concrete posts are in poor condition with up to 75% showing heavy spalling with exposed reinforcing (Photos 11 and 12).

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. 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

Due to the advanced deterioration of the pipe floor, BETA recommends this structure be slip-lined with a new corrugated pipe arch of similar dimensions. Until slip-lining can be performed, it is recommended that the existing posting be enforced and that the Town follow up and confirm the origins and validity of current posting and/or loading restrictions. BETA also recommends that the existing concrete post and steel wire guardrail assembly be removed and replaced at all approaches and over the culvert. The new guardrail shall be Type SS or approved equal and in conformance with current MassDOT standards.

Roadway width over the culvert is not adequate to carry two lanes of traffic. “BE PREPARED TO STOP” or “REDUCED SPEED” signs should be added at the approaches. The roadway centerlines should be striped accordingly. All signage and striping should be in accordance with current MUTCD standards.

Conduct routine inspections at intervals not exceeding two years.

BUDGETARY COST ESTIMATE

Rehabilitation via Slip-Lining:

Construction:	$80,000
Engineering:	$20,000
Total:	$100,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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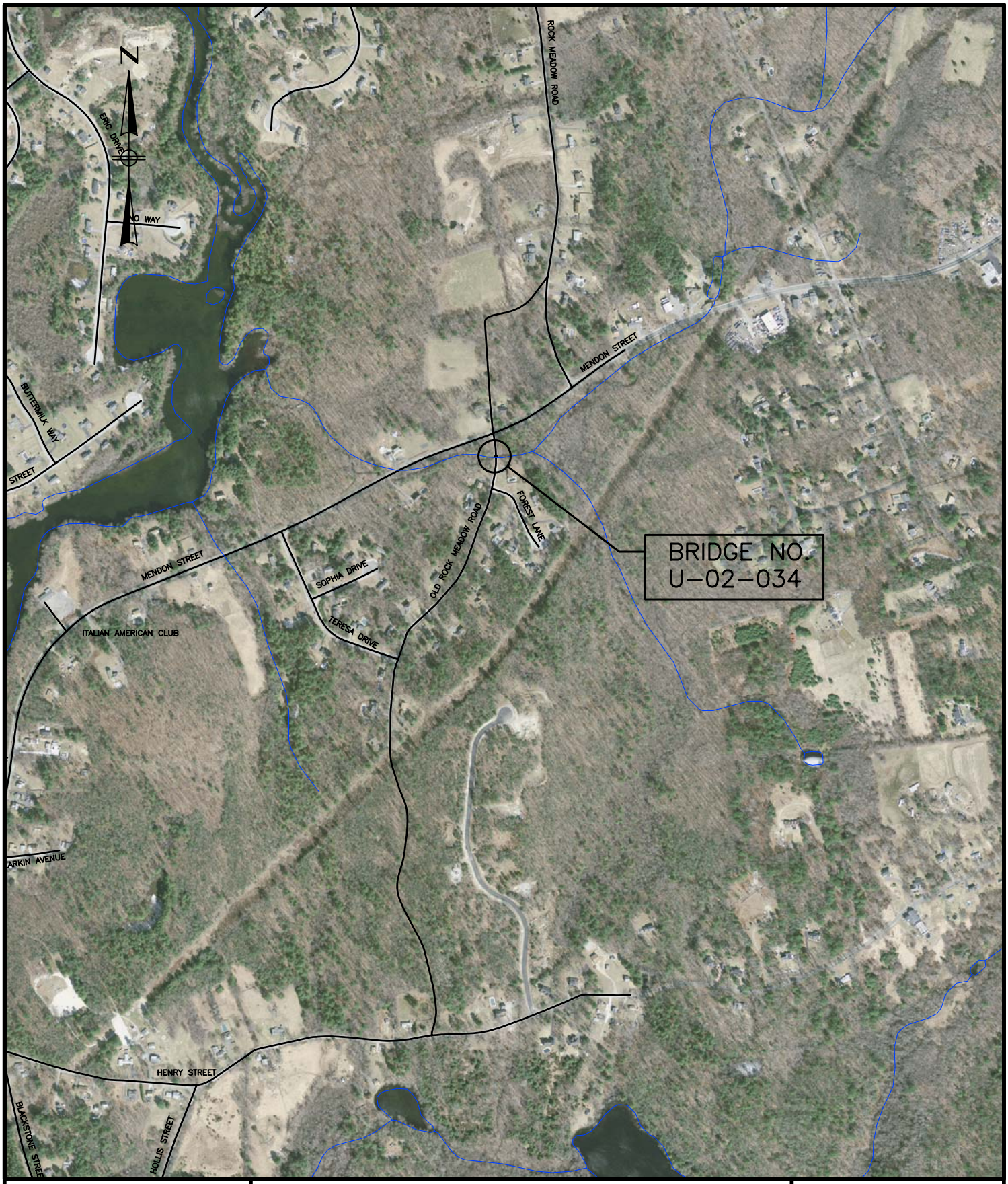

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

ROCKMEADOW ROAD
OVER
ROCK MEADOW BROOK

BRIDGE NO.
U-02-034

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-034

General:

Street Name: Rock Meadow Road **Waterway:** Rockmeadow Brook **Culvert ID:** U-02-034

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Peter Kotowski **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/20/2011 **Weather:** Sunny/Partly Cloudy **Temp:** 85°F

General Culvert Information:

Culvert Type: Corr. Metal Pipe w/Tapered opening

Construction Date: 1850

Dimensions Of Hydraulic Opening Height (Inches): 99

Length of Culvert Feet: 34

Dimensions Of Hydraulic Opening Width (Inches): 156

Depth of Fill Over Culvert Inches: 24"

Depth of Flow During Inspection: 0"

Direction of Flow: West

Utilities Carried By Structure: Overhead wires at East fascia

Drainage Structures: None

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Pipe: Pipe sidewalls + roof in good condition with no deficiencies noted. Floor of pipe typically shows heavy corr. w/100% section loss > several holes in floor throughout (bad condition). Rated 2 due to pipe floor

Culvert Roof Rating: 2

Culvert Floor, Entrance, Exit

Floor Rating: 4

Floor Scour: None detected **Debris:** Sand + Boulders

Floor Notes: See pipe notes for floor of pipe. Upstream + downstream channel floor is all sand and boulders (no flow)

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-034

Training/Wingwalls:

North East Wall: N/A **North West Wall Type:** N/A **North West Wall Rating:** 4

North East Wall: Determined as East wall (not Northeast). Can't see wall/Burried

North West Wall: Sidewall **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 3

North West Wall: Determined as West wall (not Northwest). Well exposed (full length) w/spots of undermining

South East Wall: N/A **South East Wall Type:** N/A **South East Wall Rating:** N/A

South East Wall: No wall

South West Wall: N/A **South West Wall Type:** N/A **South West Wall Rating:** N/A

South West Wall: No wall

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition: Mod. Alligator cracking on W. side of street **North Roadway Inches:** 180

North Roadway Approach Settlement: Minor wheel line rutting **North Roadway Rating:** 4

North Roadway Approach Alignement: Intersection w/Mendon ~100' N of culvert. Straight

South Roadway Approach Condition: Mod. Alligator cracking on W. side of street **South Roadway Inches:** 180

South Roadway Approach Settlement: Minor wheel line rutting **South Roadway Rating:** 4

South Roadway Approach Alignement: Horiz curve/poor visibility

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Concrete post + metal wire guardrail over culvert + both approaches

Guard Rail Condition: Approx. 75% of conc. posts are heavily spalled, some standing by rebar only. Some leaning due to erosion of embankment

Guard Rail Rating: 1

Guard Rail Notes: Heavy vegetation growth on both sides of street reducing visibility. Erosion of East and West embankment TYP @ both approaches + over culvert.

Photo 1 Looking West: East Culvert Elevation

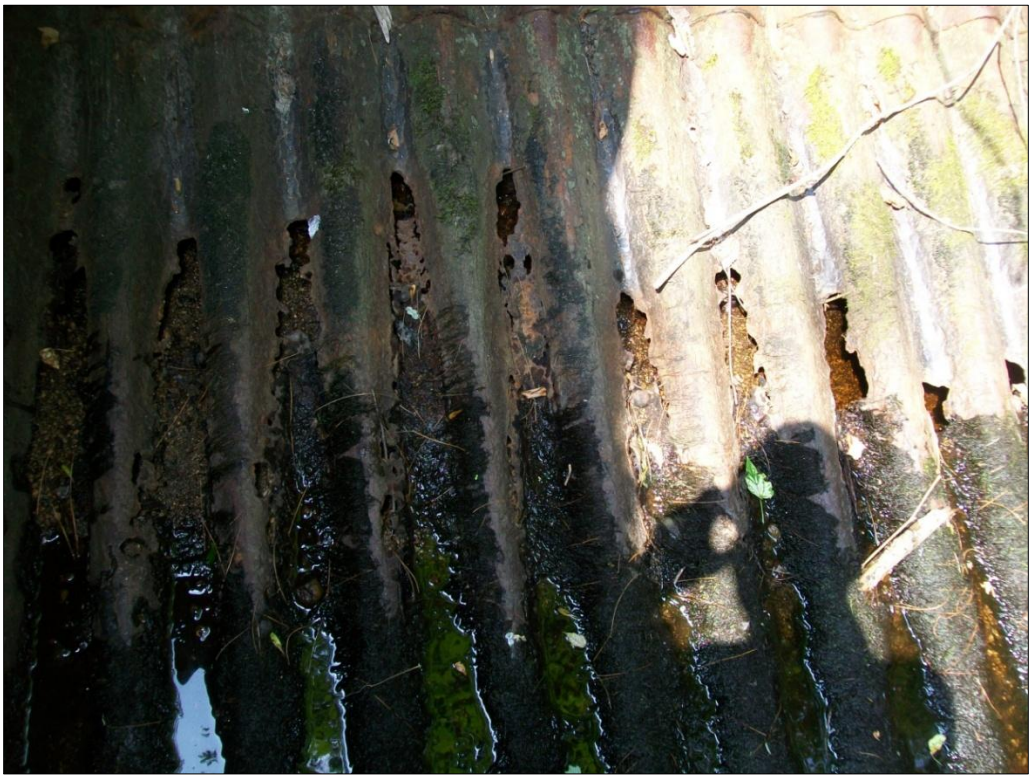

Photo 2 Looking Down: Corrosion in Culvert Floor

Photo 3 Looking West: General Underside of Pipe

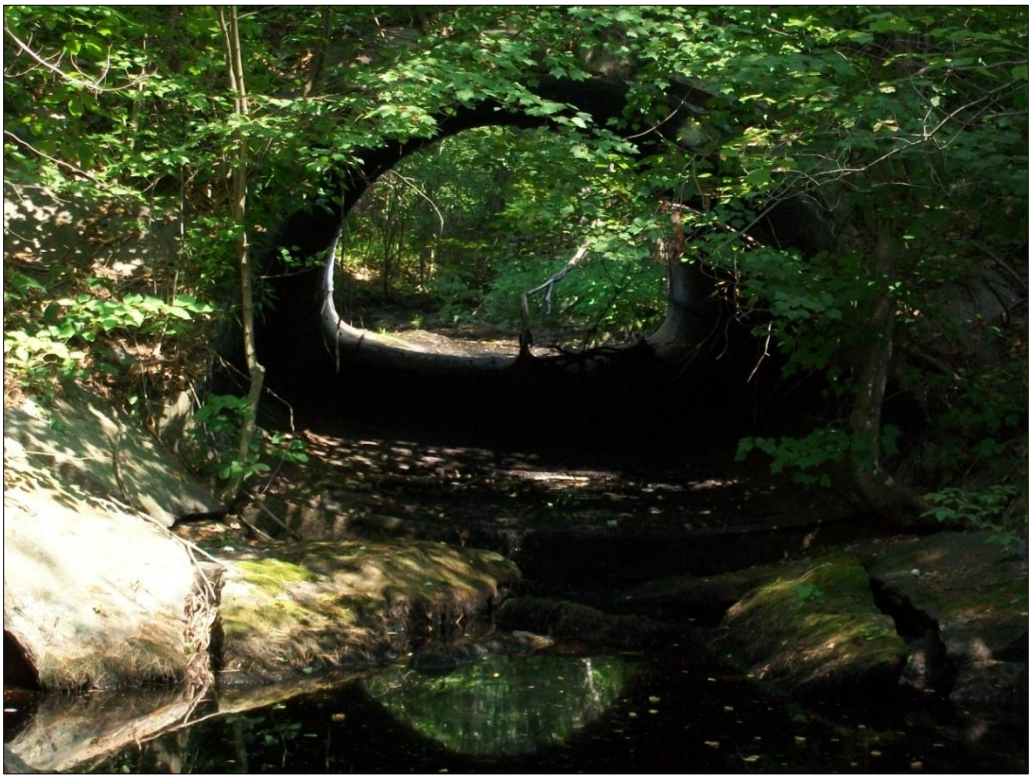

Photo 4 Looking East: West Culvert Elevation

Photo 6 Looking Northeast: West Concrete Toewall

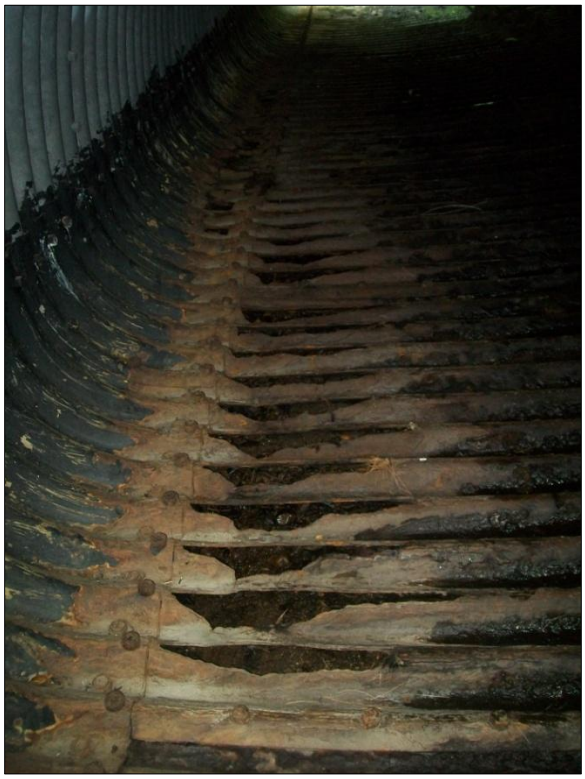

Photo 7 Looking East: Corrosion in Culvert Floor

Photo 8 Looking North: South Approach

Photo 9 Looking South: North Approach

Photo 10: Typical Guardrail

Photo 11 Looking East: Typical Spalling of Guardrail Post

Photo 12 Looking Northeast: Typical Guard Rail Post Condition

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

Priority 17

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. The flow was 3" deep at the time of inspection and flowing eastward. The depth of fill over the structure is 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 condition are exhibiting some signs of advanced deterioration. Both abutment walls have heavy scaling up to 12" above the waterline. The north abutment wall is deteriorated at the west corner up to 4" deep. Similarly, the south abutment footing is in very poor shape as it is fully exposed with the top 6" completely deteriorated (Photos 2 and 4). There is also a large amount of debris at the east entrance to the culvert.

The concrete spandrel walls and wingwalls are also in fair condition. Random areas of diagonal hairline cracking with efflorescence (Photo 5) are typical. There is an undermining spall (12' × 1' × 4" deep) at the base of the west spandrel wall that continues to the southwest wingwall. All other wingwalls are in good condition with only light scaling at the base.

The roadway is narrow but in good condition with only minor cracking; however, the barriers are in poor condition. The barriers typically exhibit cracks with efflorescence and areas of exposed aggregate. Furthermore, the top 12" of barrier is either missing or experiencing severe deterioration (Photo 7). It is possible that vehicular collision has contributed to the advanced deterioration.

As noted above, the clear span of this structure is greater than 10'-0". The Town should follow up with MassDOT in regards to assigning a bridge number to this structure.

RECOMMENDATIONS

This structure is in fair condition with several deficiencies noted. BETA recommends that the following repairs are completed to extend the structures anticipated service life:

- Repair all spalls, scaling, and cracks to the concrete arch, abutments, spandrel walls, and wingwalls.
- Fill all voids noted at the spandrel walls to prevent erosion of the embankment and loss of roadway fines.
- Repair the existing headwalls/bridge railings.
- 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 guardrail at all approaches and over the structure. If proven feasible, details are available to span standard guardrail systems over water crossings.

Conduct bi-annual inspections to monitor overall bridge conditions.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$60,000
Engineering:	$15,000
Total:	$75,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

WEST STREET
OVER
LAUREL BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-9

General:

Street Name: West Street **Waterway:** Laurel Brook **Culvert ID:** NA-9

Inspectors:

Name: Chris Farno **Position:** Engineer

Name: Ronnie Guillotte **Position:** Engineering Intern

Name: None **Position:** None

Inspection Conditions:

Date: 7/22/2011 **Weather:** Clear **Temp:** 95°F

General Culvert Information:

Culvert Type: Concrete Arch **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 62 **Length of Culvert Feet:** 20

Dimensions Of Hydraulic Opening Width (Inches): 144 **Depth of Fill Over Culvert Inches:** 19"

Depth of Flow During Inspection: 3" **Direction of Flow:** East

Utilities Carried By Structure: None

Drainage Structures: Drainage path behind SouthWest abutment wall

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: West corner deterioration up to 4" deep. Heavy scaling up to 1' above WL. Several swales (TYP), efflo continues from arch

Abutment South Sidewall: Footing exposed full length, top 6" of footing completely deteriorated. Efflo continues from arch, heavy scaling 1' above WL. 12'x1'x4" spawl at WL/West fascia.

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 2

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Moderate scaling in several areas, random efflo, hairline lateral crack at east end with efflo continuing to abutments.

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Heavy Debris

Floor Notes: Heavy debris at downstream entrance

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-9

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 4

North East Wall: Light scaling at base

North West Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 4

North West Wall: Light scaling

South East Wall: Wingwall **South East Wall Type:** Concrete **South East Wall Rating:** 4

South East Wall: Slight wearing of end

South West Wall: Wingwall **South West Wall Type:** Concrete **South West Wall Rating:** 3

South West Wall: Base of wall washed out up to 10" deep. Exposed reinforcement.

Head Wall: Headwalls **Head Wall Type:** Concrete **Head Wall Rating:** 3 East, 3 West

Head Wall Notes: East: Diagonal Cracking on south side with efflo. West: Diagonal cracking on south side with efflo.

Roadway Condition:

North Roadway Approach Condition: Low linear cracking **North Roadway Inches:** 218

North Roadway Approach Settlement: None **North Roadway Rating:** 4

North Roadway Approach Alignement: Slight horiz curve

South Roadway Approach Condition: Good **South Roadway Inches:** 218

South Roadway Approach Settlement: None **South Roadway Rating:** 4

South Roadway Approach Alignement: Slight horiz curve

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Top of headwall is extended above roadway for barrier.

Guard Rail Condition: Cracks with efflo (TYP), exposed aggregate (TYP), top of wall gone, no approach rail.

Guard Rail Rating: 1

Guard Rail Notes: None

Photo 1 Looking West: East Culvert Elevation

Photo 2 Looking East: Deterioration of South Footing at West End

Photo 3 Looking East: Underside of Culvert Roof

Photo 4 Looking East: South Culvert Wall

Photo 5 Looking East: West Culvert Elevation

Photo 6 Looking East: North Culvert Wall

Photo 7 Looking Northwest: Deterioration of West Bridge Rail

Photo 8 Looking South: North Approach

Photo 9 Looking North: South Approach

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

Priority 18

AVAILABLE INFORMATION

Laurel 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 with stone masonry abutments. The structure has an out-to-out width of 20'-6" and a clear span of 12'-0". The hydraulic opening of the arch is approximately 6'-5" high by 12'-0" wide. The flow was 16" deep at the time of inspection and flowing eastward.

The roadway width over the structure, measured from safety barrier to safety barrier, is approximately 16'-6" with no sidewalks and consists of an asphaltic wearing surface. There is a sharp horizontal and vertical curve at the south approach. The bridge railing varies. The east railing consists of approximately a 12' length of timber bridge rail mounted to metal posts. Placed in front of the timber rail is a standard highway guardrail that runs the length of the bridge. This guardrail is mounted to timber posts at each end with a single Jersey barrier at the south approach acting as a transition. The west bridge rail consists of a standard highway guardrail mounted to timber posts. There is also a Jersey barrier that runs the length of the bridge in front of the metal guardrail. The only approach guard rail on the west side is a timber railing at the north approach.

Overhead wires run along the west side of the roadway. Also, there is a paved waterway at the southwest edge of pavement.

The only sign posted reads “Narrow Bridge” and is located at the south approach.

FINDINGS

The overall condition of the bridge is fair with a few problems noted.

The stone arch itself is in good shape. There are a number of areas of concrete repair on the underside of the arch. These areas typically exhibit random hairline cracking with efflorescence (See Photo 3).

The stone abutments were found to be in fair condition. Several areas of missing mortar and chinking stones were noted to be concentrated at the waterline.

Stone training walls line the waterway while stone wingwalls support the roadway. These walls are in fair condition but typically exhibit several areas of missing mortar and small voids. The southeast wingwall also has heavy vegetation growing over it. The most notable wall deficiency is bulging and/or lateral displacement of the northeast wingwall; this wall is experiencing stability failure (Photo 7).

Minor amounts of debris and wheel line rutting were typically found in the roadway. The south approach alignment consists of a sharp horizontal and vertical curve resulting in minimal sight distance approaching the structure (Photo 10). The guardrail on the east side of the roadway is in good condition. However, the guardrail on the west side of the roadway is in poor condition with extensive damage. A Jersey barrier has been placed along the length of the roadway to protect this damaged guardrail and has resulted in a significant reduction in roadway width. The reduction in width coupled with poor sight distance at the south approach has created a safety hazard.

As noted above, the clear span of this structure is greater than 10'-0". The Town should follow up with MassDOT in regards to assigning a bridge number to this structure.

RECOMMENDATIONS

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:

- Replace all missing and/or loose chinking stones in the stone arch, abutments, training walls, and wingwalls.
- Repoint all joints to the stone arch, abutments, training walls, and wingwalls.
- Fill all voids noted at the stone wingwalls to prevent erosion of the embankment and loss of roadway fines.
- Repair the northeast wingwall and/or stabilize against further lateral movement to prevent damage to the roadway above.

Roadway width over the culvert is not adequate to carry two lanes of traffic. Additional "BE PREPARED TO STOP" approach signs should be added. The roadway centerlines should be striped accordingly. All signage and striping should be fabricated and placed in accordance with current MUTCD standards. Signage in accordance current MUTCD standards is also recommended at the south approach indicating a sharp curve and/or reduced speed. BETA also recommends the installation of new guardrail at all approaches and over the structure.

Conduct bi-annual inspections to monitor overall bridge conditions.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$65,000
Engineering:	$20,000
Total:	$85,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

LAUREL STREET
OVER
LAUREL BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-8

General:

Street Name: Laurel Street **Waterway:** Laurel Brook **Culvert ID:** NA-8

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: Ronnie Guillotte **Position:** Engineering Intern

Inspection Conditions:

Date: 7/22/2011 **Weather:** Sunny and Hot **Temp:** 95°F

General Culvert Information:

Culvert Type: Stone Masonry Arch **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 76 **Length of Culvert Feet:** 20.5

Dimensions Of Hydraulic Opening Width (Inches): 144 **Depth of Fill Over Culvert Inches:** 24"

Depth of Flow During Inspection: 15" **Direction of Flow:** East

Utilities Carried By Structure: Overhead wires

Drainage Structures: Paved waterway at SouthWest approach

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Missing mortar at waterline

Abutment South Sidewall: Missing mortar at waterline

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 3

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Random efflo (TYP), concrete repair (TYP), several missing chink stones, random concrete cracking of the concrete repair w/efflo (TYP).

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 4

Floor Scour: None detected **Debris:** Sand, Cobbles, Boulders

Floor Notes: None

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-8

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 2

North East Wall: Several voids (TYP), missing mortar and chink stones (TYP), some lateral displacement/severe bulging.

North West Wall: Training **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 4

North West Wall: Some missing mortar at waterline

South East Wall: Wingwall **South East Wall Type:** Mortared Masonry **South East Wall Rating:** 4

South East Wall: Few small voids at base

South West Wall: Training **South West Wall Type:** Mortared Masonry **South West Wall Rating:** 3

South West Wall: Missing mortar and chink stones (TYP), several voids, heavy vegetation

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition:	Debris on shoulder, Good	**North Roadway Inches:**	204
North Roadway Approach Settlement:	Minor wheel - line rutting	**North Roadway Rating:**	4
North Roadway Approach Alignement:	Poor - sharp horiz + vert curve.		
South Roadway Approach Condition:	Debris on shoulder, Good	**South Roadway Inches:**	204
South Roadway Approach Settlement:	Minor wheel-line rutting.	**South Roadway Rating:**	4
South Roadway Approach Alignement:	Straight		
East Roadway Approach Condition:	N/A	**East Roadway Inches:**	N/A
East Roadway Approach Settlement:	N/A	**East Roadway Rating:**	N/A
East Roadway Approach Alignement:	N/A		
West Roadway Approach Condition:	N/A	**West Roadway Inches:**	N/A
West Roadway Approach Settlement:	N/A	**West Roadway Rating:**	N/A
West Roadway Approach Alignement:	N/A		

Safety Barrier

Guard Rail Type: Wooden bridge rail. Standard highway guardrail, Jersey barrier on West side.

Guard Rail Condition: Severe collision damage on west rail. Jersey barriers covering

Guard Rail Rating: 1

Guard Rail Notes: No approach guardrail at north approach but probably not required.

Photo 1 Looking West: East Culvert Elevation

Photo 2 Looking West: Northeast Wingwall Elevation

Photo 3 Looking West: Underside of Arch Showing Efflorescence

Photo 4 Looking West: North Abutment Elevation

Photo 5 Looking Southwest: Southwest Training Wall Elevation

Photo 6 Looking East: South Abutment

Photo 7 Looking North: Lateral Displacement of Northeast Wingwall

Photo 8 Looking South: North Approach

Photo 9 Looking Southwest: West Bridge Rail Elevation

Photo 10 Looking South: Northeast Approach Guardrail

Photo 11 Looking Southeast: East Bridge Rail Elevation

Photo 12 Looking Northeast: South Approach

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

Priority 19

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 52.8.

A bridge rating report dated June, 1982 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. Despite of these results, the bridge is currently posted for a 14 ton weight limit.

MassDOT most recently conducted a routine arch and special member inspection on June 2, 2010 and a special inspection on April 3, 2010 to monitor conditions after flooding.

MassDOT has also recently performed a special member inspection on June 8, 2011to monitor spandrel wall conditions.

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 26" 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 a number of signs posted at this bridge. At both approaches, there are signs that read “Weight Limit 14 Tons”, “Yield to Pedestrians”, “5 M.P.H.”, and “Caution Narrow Bridge”. At the north approach only, however, there are also signs that read “Caution Sidewalk Closed” and “Yield to Pedestrians”. See photos for clarification.

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 and efflorescence (See Photo 3). Additionally, there are areas of missing pointing and chinking stones. There is also a 6'x6'x3" deep area of fragmenting stones at mid-span near the west opening.

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 and chinking stones. The south wall also has small voids at the waterline. Heavy debris is typical in the channel and no scour was detected at the base of the concrete walls.

The east spandrel wall has minor cracking at the top and approximately 6" of outward displacement at the south end (Photos 12 and 13). 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 6).

The condition of the roadway is poor. There is random longitudinal, transverse, and map cracking throughout the pavement with some sealing. There is moderate heaving and random settlement throughout as well. 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 13). The edge of pavement at the east fascia is fragmented, and the roadway appears unstable (Photo 11). Jersey barriers at both curb lines have created a large reduction of lane width and have made both sidewalks inaccessible to pedestrians (Photos 9 and 14). Pedestrian traffic is restricted to sub-standard vehicular travel lanes and poses a severe safety hazard.

RECOMMENDATIONS

This structure is currently under contract by MassDOT to be repaired and rehabilitated. The scope of rehabilitation measures are as follows:

- 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.

Not under contract but if proven feasible, the deck will be widened to accommodate a sidewalk on the north side. A new water and relocated gas line will cross the bridge under the sidewalk.

Given the scope of work listed above, BETA has no repair recommendations at this time. However, BETA does recommend that the Town verify the current posting for this bridge. If proven that this structure does not meet minimum statutory loading, strengthening of the arch should be incorporated into the rehabilitation plan.

BUDGETARY COST ESTIMATE

NA

Attachments

Locus Map

Culvert Inspection Checklist

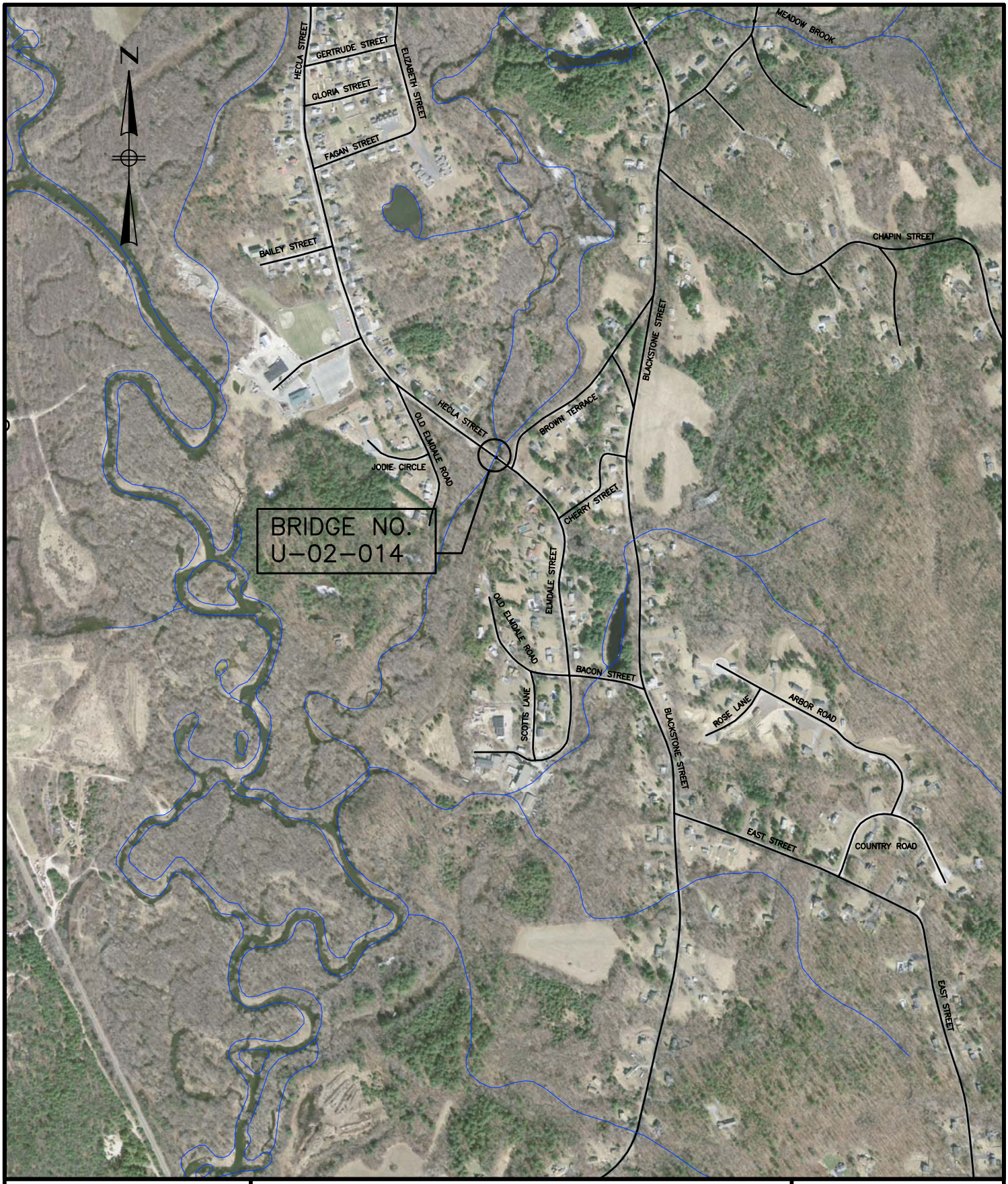
Inspection Photos

National Bridge Inventory Sheet Dated May 12, 2011

MassDOT Routine Arch and Special Member Inspection Report Dated June 2, 2010

MassDOT Special Member Inspection Report Dated June 8, 2011

MassDOT Other Inspection Report Dated April 3, 2010



BETA
ENGINEERING SUCCESS TOGETHER
315 NORWOOD PARK SOUTH
NORWOOD, MA 02062
781.255.1982
EMAIL: BETA@BETA-INC.COM

BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HECLA STREET
OVER
THE WEST RIVER

BRIDGE NO.
U-02-014

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-014

General:

Street Name: Hecla Street **Waterway:** West River **Culvert ID:** U-02-014

Inspectors:

Name: Peter Kotowski **Position:** Engineer

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/20/2011 **Weather:** Partly Cloudy **Temp:** 85°F

General Culvert Information:

Culvert Type: Stone Masonry Arch **Construction Date:** 1930

Dimensions Of Hydraulic Opening Height (Inches): 173 **Length of Culvert Feet:** 24

Dimensions Of Hydraulic Opening Width (Inches): 384 **Depth of Fill Over Culvert Inches:** 26.4"

Depth of Flow During Inspection: 252" **Direction of Flow:** West

Utilities Carried By Structure: Overhead wires @ East Fascia. USGS gauging station @ NE Corner.

Drainage Structures: Catch Basin at NorthWest Approach, Paved waterway @ SouthEast Corner

Other: A smaller arch structure is located approx. 50' South of main arch + shares same spandrel walls. 2nd Arch in good condition + completely dry w/heavy vegetation growth.

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Conc. Wall in front of stone abut (looks like scour protection) w/minor scaling. Missing pointing and chink stones just above concrete wall.

Abutment South Sidewall: Missing pointing + chink stones @ water w/ small void.

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 3

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Bottom of Arch: Rand. Missing pointing stones underside of arch. Areas of water and efflo(TYP). Rand. missing chink stones + voids(TYP). 6'x5'x3" area of spalling stones(midspan w/opening) - pointing repair work is poor. Mortar was laid over entire underside covering stones + trapping moisture > recommend removing mortar and re-pointing correctly.

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Lots of Debris (TYP)

Floor Notes: Evidence of past scour due to presence of wall @ N. abut (monitor). Old drain directly between where wall is failing (TYP @ all 4 corners).

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-014

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 4

North East Wall: Good Conditoin

North West Wall: Wingwall **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 2

North West Wall: Random Small void from missing chink stones + pointing - slab supporting roadway adjacent to wall is severely undermined

South East Wall: N/A **South East Wall Type:** N/A **South East Wall Rating:** N/A

South East Wall: N/A see spandrel wall notes

South West Wall: N/A **South West Wall Type:** N/A **South West Wall Rating:** N/A

South West Wall: N/A see spandrel wall notes

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition: Random MC, Long + trans cracking, some scaling **North Roadway Inches:** 168

North Roadway Approach Settlement: Mod. heaving + random settlement throughout **North Roadway Rating:** 1

North Roadway Approach Alignement: Straight

South Roadway Approach Condition: Random MC, Long + trans cracking, some scaling **South Roadway Inches:** 168

South Roadway Approach Settlement: Mod. heaving + random settlement throughout **South Roadway Rating:** 1

South Roadway Approach Alignement: Straight

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: C.C.F across bridge + approaches

Guard Rail Condition: Fence is non-standard + not crash tested. Fence is mounted to top of spandrel walls + is moving w/stone. No App GR

Guard Rail Rating: 1

Guard Rail Notes: Lane reduction, Jersey Barriers across both approaches and lanes over center of bridge. Edges of pavement fragmented + failing behind Jersey barriers @ fascias. Top of East spandrel wall is shifting + appears unstable.

Photo 1 Looking East: West Bridge Elevation

Photo 2 Looking South: South Abutment Elevation

Photo 3 Looking South: Typical Underside of Arch

Photo 4 Looking North: North Abutment Elevation

Photo 5 Looking West: Drain Pipe at Southeast Spandrel Wall

Photo 6 Looking North: Undermining of Concrete Slab Above Northwest Wingwall

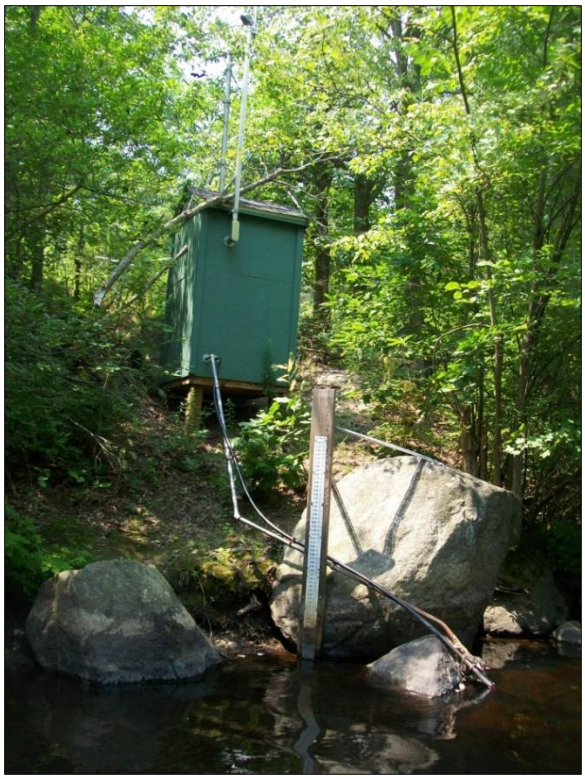

Photo 7 Looking North: USGS Gaging Station at Northeast Corner

Photo 8 Looking West: East Elevation

Photo 9 Looking South: North Approach

Photo 10 Looking South: Bridge Weight Limit Posting at North Approach

Photo 11 Looking South: Failing Pavement Behind West Jersey Barriers

Photo 12 Looking South: Displacement of Top of West Spandrel Wall and Fence

Photo 13 Looking South: Displacement of Top of East Spandrel Wall and Fence

Photo 14 Looking North: South Approach

Photo 15 Looking North: Bridge Weight Limit Posting at South Approach

Photo 16 Looking Southeast: Smaller Arch Showing Heavy Vegetation Growth

Report Date: November 2, 2011

State Information

BDEPT#= U02014 Agency Br.No.

Town= Uxbridge L.O.

B.I.N= 1J3 AASHTO= 068.8

FHWA Select List= N

Identification

(8) Structure Number U020141J3MUNNBI

(5) Inventory Route 151000000

(2) State Highway Department District 03

(3) County Code 027 (4) Place code 71620

(6) Features Intersected **WATER WEST RIVER**

(7) Facility Carried **HWY HECLA ST**

(9) Location 1M S OF RT16 E BLKSTN RVR

(11) Kilometerpoint 0000.418

(12) Base Highway Network N

(13) LRS Inventory Route & Subroute 000000000000

(16) Latitude 42 DEG 04 MIN 12.78 SEC

(17) Longitude 71 DEG 36 MIN 33.66 SEC

(98) Border Bridge State Code Share %

(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Masonry Code 811

Arch - Deck Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit 001

(46) Number of approach spans 0000

(107) Deck Structure Type - Not applicable Code N

(108) Wearing Surface / Protective System:

A) Type of wearing surface - Not applicable=no deck Code N

B) Type of membrane - Not applicable=no deck Code N

C) Type of deck protection - Not applicable=no deck Code N

Age and Service

(27) Year Built 1930

(106) Year Reconstructed 0000

(42) Type of Service: On - Highway

Under - Waterway Code 15

(28) Lanes: On Structure 02 Under structure 00

(29) Average Daily Traffic 000800

(30) Year of ADT 2010 (109) Truck ADT 02 %

(19) Bypass, detour length 003 KM

Geometric Data

(48) Length of maximum span 0009.8 M

(49) Structure Length 00017.7 M

(50) Curb or sidewalk: Left 00.0 M Right 00.0 M

(51) Bridge Roadway Width Curb to Curb 007.2 M

(52) Deck Width Out to Out 007.5 M

(32) Approach Roadway Width (w/shoulders) 007.3 M

(33) Bridge Median - No median Code 0

(34) Skew 00 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear 99.99 M

(47) Inventory Route Total Horiz Clear 04.2 M

(53) Min Vert Clear Over Bridge Rdwy 99.99 M

(54) Min Vert Underclear ref N 00.00 M

(55) Min Lat Underclear RT ref N 00.0 M

(56) Min Lat Underclear LT 00.0 M

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0

(111) Pier Protection Code

(39) Navigation Vertical Clearance 000.0 M

(116) Vert-lift Bridge Nav Min Vert Clear M

(40) Navigation Horizontal Clearance 0000.0 M

Classification

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class - Urban Local	19
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	Y
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance undetermined	

Condition

	Code
(58) Deck	N
(59) Superstructure	5
(60) Substructure	5
(61) Channel & Channel Protection	5
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - Other/Unknown	0
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	77.6
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	46.5
(70) Bridge Posting	5
(41) Structure - Open with shoring	D

Appraisal

	Code
(67) Structural Evaluation	5
(68) Deck Geometry	4
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	8
(72) Approach Roadway Alignment	7
(36) Traffic Safety Features	0 0 0 0
(113) Scour Critical Bridges	U

Inspections

(90) Inspection Date 06/02/10 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	05/01/87
(C) Other Special Inspection	N	00	MO C)	06/08/11
(*) Other Inspection (Flood)	Y	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

Rating Loads

Report Date 02/01/82	H20	Type 3	Type 3S2	Type HS
Operating	37.0	78.0	123.0	0.0
Inventory	22.0	47.0	73.0	0.0

Field Posting

Status LEGAL Posting Date 06/18/82

	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

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		
P / N	Wader	N / N	RR Flagperson		
N / N	Inspector 50	N / N	Police		

Inspection Hours: 008

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STRUCTURES INSPECTION FIELD REPORT

ROUTINE ARCH & SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1J3	U-02-014

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
UXBRIDGE	U02014-1J3-MUN-NBI	000.418	P:POSTED	JUN 2, 2010

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY HECLA ST		1930	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER WEST RIVER	Urban Local	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
811 : Masonry Arch - Deck	Town Agency	Town Agency	R. Orlando

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
N : Not applicable	SUNNY	22°C	R. C. ANGELL

ITEM 58 — DECK — N

		DEF
1. Wearing Surface	5	M-P
2. Deck Condition	N	-
3. Spandrel Fill	7	-
4. Curbs	N	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	6	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	6	M-P
b. Appr. Roadway Settlement	5	M-P
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 — SUPERSTRUCTURE — 4

		DEF
1. Arch/Arch Ring	7	M-P
2. Keystone Area	7	-
3. Stringers	N	-
4. Floorbeams	N	-
5. Spandrel Walls	4	S-A
6. Spring Lines	7	-
7. Diaphragms/Cross Frames	N	-
8. Conn Plt's, Gussets & Angles	N	-
9. Pin & Hangers	N	-
10. Masonry Joints	6	M-P
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Deformation/Flattening	7	-
14. Member Alignment	7	-
15. Paint/Coating	N	-
16.	N	-

Year Painted: N

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

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

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

Any Fracture Critical Member: **(Y/N)** — N

Any Cracks: **(Y/N)** — N

ITEM 60 — SUBSTRUCTURE — 5

	Dive	Cur		DEF
1. Abutments			5	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	N	7		-
e. Wingwalls	N	6		M-P
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	7		-
h. Footings	N	7		-
i. Piles	N	X		-
j. Scour	N	5		M-P
k. Settlement	N	7		-
l. Erosion	N	5		S-P
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 ( )

I-60 (Dive Report): N ***I-60 (This Report):*** 5

93B-U/W (DIVE) Insp 00/00/00

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 2, 2010**

ITEM 61 — CHANNEL & CHANNEL PROTECTION

5

	Dive	Cur	DEF
1.Channel Scour	N	5	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 (**X**) Moderate ( ) Low ( ) None ( )

ITEM 61 (Dive Report): **N** ***ITEM 61 (This Report)*** **5**

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

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	6	M-P
B. Transitions	0	7	-
C. Approach Guardrail	0	7	-
D. Approach Guardrail Ends	0	7	-

WEIGHT POSTING

Not Applicable ☐

	H	3	3S2	Single
Actual Posting	N	N	N	14
Recommended Posting	N	N	N	N

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

	At bridge		Other Advance	
	N	S	N	S
Signs In Place (Y=Yes,N=No, NR=NotRequired)	Y	Y	Y	Y
Legibility/ Visibility	7/7	7/7	7/7	7/7

CLEARANCE POSTING

Not Applicable **X**

	E		W		
	ft	in	ft	in	meter
Actual Field Measurement		0		0	
Posted Clearance		0		0	

	At bridge		Advance	
	E	W	E	W
Signs In Place (Y=Yes,N=No, NR=NotRequired)				
Legibility/ Visibility	/	/	/	/

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	P	N
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 8

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

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

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): **Y**

Date: 02/01/1982

Inspection data at time of existing rating

I 58: **6** I 59: **7** I 60: **6** Date : 05/18/1981

(To be filled out by DBIE)

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

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

REASON: _____

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	Advance 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	Advance 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 stablility. 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].

STRUCTURES INSPECTION FIELD REPORT

ROUTINE ARCH & SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1J3	U-02-014

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	90-ROUTINE INSP. DATE	93*-SPEC. MEMB. INSP. DA
UXBRIDGE	U02014-1J3-MUN-NBI	000.418	Jun 2, 2010	Jun 2, 2010

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	*YR REHAB'D (NON 106)
HWY HECLA ST		1930	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER WEST RIVER	Urban Local	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
811 : Masonry Arch - Deck	Town Agency	Town Agency	R. Orlando

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
N : Not applicable	SUNNY	22°C	R. C. ANGELL

WEIGHT POSTING — *Not Applicable* ☐

	H	3	3S2	Single
Actual Posting	N	N	N	14
Recommended Posting	N	N	N	N

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

Signs In Place (Y=Yes,N=No, NR=NotRequired)
Legibility/ Visibility

	At bridge		Advance	
	N	S	N	S
Signs In Place	Y	Y	Y	Y
Legibility/ Visibility	7/7	7/7	7/7	7/7

PLANS (Y/N): N

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

TAPE#: _____

RATING

Rating Report (Y/N): Y Date: 02/01/1982

Inspection data at time of existing rating

I 58: 6 I 59: 7 I 60: 6 I 62: - Date : 05/18/1981

Request for Rating or Rerating (Y/N): N

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

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 PREVIOUS (0-9)	CONDITION PRESENT (0-9)	INV. RATING OF MEMBER FROM RATING H-20	3	3S2	Deficiencies
A	Item 59.5 - Spandrel Walls	N		See remarks in comments section.	6	4	Not Rated			S-A
B										
C										
D										
E										

List of field tests performed:

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	-	6	6	-
(Overall Current Condition)	-	4	5	-

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.

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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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 2, 2010**

REMARKS

BRIDGE ORIENTATION
The approaches are South and North and the elevations are West and East (from the rating). This structure is a single span masonry arch. The river flows from East to West.

GENERAL REMARKS
There is a lane reduction across both approaches and structure diverting traffic through the center of the roadway. There are three 14 ton posting signs at both the North and South approaches. There are several signs that read "Caution Narrow Bridge" at both approaches. At the North side of the bridge there are a couple of yield signs that read "yield to oncoming traffic". **See Photo 1**.

ITEM 58 - DECK

Item 58.1 - Wearing Surface
The bituminous concrete wearing surface has moderate transverse, map, and longitudinal cracking throughout; some of which have been sealed. There are also areas of minor settlement and heaving throughout. **See Photo 2.**

Item 58.8 - Railing
All traffic safety features consist of chain link fencing, continuous across the structure into the transition and approach guardrail areas. One of the Northwest horizontal is disconnected from the post and is loose. The South end of the East rail is up to 3 feet out of alignment. **See Photo 3.** There are Jersey barriers restricting traffic to the center of the bridge, and acting as temporary bridge rails.

APPROACHES

Approaches a - Appr. Pavement Condition
Both bituminous concrete approach pavement wearing surfaces show numerous transverse, longitudinal, and map cracking throughout some of which have been sealed. There is a moderate depression at the Southeast corner of structure, directly over the displacement mentioned in item 59.5. There are also areas of minor heaving, rutting and a general unevenness throughout.

Approaches b - Appr. Roadway Settlement
See Item Approaches a.

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring
The concrete pointing on the underside of the masonry arch and both breastwalls has isolated areas of minor water and efflorescence leaching, and a few areas of missing pointing.

Item 59.5 - Spandrel Walls
The top of the South end of the East spandrel wall (cap stones) has minor cracking to the mortar, and up to 6 inches of outward displacement. This area is South of the arch ring. **See Photo 4.** The remainder of the spandrel walls have minor pointing missing.

Item 59.10 - Masonry Joints
The West spandrel wall has some minor pointing missing with up to 10 inches of penetration. See Item 59.1.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 2, 2010**

REMARKS

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
See Item 59.1.

Item 60.1.e - Wingwalls
The end of the Northeast wingwall has up to 1 inch of separation between the stones and the mortar, with minor outward displacement from a tree growing at the top.

Item 60.1.j - Scour
The East half of the North footing is exposed up to 2 feet.

Item 60.1.l - Erosion
The Northwest wingwall cap extension is undermined up to 3 feet. This area is encroaching into the North approach.

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.

Item 36b - Transitions
See Item 58.8.

Item 36d - Approach Guardrail Ends
See Item 58.8.

Photo Log
Photo 1 : North approach to deck transition.
Photo 2 : Overview of the wearing surface and approach pavement.
Photo 3 : South end of the East rail, up to 3 feet out of alignment.
Photo 4 : South end of the East spandrel wall.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 2, 2010**

PHOTOS

Photo 1: **North approach to deck transition.**

Photo 2: **Overview of the wearing surface and approach pavement.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 2, 2010**

PHOTOS

Photo 3: **South end of the East rail, up to 3 feet out of alignment.**

Photo 4: **South end of the East spandrel wall.**

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STRUCTURES INSPECTION FIELD REPORT

SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1J3	U-02-014

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	90-ROUTINE INSP. DATE	93*-SPEC. MEMB. INSP. DA
UXBRIDGE	U02014-1J3-MUN-NBI	000.418	Jun 2, 2010	Jun 8, 2011

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	*YR REHAB'D (NON 106)
HWY HECLA ST		1930	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER WEST RIVER	Urban Local	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
811 : Masonry Arch - Deck	Town Agency	Town Agency	R. C. Angell

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
N : Not applicable	SUNNY	29°C	R. VANMETER

WEIGHT POSTING — *Not Applicable* X

	H	3	3S2	Single
Actual Posting	N	N	N	14
Recommended Posting	N	N	N	N

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

Signs In Place (Y=Yes,N=No, NR=NotRequired)

Legibility/ Visibility

	At bridge		Advance	
	N	S	N	S
Signs In Place				
Legibility/ Visibility	7/7	7/7	7/7	7/7

PLANS (Y/N): N

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

TAPE#:

RATING

Rating Report (Y/N): Y Date: 02/01/1982

Inspection data at time of existing rating

I 58: - I 59: 7 I 60: 6 I 62: - Date : 05/18/1981

Request for Rating or Rerating (Y/N): N

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

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 PREVIOUS (0-9)	CONDITION PRESENT (0-9)	INV. RATING OF MEMBER FROM RATING H-20	3	3S2	Deficiencies
A	Item 59.5 - Spandrel Walls	N		See remarks in comments section.	4	5	Not Rated			S-A
B										
C										
D										
E										

List of field tests performed:

None:

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	-	4	5	-
(Overall Current Condition)	-	5	5	-

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.

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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].

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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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 8, 2011**

REMARKS

BRIDGE ORIENTATION

Orientation from 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

Note:

The Spandrel wall was raised from "4" (poor condition) to "5" (fair condition) due to the 6 in. of outward displacement to the East spandrel wall being South of the arch ring and not having any effect to the arch ring.

Note:

There is a lane reduction across both approaches and structure diverting traffic through the center of the roadway. There are three 14 ton posting signs at both the North and South approaches. There is one sign that reads "Caution Narrow Bridge" at both ends of the bridge. There are a two signs that read "yield to oncoming traffic" at the North end of the bridge. **See Photos #1 & #2**.

ITEM 59 - SUPERSTRUCTURE

Item 59.5 - Spandrel Walls

The top of the East spandrel wall (cap stones), at the South end, has minor cracking to the mortar, and up to 6 in. of outward displacement. This area is South of the arch ring with no effect to the arch ring. **See Photos #3 & #4.** The remainder of the spandrel walls show minor missing pointing.

Photo Log

Photo 1 : South approach to the bridge.
Photo 2 : North approach to the bridge.
Photo 3 : Cap stones displaced outward (South of the Arch ring).
Photo 4 : Cap stones displaced outward (South of the Arch ring).

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 8, 2011**

PHOTOS

Photo 1: **South approach to the bridge.**

Photo 2: **North approach to the bridge.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**JUN 8, 2011**

PHOTOS

Photo 3: **Cap stones displaced outward (South of the Arch ring).**

Photo 4: **Cap stones displaced outward (South of the Arch ring).**

STRUCTURES INSPECTION FIELD REPORT

OTHER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1J3	U-02-014

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	90-ROUTINE INSP. DATE	INSPECTION DATE
UXBRIDGE	U02014-1J3-MUN-NBI	000.418	Jun 12, 2008	Apr 3, 2010

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	*YR REHAB'D (NON 106)
HWY HECLA ST		1930	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER WEST RIVER	Urban Local	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
811 : Masonry Arch - Deck	Town Agency	Town Agency	R. C. Angell

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
N : Not applicable	Sunny	22°C	D. SIMKHOVICH

WEIGHT POSTING — *Not Applicable* X

	H	3	3S2	Single
Actual Posting	14	21	32	N
Recommended Posting	N	N	N	N

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

Signs In Place (Y=Yes,N=No, NR=NotRequired)

Legibility/ Visibility

	At bridge		Advance	
	N	S	N	S
Signs In Place				
Legibility/ Visibility	7 / 7	7 / 7	/	/

PLANS (Y/N): N

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

TAPE#:

RATING

Rating Report (Y/N): Y Date: 02/01/1982

Inspection data at time of existing rating

I 58: 6 I 59: 7 I 60: 6 I 62: - Date : 05/18/1981

Request for Rating or Rerating (Y/N): N

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

REASON:

MEMBER(S):

	MEMBER	CRACK (Y/N)	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION PREVIOUS (0-9)	CONDITION PRESENT (0-9)	INV. RATING OF MEMBER FROM RATING H-20	3	3S2	Deficiencies
A	Item 59.1 - Arch/Arch Ring	N	N	No problems since flood waters.	7	7	Not Rated			-
B	Item 60.1 - Abutments	N	N	No problems since flood waters.	6	6	Not Rated			-
C	Item 60.1.d - Breastwalls	N	N	No problems since flood waters.	7	7	Not Rated			-
D	Item 60.1.e - Wingwalls	N	N	No problems since flood waters.	6	6	Not Rated			-
E										

List of field tests performed:

NONE

	I-58	I-59	I-60	I-61	I-62
(Overall Previous Condition)	-	7	6	5	-
(Overall Current Condition)	-	7	6	5	-

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**APR 3, 2010**

REMARKS

BRIDGE ORIENTATION
According to the rating report, the approaches are South and North. The West river flows from East to West.

GENERAL REMARKS
Stream flow velocity = High.
Water level = Moderately higher than normal. **See photos 1 and 2.**

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring
No problems since flood waters.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
No problems since flood waters.

Item 60.1.d - Breastwalls
No problems since flood waters.

Item 60.1.e - Wingwalls
No problems since flood waters.

Photo Log
Photo 1 : View of the channel upstream.
Photo 2 : View of the channel downstream.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J3**	**U-02-014**	**U02014-1J3-MUN-NBI**	**APR 3, 2010**

PHOTOS

Photo 1: **View of the channel upstream.**

Photo 2: **View of the channel downstream.**

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Rivulet Street over Rivulet Brook
(Bridge No. N/A)

Priority 20

AVAILABLE INFORMATION

Rivulet Street is classified as a Rural Minor Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This culvert consists of several separate structures, each of different construction types, adjacent to one another. The culvert's inlet is located at Taft Pond west of Rivulet Street and extends under Foam Concepts at 44 Rivulet Street. Two structures are located within the public right-of-way. For the purpose of this inspection, only the two structures within the right-of-way were inspected. Here, the east structure will be referred to as structure 1, and the west structure will be called structure 2.

Structure 1 consists of a 3-sided concrete box culvert. It has a width of 23'-0" with a clear span of 15'-0". The hydraulic opening of the structure is 7'-2" high by 15'-0" wide.

Structure 2 consists of a mortared stone masonry arch. It has a width of 41'-0" before reaching the third structure within the property of Foam Concepts. The arch has a clear span of 15'-6". The hydraulic opening of the structure is 6'-6" high by 15'-6" wide. The depth of flow at the time of inspection was approximately 3" and flowing east. The depth of fill over the structures is approximately 22".

The roadway width over both structures is 42'-1" with a 5'-6" sidewalk on the south side of the roadway. The roadway consists of a bituminous surface course.

Overhead wires run along the south side of the roadway. Also, there are 2- 12" diameter pipes spanning the abutment walls that appear to be damming the flow of the stream.

The guardrail consists of only concrete posts spaced approximately 5' apart with nothing connecting them.

There were no signs noted at the approaches.

FINDINGS

The overall condition of both structures is fair with few problems noted.

The concrete roof of structure 1 shows random spots of efflorescence and moisture, but otherwise is in good condition (See Photo 4). The concrete abutment walls both show moderate scaling up to the high waterline and minor honeycombing throughout. There is also deterioration at the utility pipe penetrations. Approximately 15' of the north footing is exposed (Photo 5) with no sour detected.

The stone arch underside of structure 2 shows random voids and some loss of pointing but is otherwise in good condition (Photo 8). The stone abutment walls show some loss of mortar and chinking stones with several voids at the base.

There is a large amount of debris on the channel floor, and the existing utility pipes appear to be damming stream flow. No scour was detected.

The roadway over the structure is in good condition with minor cracking and few asphalt patches. The bridge rail only consists of concrete posts. This poses a safety hazard due to the presence of a 15' vertical drop that cannot be seen from the roadway.

As noted above, the clear span of this structure is greater than 10'-0". The Town should follow up with MassDOT in regards to assigning a bridge number to this structure.

RECOMMENDATIONS

This structure is in good condition with few problems noted. BETA recommends that the following repairs be completed to extend the structures anticipated service life:

- Replace all missing and/or loose chinking stones in the stone arch and abutments of structure 2.
- Repoint all joints to the stone arch and abutments of structure 2.
- Repair concrete pipe penetrations at structure 1 side walls.
- Remove all debris from waterway and protect utilities future channel debris.

Conduct bi-annual inspections to monitor overall bridge conditions.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$50,000
Engineering:	$15,000
Total:	$65,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BETA
ENGINEERING SUCCESS TOGETHER
315 NORWOOD PARK SOUTH
NORWOOD, MA 02062
781.255.1982
EMAIL: BETA@BETA-INC.COM

BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

RIVULET STREET
OVER
RIVULET BROOK

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-2

General:

Street Name: Rivulet Street **Waterway:** Rivulet Brook **Culvert ID:** NA-2

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/21/2011 **Weather:** Partly Cloudy **Temp:** 90°F

General Culvert Information:

Culvert Type: 1: 3 Sided Concrete Box. 2: Stone Masonry Arch

Construction Date: N/A

Dimensions Of Hydraulic Opening Height (Inches): 86

Length of Culvert Feet: 23

Dimensions Of Hydraulic Opening Width (Inches): 180

Depth of Fill Over Culvert Inches: 22"

Depth of Flow During Inspection: 3"

Direction of Flow: East

Utilities Carried By Structure: 12" dia pipes. Pipes damming up channel.

Drainage Structures: Catch basins

Other: ~30" RCP w/headwall approx. 100% of culvert + extends under mill to pond. All dimensions are for 1st culvert. For Stone Masonry Arch, 78"Hx185"W, 492" Culvert length > Arch 3 extends under culvert to pond. Abutments rated 3 (severe loss of mortar and chink stones, several

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Moderate scaling up to high WL. Deterioration of pipe penetration. Minor honeycombing. North footing 15' exposed

Abutment South Sidewall: Moderate scaling up to high WL. Deterioration of pipe penetration. Minor honeycombing.

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 3 **Abutment South Sidewall Rating:** 4

Abutment East Sidewall Rating: 3 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Random spots of efflo and moisture. Structure 2 roof also rated 4 with a few random voids and some loss of mortar.

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 2

Floor Scour: None detected **Debris:** Lots on floor (Boulders, Sediment)

Floor Notes: North footing 15' exposed. Pipes damming flow. Same case for structure 2.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-2

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 4

North East Wall: Minor scaling up to high waterline

North West Wall: N/A **North West Wall Type:** N/A **North West Wall Rating:** N/A

North West Wall: Culvert extends under mill

South East Wall: Wingwall **South East Wall Type:** Concrete **South East Wall Rating:** 4

South East Wall: Minor scaling up to high WL

South West Wall: N/A **South West Wall Type:** N/A **South West Wall Rating:** N/A

South West Wall: N/A

Head Wall: Slab Fascia **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: None

Roadway Condition:

North Roadway Approach Condition: Minor cracking, few patches **North Roadway Inches:** 505

North Roadway Approach Settlement: None **North Roadway Rating:** 4

North Roadway Approach Alignement: Slight horiz curve. Driveways

South Roadway Approach Condition: Minor cracking, few patches **South Roadway Inches:** 505

South Roadway Approach Settlement: None **South Roadway Rating:** 4

South Roadway Approach Alignement: Slight horiz curve, driveways

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Concrete posts. Really no rail.

Guard Rail Condition: Non-existent

Guard Rail Rating: 1

Guard Rail Notes: None

Photo 1 Looking West: East Culvert Elevation

Photo 2 Looking West: Structure 2 East Elevation from Structure 1

Photo 3 Looking West: Toward 44 Rivulet Street

Photo 4 Looking East: Structure 1 Underside of Slab

Photo 5 Looking West: Structure 1 North Abutment Exposed Footing

Photo 6 Looking Southwest: Structure 1 South Abutment Elevation

Photo 7 Looking Northwest: Structure 1 North Abutment Elevation

Photo 8 Looking East: Structure 2 Underside of Arch

Photo 9 Looking Northeast: North Abutment Elevation

Photo 9 Looking Southeast: South Abutment Elevation

Photo 10 Looking South: North Approach

Photo 11 Looking West: Top of Culvert

Photo 12 Looking North: South Approach

Photo 13 Looking Northeast: Concrete Posts/Bridge Rail on East Side of Roadway

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Hartford Avenue East over Mumford Tail Race (Bridge No. N/A)

Priority 21

AVAILABLE INFORMATION

Hartford Avenue East is classified as a Rural Major Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a concrete box culvert with dry laid stone masonry training walls. The structure has an out-to-out width of 52'-0" with a clear span of 8'-0". The rectangular hydraulic opening is 4'-0" high by 8'-0" wide. The flow was 25" deep at the time of inspection and flowing southward.

The roadway width over the structure is 30'-6" with 5'-0" sidewalks on both sides. The pavement consists of an asphaltic wearing surface. Residential and commercial driveways are located directly adjacent to the structure on both sides of the roadway in the east approach.

Directly adjacent to the structure, the Hartford Avenue East over the Mumford River Bridge carries several utilities. No utilities were found to cross this culvert, but the adjacent structure indicates the presence of a sewer and water line. Overhead wires also run along the south side of the roadway. Additionally, there is a drain line that runs along the roadway. Catch basins are present in the gutter line near the structure and a drainage outfall is located in the northwest training wall.

The guardrail over the culvert consists of a standard highway guardrail with a chain link fence attached. On the north side of the roadway, the guardrail is mounted to the culvert's concrete headwall. Alternatively, the guardrail posts are driven into the ground on the south side of the roadway. Approach guardrail is present at the east approach. At the west approach, there is approach guardrail on the north side only.

There are "6 Ton Limit Ahead", "Road Narrows", and "Speed Limit 30" at both approaches. All signs are for the Hartford Avenue East over Canal crossing located approximately 400' east.

FINDINGS

The overall condition of the structure is good with few minor deficiencies noted.

The concrete box culvert is in good condition but does exhibit minor scaling of the sidewalls, minor efflorescence at the culvert joints, and minor scaling on the north face of the headwall (See Photos 2 and 3).

The training walls are in fair condition. The walls are made up of dry-laid stone masonry. Loose chinking stones and medium-sized voids (Photos 4 and 5) are random but typical. The southwest training wall is experiencing stability failure. Approximately 15' of the wall

shows horizontal displacement into the channel (Photo 7). There is also a large amount of debris at the upstream opening of the culvert.

The roadway over the culvert is in good condition with few random potholes and minor cracking. The SS guardrail is in good condition other than minor collision damage at the northeast corner. The alignment of the roadway is straight with clear visibility.

RECOMMENDATIONS

The overall condition of the structure is good. BETA recommends that the following items be addressed:

- Fill all voids to the adjacent training wall to prevent loss of roadway fines.
- Remove debris from the upstream culvert opening.
- The Town shall investigate the stability and repair measures for the southwest training wall. It is possible the wall is property of the adjacent living community.

Conduct bi-annual inspections to monitor overall bridge conditions.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$15,000
Engineering:	$5,000
Total:	$20,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BETA
ENGINEERING SUCCESS TOGETHER

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HARTFORD AVENUE EAST
OVER
MUMFORD TAIL RACE

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-1

General:

Street Name: Hartford Avenue East **Waterway:** Mumford Tail Race **Culvert ID:** NA-1

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/15/2011 **Weather:** Partly Cloudy **Temp:** 80°F

General Culvert Information:

Culvert Type: Concrete Box Culvert **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 48 **Length of Culvert Feet:** 52

Dimensions Of Hydraulic Opening Width (Inches): 96 **Depth of Fill Over Culvert Inches:** N/A

Depth of Flow During Inspection: 25" **Direction of Flow:** South

Utilities Carried By Structure: Overhead wires on South side. Sewer and water.

Drainage Structures: Outfall at NorthWest training wall. Catch basin at NorthEast gutterline.

Other: None

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Minor scaling of sidewalls

Abutment West Sidewall: Minor scaling of sidewalls

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 4

Culvert Roof:

Culvert Roof Notes: Good shape. Minor efflo at culvert joint.

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Lots of Debris

Floor Notes: Large amounts of debris at upstream opening

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

NA-1

Training/Wingwalls:

North East Wall: Training **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 3

North East Wall: Loose chink stones. Mod voids (TYP)

North West Wall: Training **North West Wall Type:** Dry Laid Stone **North West Wall Rating:** 3

North West Wall: Loose chink stones. Mod voids (TYP)

South East Wall: Training **South East Wall Type:** Dry Laid Stone **South East Wall Rating:** 3

South East Wall: Loose chink stones. Mod voids (TYP)

South West Wall: Training **South West Wall Type:** Dry Laid Stone **South West Wall Rating:** 2

South West Wall: Loose chink stones. Mod voids (TYP). Up to 15' of wall has moved into channel.

Head Wall: Headwall **Head Wall Type:** Concrete **Head Wall Rating:** 4

Head Wall Notes: Minor scaling on North face. Guardrail attached to face. Good shape.

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Unwraveling of pavement **East Roadway Inches:** 365" w/5' sidewa

East Roadway Approach Settlement: None **East Roadway Rating:** 4

East Roadway Approach Alignement: Straight. Intersection and drives.

West Roadway Approach Condition: Minor cracking **West Roadway Inches:** 365" w/5' sidewa

West Roadway Approach Settlement: None **West Roadway Rating:** 4

West Roadway Approach Alignement: Straight, Driveways

Safety Barrier

Guard Rail Type: Standard highway guardrail in front of fence.

Guard Rail Condition: NE collision damage, non-standard transition. North GR mounted to headwall. South GR mounted in ground.

Guard Rail Rating: 4

Guard Rail Notes: None

Photo 1 Looking South: North Culvert Elevation

Photo 2 Looking South: Underside of Culvert

Photo 3 Looking Southeast: Typical Culvert Wall

Photo 4 Looking West: Northwest Training Wall

Photo 5 Looking Southeast: Corner of Culvert at Northeast Wall

Photo 6 Looking North: South Culvert Elevation

Photo 7 Looking North: Lateral Movement of Southwest Training Wall

Photo 8 Looking East: West Approach

Photo 9 Looking South: Cracks in Pavement Over Culvert

Photo 10 Looking West: East Approach

Photo 11 Looking Northwest: North Bridge Rail Elevation

Photo 12 Looking Southwest: South Bridge Rail Elevation

Photo 13 Looking South: Elevation of North Headwall with Guardrail Posts Mounted

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Hartford Avenue East over the Blackstone River (Bridge No. U-02-018)

Priority 22

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 74.7.

A bridge rating report dated December, 1987 was provided by MassDOT. Based on the condition of the arch and "Engineering Judgment" the report concludes that the bridge capacity is satisfactory and does not require posting.

MassDOT has most recently completed a routine arch inspection dated October 20, 2010.

Hartford Avenue is classified as a Rural Major Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a mortared stone masonry arch. Original bridge construction is dated circa 1900. The structure was then rebuilt in 1960. There is a 7' high dam located directly upstream of the structure and a concrete spillway through the arch. The structure has an out-to-out width of 24'-0" with a clear span of 39'-0". The hydraulic opening of structure is approximately 11'-0" high by 39'-0" wide. The depth of flow under the arch at the time of inspection was 4" and flowing southward rapidly. The depth of fill over the bridge is approximately 9'-0".

The bridge carries a roadway 20'-0" wide with no sidewalks on either side and consists of an asphaltic wearing surface. Both approaches are fairly straight with a posted 30 mph speed limit.

Overhead wires run along the north fascia of the bridge. Hydraulic and drainage structures include the dam noted above and rip-rap drainage swales at the southeast and southwest approaches.

The bridge railing consists of concrete posts and railings. The bridge rail across the structure is transitioned to standard SS highway guardrail at both approaches.

The only posted sign noted reads "Watch for Pedestrians" and is located approximately 250' west of the bridge.

FINDINGS

The overall condition of the structure is good with minor deficiencies noted.

The underside of the arch has few areas of missing mortar with minor to moderate efflorescence (See Photo 4).

The abutments were also found to be in good condition with some minor problems. All wingwall and abutment faces exhibit random areas of missing mortar and chinking stones. Also, a full height vertical crack approximately ½" wide (Photo 3) was found at the

west end of the southwest spandrel wall. The concrete parapets typically exhibit areas of minor scaling. A spall with exposed reinforcement was also recorded at the southeast corner of the south parapet.

Overall, the roadway is in good condition with isolated areas of minor cracking. The concrete bridge rail randomly exhibits areas of minor scaling and spalling with exposed reinforcement, primarily at the post bases (Photos 11 and 13). There is also hairline cracking with rust in the post bases and minor collision damage at the northwest transition.

RECOMMENDATIONS

The overall condition of the structure is good. BETA recommends that the following items be addressed:

- Replace all missing and/or loose chinking stones in the stone arch, wingwalls, and abutments.
- Repoint all masonry joints as required.
- Repair all concrete deficiencies to concrete bridge railing and parapet.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$70,000
Engineering:	$20,000
Total:	$90,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

National Bridge Inventory Sheet Dated November 2, 2011

MassDOT Routine Arch Inspection Report Dated October 20, 2010

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HARTFORD AVENUE EAST
OVER
THE BLACKSTONE RIVER

BRIDGE NO.
U-02-018

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-018

General:

Street Name: Hartford Avenue East **Waterway:** Blackstone River **Culvert ID:** U-02-018

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/15/2011 **Weather:** Clear **Temp:** 75°F

General Culvert Information:

Culvert Type: Stone Masonry Arch **Construction Date:** 1900 Rebuilt 1960

Dimensions Of Hydraulic Opening Height (Inches): 132 **Length of Culvert Feet:** 24

Dimensions Of Hydraulic Opening Width (Inches): 468 **Depth of Fill Over Culvert Inches:** 108"

Depth of Flow During Inspection: 4" **Direction of Flow:** South

Utilities Carried By Structure: Overhead wires on North side.

Drainage Structures: Stone lined drainage path at SouthWest and SouthEast approaches

Other: Visual inspection from banks due to swift current

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Random missing mortar and chink stones (TYP)

Abutment West Sidewall: Random missing mortar and chink stones (TYP)

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 4

Culvert Roof:

Culvert Roof Notes: Arch: Random missing mortar/pointing w/efflo (TYP). Spandrel wall(Rated 4): Random missing mortar and chink stones north and south. Fragmented stones on southface at top of west end.

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 4

Floor Scour: None detected **Debris:** Minor/No Debris

Floor Notes: Paved spillway directly downstream from dam. Dam directly upstream from bridge

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-018

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North East Wall: Missing mortar/small voids up to 2' above waterline. Random mortar repair throughout. Veg. growth from joints (TYP)

North West Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 3

North West Wall: Missing pointing and chink stones (TYP). Veg. growth from joints (TYP)

South East Wall: Wingwall **South East Wall Type:** Mortared Masonry **South East Wall Rating:** 3

South East Wall: Missing mortar/pointing and chink stones (TYP). Veg. growth from joints (TYP)

South West Wall: Wingwall **South West Wall Type:** Mortared Masonry **South West Wall Rating:** 3

South West Wall: Cracked stone at west end. Full height vertical, 1/2" wide. Veg. growth from joints (TYP)

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition: Minor cracking, Asphalt berm. Good **North Roadway Inches:** 252

North Roadway Approach Settlement: None **North Roadway Rating:** 4

North Roadway Approach Alignement: Slight horiz. curve

South Roadway Approach Condition: Minor cracking, Asphalt berm, Good **South Roadway Inches:** 252

South Roadway Approach Settlement: None **South Roadway Rating:** 4

South Roadway Approach Alignement: Slight horiz. curve

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Standard highway approach and concrete bridge rail.

Guard Rail Condition: Random minor scaling, spalling, exposed rein. Minor random collision damage at NW transition. Hairline cracking w/rust at post bases.

Guard Rail Rating: 4

Guard Rail Notes: None

Photo 1 Looking Northeast: South Bridge Elevation

Photo 2 Looking East: South Concrete Parapet Elevation

Photo 3 Looking North: Crack in Southwest Wingwall

Photo 4 Looking Northeast: Arch Underside and East Abutment

Photo 5 Looking North: Cracked Stone at Top of South Spandrel Wall

Photo 6 Looking West: North Parapet Elevation

Photo 7 Looking Northwest: Underside of Arch and West Abutment

Photo 8 Looking Southwest: North Bridge Elevation

Photo 9 Looking West: East Approach

Photo 10: Typical Guardrail Transition

Photo 11 Looking Southwest: Typical Spall in South Bridge Rail

Photo 12: Typical Bridge Rail Elevation

Photo 13 Looking North: Spalling and Cracking at North Bridge Rail Base

Photo 14 Looking East: West Approach

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Report Date: November 2, 2011

State Information

BDEPT#= U02018 Agency Br.No.

Town= Uxbridge L.O.

B.I.N= 1DL AASHTO= 074.7

FHWA Select List= Y

Identification

(8) Structure Number U020181DLMUNNBI

(5) Inventory Route 151000000

(2) State Highway Department District 03

(3) County Code 027 (4) Place code 71620

(6) Features Intersected **WATER BLACKSTONE RIVER**

(7) Facility Carried **HWY HARTFORD AVE**

(9) Location 400 FT. EAST OF OAK ST

(11) Kilometerpoint 0001.996

(12) Base Highway Network N

(13) LRS Inventory Route & Subroute 000000000000

(16) Latitude 42 DEG 05 MIN 54.32 SEC

(17) Longitude 71 DEG 37 MIN 21.90 SEC

(98) Border Bridge State Code Share %

(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Masonry Code 811

Arch - Deck Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit 001

(46) Number of approach spans 0000

(107) Deck Structure Type - Not applicable Code N

(108) Wearing Surface / Protective System:

A) Type of wearing surface - Not applicable=no deck Code N

B) Type of membrane - Not applicable=no deck Code N

C) Type of deck protection - Not applicable=no deck Code N

Age and Service

(27) Year Built 1900

(106) Year Reconstructed 1960

(42) Type of Service: On - Highway

Under - Waterway Code 15

(28) Lanes: On Structure 02 Under structure 00

(29) Average Daily Traffic 014500

(30) Year of ADT 2010 (109) Truck ADT 06 %

(19) Bypass, detour length 006 KM

Geometric Data

(48) Length of maximum span 0011.9 M

(49) Structure Length 00011.9 M

(50) Curb or sidewalk: Left 00.2 M Right 00.2 M

(51) Bridge Roadway Width Curb to Curb 006.1 M

(52) Deck Width Out to Out 007.3 M

(32) Approach Roadway Width (w/shoulders) 006.4 M

(33) Bridge Median - No median Code 0

(34) Skew 00 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear 99.99 M

(47) Inventory Route Total Horiz Clear 06.1 M

(53) Min Vert Clear Over Bridge Rdwy 99.99 M

(54) Min Vert Underclear ref N 00.00 M

(55) Min Lat Underclear RT ref N 00.0 M

(56) Min Lat Underclear LT 00.0 M

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0

(111) Pier Protection Code

(39) Navigation Vertical Clearance 000.0 M

(116) Vert-lift Bridge Nav Min Vert Clear M

(40) Navigation Horizontal Clearance 0000.0 M

Classification

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class - Urban Minor Arterial	16
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance undetermined	

Condition

	Code
(58) Deck	N
(59) Superstructure	7
(60) Substructure	7
(61) Channel & Channel Protection	7
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - Other/Unknown	0
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	44.1
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	32.4
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	7
(68) Deck Geometry	2
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	6
(72) Approach Roadway Alignment	8
(36) Traffic Safety Features	0 0 1 1
(113) Scour Critical Bridges	8

Inspections

(90) Inspection Date 10/20/10 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	11/29/02
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 12/01/87	H20	Type 3	Type 3S2	Type HS
Operating	27.0	34.0	49.0	49.0
Inventory	20.0	25.0	36.0	36.0

Field Posting

Status EJDMNT Posting Date 12/14/87

	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	N / N	Other
N / N	Ladder	N / N	Staging	BINOCULARS	
N / N	Boat	N / N	Traffic Control		
Y / N	Wader	N / N	RR Flagperson	Inspection Hours:	008
Y / N	Inspector 50	N / N	Police		

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STRUCTURES INSPECTION FIELD REPORT

ROUTINE ARCH INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1DL	U-02-018

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
UXBRIDGE	U02018-1DL-MUN-NBI	001.996	A:OPEN	OCT 20, 2010

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY HARTFORD AVE		1900	1960	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER BLACKSTONE RIVER	Urban Minor Arterial	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
811 : Masonry Arch - Deck	Town Agency	Town Agency	Z. Gikas

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
N : Not applicable	SUNNY	11°C	R. C. ANGELL, D. TRAINEE

ITEM 58 — DECK: N

		DEF
1. Wearing surface	7	-
2. Deck Condition	N	-
3. Spandrel Fill	7	-
4. Curbs	6	M-P
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	7	-
8. Railing	6	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)	N	S
	215	260

APPROACHES

		DEF
a. Appr. pavement condition	7	-
b. Appr. Roadway Settlement	8	-
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 — SUPERSTRUCTURE: 7

		DEF
1. Arch/Arch Ring	7	-
2. Keystone Area	7	-
3. Stringers	N	-
4. Floorbeams	N	-
5. Spandrel Walls	7	-
6. Spring Lines	7	-
7. Diaphragms/Cross Frames	N	-
8. Conn Plt's, Gussets & Angles	N	-
9. Pin & Hangers	N	-
10. Masonry Joints	7	M-P
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Deformation/Flattening	7	-
14. Member Alignment	7	-
15. Paint/Coating	N	-
16.	N	-

Year Painted	N

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

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

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

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

Any Cracks: (Y/N): N

ITEM 60 — SUBSTRUCTURE: 7

	Dive	Cur		DEF
1. Abutments			7	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	N	7		-
e. Wingwalls	N	7		-
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	6		M-P
h. Footings	N	H		-
i. Piles	N	X		-
j. Scour	N	7		-
k. Settlement	N	7		-
l. Erosion	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 ( )

I-60 (Dive Report): N *I-60 (This Report):* 7

93B-U/W (DIVE) Insp: 01/26/2010

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DL**	**U-02-018**	**U02018-1DL-MUN-NBI**	**OCT 20, 2010**

ITEM 61 — CHANNEL & CHANNEL PROTECTION

7

	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	7	-
7.Aggradation	N	8	-
8.Fender System	N	N	-

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

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

93b-U/W INSP. DATE: 01/26/2010

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	6	M-P
B. Transitions	0	6	M-P
C. Approach Guardrail	1	7	-
D. Approach Guardrail Ends	1	7	-

WEIGHT POSTING

Not Applicable X

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

Waived Date: 00/00/00 **EJDMT Date:** 12/14/1987

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Other Advance E	Other Advance W

CLEARANCE POSTING

Not Applicable X

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

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge N	At bridge S	Advance N	Advance S

ACCESSIBILITY (Y/N/P)

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

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: 12/01/1987

Inspection data at time of existing rating
I 58: - I 59: - I 60: - Date : 00/00/00

(To be filled out by DBIE)
Request for Rating or Rerating (Y/N): Y

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

REASON: Rated by design

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	Advance 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	Advance 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 stablility. 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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DL**	**U-02-018**	**U02018-1DL-MUN-NBI**	**OCT 20, 2010**

REMARKS

BRIDGE ORIENTATION
According to the plans the approaches are West and East and the elevations are South and North. The bridge is a single span stone masonry deck arch structure. There is a paved floor spillway directly upstream of the bridge. The Blackstone River flows from the North to the South.

GENERAL REMARKS
Current was so swift the inspectors were unable to get under the bridge.

ITEM 58 - DECK

Item 58.1 - Wearing surface
There is isolated areas of transverse and longitudinal cracking, heaviest in the Westbound lane.

Item 58.4 - Curbs
Both railing bases/curbs have minor cracking,delamination, and spalling and rust throughout (especially the North). **See photo 1.**

Item 58.7 - Parapets
The South parapet has a 2 foot high x 1 foot wide x 5 inch deep spall with exposed reinforcement at the Southeast corner. **See photo 2.** There are several full height hairline cracks, some with efflo., to the South parapet (some reflecting through the base of the curb). **See photo 3.**

Item 58.8 - Railing
The concrete railing has minor scale and spalling and a few areas of exposed reinforcement (rebar too close) throughout. Most of the tops of the concrete posts have small chip outs due to collision damage. Both rail bases have minor cracking with rust throughout (especially North). Also see Item 58.4.

APPROACHES

Approaches a - Appr. pavement condition
The West approach pavement has isolated longitudinal cracking.

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring
There is some very minor pointing missing at intermittent locations throughout and minor to moderate efflorescence staining with icicles throughout. **See photos 4 & 5.**

Item 59.5 - Spandrel Walls
At the top of the South spandrel wall there is one cracked stone at the extreme West end. **See photo 6.**

Item 59.10 - Masonry Joints
See Item 59.1.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
The breastwall from the waterline up shows several areas of missing pointing and chinking stones.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DL**	**U-02-018**	**U02018-1DL-MUN-NBI**	**OCT 20, 2010**

REMARKS

Item 60.1.e - Wingwalls
There is minor vegetation growth from the joints of some of the walls. There is missing pointing and chinking stones throughout the Northwest wingwall. **See photo 7.**

Item 60.1.g - Pointing
See item 60.1.d and 60.1.e.

Item 60.1.l - Erosion
There has been newly placed rip/rap to control a previous embankment washout at the Southeast and Southwest corner since the inspection of 2006.

TRAFFIC SAFETY

Item 36a - Bridge Railing
The bridge railing consists of concrete posts and 2 concrete rails. See Item 58.8.

Item 36b - Transitions
The transitions are not double panel and the post are not properly spaced. The Northwest has minor collision damage with a 1 ft. long tear at the connection to the concrete railing. **See photo 8**. There is minor collision damage at the Northeast corner of the bridge.

Item 36c - Approach Guardrail
The approach guardrail consists of single SS guardrail. The Southwest posts have some minor tearing and collision damage.

Photo Log
Photo 1 : Spalling throughout the North curb.
Photo 2 : Spall with exposed rebar to the East end of the South parapet.
Photo 3 : Typical cracking with efflo. to the South parapet.
Photo 4 : West side of the arch.
Photo 5 : East side of the arch.
Photo 6 : Cracked stone at the top West end of the South spandrel wall.
Photo 7 : Missing pointing and chinking stones to the Northwest wingwall.
Photo 8 : Collision damage and tear to the Northwest transition.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DL**	**U-02-018**	**U02018-1DL-MUN-NBI**	**OCT 20, 2010**

PHOTOS

Photo 1: **Spalling throughout the North curb.**

Photo 2: **Spall with exposed rebar to the East end of the South parapet.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DL**	**U-02-018**	**U02018-1DL-MUN-NBI**	**OCT 20, 2010**

PHOTOS

Photo 3: **Typical cracking with efflo. to the South parapet.**

Photo 4: **West side of the arch.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DL**	**U-02-018**	**U02018-1DL-MUN-NBI**	**OCT 20, 2010**

PHOTOS

Photo 5: **East side of the arch.**

Photo 6: **Cracked stone at the top West end of the South spandrel wall.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1DL**	**U-02-018**	**U02018-1DL-MUN-NBI**	**OCT 20, 2010**

PHOTOS

Photo 7: **Missing pointing and chinking stones to the Northwest wingwall.**

Photo 8: **Collision damage and tear to the Northwest transition.**

Depot Street over the Mumford River
(Bridge No. U-02-008)

Priority 23

AVAILABLE INFORMATION

The current NBI Structure Inventory and Appraisal shows an AASHTO Sufficiency Rating of 73.2.

A bridge rating report dated February, 1996 was provided by MassDOT. Based on the calculations and the condition of the structure, the report concludes that the bridge capacity is satisfactory and does not require posting.

The most recent MassDOT bridge inspection report on record is dated September 10, 2009.

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

BRIDGE DESCRIPTION

This structure consists of 9 adjacent precast box beams on concrete abutments. The bridge was constructed in 1994. The structure has an out-to-out width of 36'-0" with a clear span of 75'-0". The hydraulic opening of structure is approximately 15'-2" high by 75'-0" wide. The depth of flow at the time of inspection was approximately 30" and flowing eastward.

The roadway width over the structure is 26'-0" with a 6'-0" sidewalk on the west side of the roadway. There is 3" (minimum) thick asphaltic wearing surface placed directly on top of the box beams. Commercial driveways are located at both approaches. The north approach has a slight horizontal curve with limited visibility.

Overhead wires run along the west fascia of the bridge and a water line is mounted to the east fascia. A USGS gauging station is located at the southwest corner of the bridge. Additionally, there are 2 catch basins at the south approach and one catch basin at the northwest approach.

The bridge railing consists of a concrete bridge rail over the bridge and standard highway guardrail at the approaches. Both are transitioned together by means of a standard concrete highway guardrail transition.

There were no signs noted at the approaches.

FINDINGS

The overall condition of the structure is good with few problems noted.

The box beams were in good condition. Minor moisture with efflorescence at the shear keys of beams 3 and 7 (See Photo 4) was found. Beams 1-3, 7, and 8 have several pieces of backer rod hanging (Photo 3). There is heavy efflorescence on beam 1 at the north abutment. Minor hairline temperature cracking was recorded at beam 4. Also, beam 9 has an 8" diameter by 1" deep spall near the north abutment fascia (Photo 5).

The abutments were also found to be in good condition. Both abutments have exposed steel sheeting (Photos 7 and 9) and minor honeycombing throughout. The south abutment also has a full height vertical hairline crack under beam 2 and a 5' hairline crack under beam 7.

The wingwalls are all in good condition. The only deficiencies noted were on the northwest wall in which there was some map cracking with efflorescence and an 18" crack at the top of the wall.

The pavement over the bridge is in fair condition. There is a ½" full length longitudinal crack near the east curb and a ¼" longitudinal full length crack near beam 2, which is sealed. There is also minor alligator cracking throughout. The curb at the southeast endpost is settling, and there is map cracking at the northeast endpost. The northwest approach sidewalk is severely scaled (Photo 16). Both bridge joints are cracked (Photo 15), and the concrete bridge rail has a 5" diameter area of delamination on the east side at center span. There is also minor hairline cracking along the base of the rail and heavier cracking towards the ends of the guardrail base.

RECOMMENDATIONS

This structure is in good condition with several minor problems noted. BETA recommends that the following repairs be completed to extend the structure's anticipated service life:

- Repair the backer rod at the shear keys between adjacent box beams.
- Repair spall at beam 9 fascia.
- Repair all spalled, cracked, and delaminated areas to concrete bridge railing.

Due to the condition of the wearing surface over the bridge and the condition of the shear keys, BETA recommends the exiting wearing surface be removed and replaced with a new superpave wearing surface and membrane waterproofing. This would also allow access for shear key repair.

BUDGETARY COST ESTIMATE

Repairs

Construction:	$50,000
Engineering:	$15,000
Total:	$65,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

National Bridge Inventory Sheet Dated November 2, 2011

MassDOT Routine Inspection Report Dated September 7, 2011

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BETA
ENGINEERING SUCCESS TOGETHER
315 NORWOOD PARK SOUTH
NORWOOD, MA 02062
781.255.1982
EMAIL: BETA@BETA-INC.COM

BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

DEPOT STREET
OVER
THE MUMFORD RIVER

BRIDGE NO.
U-02-008

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-008

General:

Street Name: Depot Street **Waterway:** Mumford River **Culvert ID:** U-02-008

Inspectors:

Name: Peter Kotowski **Position:** Engineer

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/20/2011 **Weather:** Partly Cloudy **Temp:** 78°F

General Culvert Information:

Culvert Type: Precast Concrete Box (butted)

Construction Date: 1994

Dimensions Of Hydraulic Opening Height (Inches): 181

Length of Culvert Feet: 36

Dimensions Of Hydraulic Opening Width (Inches): 900

Depth of Fill Over Culvert Inches: 0"

Depth of Flow During Inspection: 30"

Direction of Flow: East

Utilities Carried By Structure: Powerlines, West Fascia, Waterline Eastside, Gauging station SW Corner

Drainage Structures: 2 Catch Basins at NorthWest Approach, 2 Catch Basins at South Approach

Other: Parapets: 1' hairline crack @ N. abut w/Efflo at bottom, West parapet.

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Minor honeycombing, Exposed steel sheeting at both abutments

Abutment South Sidewall: Full Length Hairline BM2. 5' Hairline under BM7, Minor Honeycombing

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 4 **Abutment South Sidewall Rating:** 4

Abutment East Sidewall Rating: 4 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Pavement directly over boxes: 1/2" longitudinal crack full length near east curb. 1/4" long. crack full length over beam 2 (sealed). Minor alligator (TYP).

Culvert Roof Rating: 3

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** Moderate Debris, Some Boulders

Floor Notes: Some erosion. Monitor embankment/exposed sheeting

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-008

Training/Wingwalls:

North East Wall:	Wingwall	**North West Wall Type:**	Concrete	**North West Wall Rating:**	4
North East Wall:	None				
North West Wall:	Wingwall	**North West Wall Type:**	Concrete	**North West Wall Rating:**	4
North West Wall:	Map Cracking w/Efflo, 18" crack @ top of wall. Heavy cracking at Joints (TYP).				
South East Wall:	Wingwall	**South East Wall Type:**	Concrete	**South East Wall Rating:**	4
South East Wall:	None				
South West Wall:	Wingwall	**South West Wall Type:**	Concrete	**South West Wall Rating:**	4
South West Wall:	USGS Station Mounted				
Head Wall:	Beam Fascia	**Head Wall Type:**	Concrete	**Head Wall Rating:**	3 - Cracks in pvmt
Head Wall Notes:	Minor water/efflo @ shear keys BM 3+7. BM 7 backer rod hanging. Heavy Efflo BM1, N. Abutment. Backer rod hanging beams 1+2. BMS 7+8 and 2+3 Hanging backer rod. Minor Hairline Crack @ BM4 void square. BM9 Near N.Abut 8" dia 1" deep.				

Roadway Condition:

North Roadway Approach Condition:	Transverse crack 30' before bridge + transcracking	**North Roadway Inches:**	312
North Roadway Approach Settlement:	None	**North Roadway Rating:**	3
North Roadway Approach Alignement:	Sharp horz. curve. Low visibility		
South Roadway Approach Condition:	No cracking, dirt to pavement	**South Roadway Inches:**	312
South Roadway Approach Settlement:	None	**South Roadway Rating:**	4
South Roadway Approach Alignement:	Tangent, Clear approach		
East Roadway Approach Condition:	N/A	**East Roadway Inches:**	N/A
East Roadway Approach Settlement:	N/A	**East Roadway Rating:**	N/A
East Roadway Approach Alignement:	N/A		
West Roadway Approach Condition:	N/A	**West Roadway Inches:**	N/A
West Roadway Approach Settlement:	N/A	**West Roadway Rating:**	N/A
West Roadway Approach Alignement:	N/A		

Safety Barrier

Guard Rail Type: Steel, Transitions into Bridge Endposts (Not TRI Beam).

Guard Rail Condition: 5" dia delam on east rail @ center span. Minor hairline cracks on cap and base (TYP). Cracking at end of guardrail base.

Guard Rail Rating: 4

Guard Rail Notes: MassDOT standard Texas rail. Curb settling @ SE endpost. Mapcracking @ NE endpost. Sidewalk deterioration.

Photo 1 Looking West: East Bridge Elevation

Photo 2 Looking North: Underside of Deck

Photo 3 Looking West: Backer Rod Hanging Between Beams #2 and #3

Photo 4 Looking North: Moisture and Efflorescence at Beam #7 and #8 Shear Key

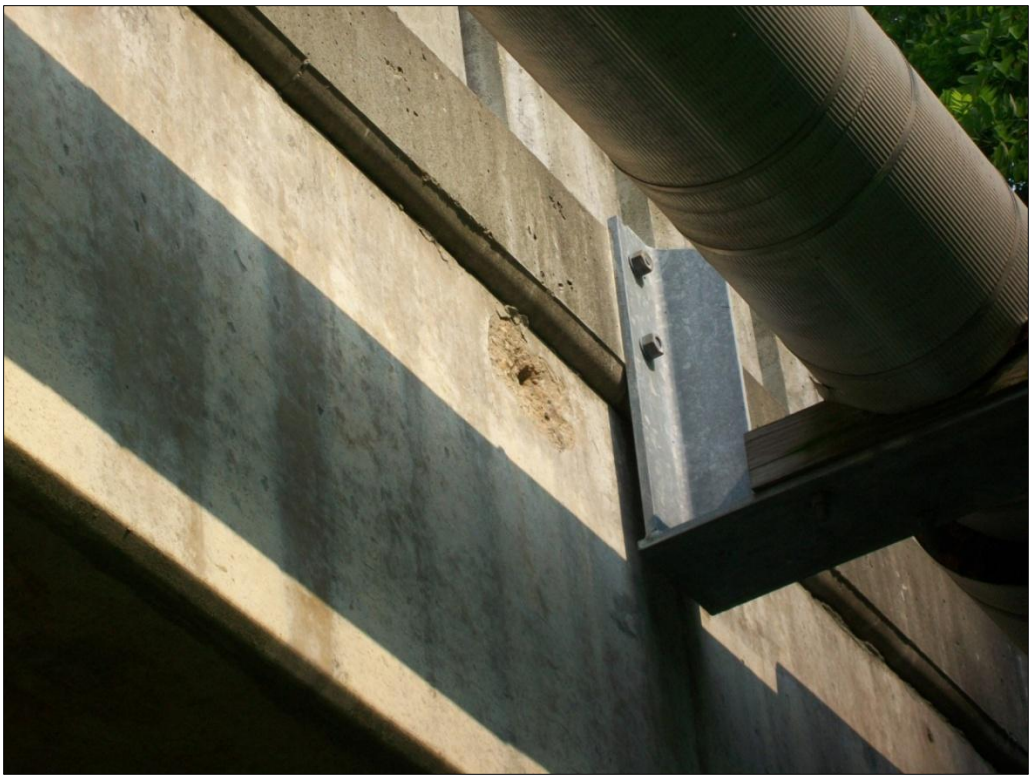

Photo 5 Looking Northwest: Spall in East Fascia of Beam #9

Photo 6 Looking North: North Abutment Elevation

Photo 7 Looking Northwest: Exposed Sheeting at North Abutment

Photo 8 Looking Southwest: Utility Along East Fascia

Photo 9 Looking East: Exposed Sheeting at South Abutment

Photo 10 Looking South: South Abutment Elevation

Photo 11 Looking East: West Bridge Elevation

Photo 12 Looking South: Southwest Wingwall Elevation with USGS Gage Attached

Photo 13 Looking North: South Approach

Photo 14 Looking Northeast: Southeast Approach Guardrail

Photo 15 Looking East: Typical Bridge Joint

Photo 16 Looking North: Severe Scaling of Northwest Approach Sidewalk

Photo 17 Looking South: North Approach

Photo 18 Looking Southwest: Typical Guardrail Transition

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Report Date: November 2, 2011

State Information

BDEPT#= U02008 Agency Br.No.

Town= Uxbridge L.O.

B.I.N= 1J2 AASHTO= 073.2

FHWA Select List= N

Identification

(8) Structure Number U020081J2MUNNBI

(5) Inventory Route 151000000

(2) State Highway Department District 03

(3) County Code 027 (4) Place code 71620

(6) Features Intersected **WATER MUMFORD RIVER**

(7) Facility Carried **HWY DEPOT ST**

(9) Location 0.1M E JCT RTS16&122

(11) Kilometerpoint 0000.241

(12) Base Highway Network N

(13) LRS Inventory Route & Subroute 000000000000

(16) Latitude 42 DEG 04 MIN 30.01 SEC

(17) Longitude 71 DEG 37 MIN 33.58 SEC

(98) Border Bridge State Code Share %

(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Prestressed Concrete Code 505

Box Beam or Girders - Multiple Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit 001

(46) Number of approach spans 0000

(107) Deck Structure Type - Concrete Precast Panels Code 2

(108) Wearing Surface / Protective System:

A) Type of wearing surface - Bituminous Code 6

B) Type of membrane - Preformed Fabric Code 2

C) Type of deck protection - Epoxy Coated Reinforcing Code 1

Age and Service

(27) Year Built 1994

(106) Year Reconstructed 0000

(42) Type of Service: On - Highway

Under - Waterway Code 15

(28) Lanes: On Structure 02 Under structure 00

(29) Average Daily Traffic 000780

(30) Year of ADT 2011 (109) Truck ADT 10 %

(19) Bypass, detour length 199 KM

Geometric Data

(48) Length of maximum span 0022.9 M

(49) Structure Length 00024.7 M

(50) Curb or sidewalk: Left 00.0 M Right 00.0 M

(51) Bridge Roadway Width Curb to Curb 007.9 M

(52) Deck Width Out to Out 010.7 M

(32) Approach Roadway Width (w/shoulders) 007.9 M

(33) Bridge Median - No median Code 0

(34) Skew 00 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear 99.99 M

(47) Inventory Route Total Horiz Clear 07.9 M

(53) Min Vert Clear Over Bridge Rdwy 99.99 M

(54) Min Vert Underclear ref N 00.00 M

(55) Min Lat Underclear RT ref N 00.0 M

(56) Min Lat Underclear LT 00.0 M

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0

(111) Pier Protection Code

(39) Navigation Vertical Clearance 000.0 M

(116) Vert-lift Bridge Nav Min Vert Clear M

(40) Navigation Horizontal Clearance 0000.0 M

Classification

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class - Urban Local	19
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance not eligible	N

Condition

	Code
(58) Deck	7
(59) Superstructure	7
(60) Substructure	7
(61) Channel & Channel Protection	7
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - HS 20=MS 18	5
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	46.8
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	33.3
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	7
(68) Deck Geometry	5
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	8
(72) Approach Roadway Alignment	6
(36) Traffic Safety Features	1 0 1 0
(113) Scour Critical Bridges	8

Inspections

(90) Inspection Date 09/07/11 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	10/01/88
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 02/01/96	H20	Type 3	Type 3S2	Type HS
Operating	39.0	52.0	50.0	0.0
Inventory	28.0	37.0	35.0	0.0

Field Posting

Status LEGAL Posting Date 06/25/96

	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	N / N	Other
P / N	Ladder	N / N	Staging		
N / N	Boat	N / N	Traffic Control		
Y / Y	Wader	N / N	RR Flagperson		
N / N	Inspector 50	N / N	Police		

Inspection Hours: 008

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STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	1J2	U-02-008

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
UXBRIDGE	U02008-1J2-MUN-NBI	000.241	A:OPEN	SEP 7, 2011

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY DEPOT ST		1994	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER MUMFORD RIVER	Urban Local	L. A. Gauthier

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
505 : Prestressed Concrete Box Beam or Girders - Multiple	Town Agency	Town Agency	R. Orlando

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
2 : Concrete Precast Panels	Rain	14°C	R. VANMETER

ITEM 58 — DECK — 7

		DEF
1. Wearing Surface	6	M-A
2. Deck Condition	7	-
3. Stay in place forms	N	-
4. Curbs	7	-
5. Median	N	-
6. Sidewalks	7	-
7. Parapets	7	-
8. Railing	7	-
9. Anti Missile Fence	N	-
10. Drainage System	N	-
11. Lighting Standards	N	-
12. Utilities	8	-
13. Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	E	W
	200	175

APPROACHES

		DEF
a. Appr. Pavement Condition	6	M-P
b. Appr. Roadway Settlement	7	M-P
c. Appr. Sidewalk Settlement	7	M-P
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 — SUPERSTRUCTURE — 7

		DEF
1. Stringers	N	-
2. Floorbeams	N	-
3. Floor System Bracing	N	-
4. Girders or Beams	7	-
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	H	-
10. Diaphragms/Cross Frames	N	-
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Member Alignment	8	-
14. Paint/Coating	N	-
15.	N	-

Year Painted	N

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

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

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

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

Any Cracks: **(Y/N)** N

ITEM 60 — SUBSTRUCTURE — 7

	Dive	Cur		DEF
1. Abutments			7	
a. Pedestals	N	N		-
b. Bridge Seats	N	7		-
c. Backwalls	N	H		-
d. Breastwalls	N	7		-
e. Wingwalls	N	7		-
f. Slope Paving/Rip-Rap	N	7		-
g. Pointing	N	N		-
h. Footings	N	H		-
i. Piles	N	N		-
j. Scour	N	7		-
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		-

UNDERMINING (Y/N) If YES please explain N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): N *I-60 (This Report):* 7

93B-U/W (DIVE) Insp 00/00/00

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J2**	**U-02-008**	**U02008-1J2-MUN-NBI**	**SEP 7, 2011**

ITEM 61 — CHANNEL & CHANNEL PROTECTION

7

	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	7	-
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: 00/00/00

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	1	7	-
B. Transitions	0	7	-
C. Approach Guardrail	1	7	-
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: 00/00/00 **EJDMT Date:** 00/00/00

Signs In Place (Y=Yes,N=No, NR=NotRequired) **Legibility/ Visibility**	At bridge N	At bridge S	Other Advance N	Other Advance S

CLEARANCE POSTING

Not Applicable **X**

	E ft	E in	W ft	W in	meter
Actual Field Measurement		0		0	
Posted Clearance		0		0	

Signs In Place (Y=Yes,N=No, NR=NotRequired) **Legibility/ Visibility**	At bridge E	At bridge W	Advance E	Advance W

ACCESSIBILITY (Y/N/P)

	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

TOTAL HOURS **8**

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

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

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): **Y**

Date: 02/01/1996

Inspection data at time of existing rating

I 58: **8** I 59: **8** I 60: **9** Date : 09/01/1995

(To be filled out by DBIE)

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

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

REASON: _____

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	Advance 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	Advance 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 stablility. 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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J2**	**U-02-008**	**U02008-1J2-MUN-NBI**	**SEP 7, 2011**

REMARKS

BRIDGE ORIENTATION
The approaches are South and North, and the elevations are West and East (from the plans). This structure is a prestressed concrete box beam with 9 beams and 8 longitudinal beam joints numbered from West to East. The river flows from West to East.

ITEM 58 - DECK

Item 58.1 - Wearing Surface
There is a 1/2 inch wide longitudinal crack, up to 3/4 of the length of the wearing surface, over beam joint #7. There is a 1/4 inch wide longitudinal crack, up to 3/4 of the length of the wearing surface, over beam joint #3, partially sealed. There is minor transverse and longitudinal cracking in several areas throughout.

Item 58.2 - Deck Condition
See Item 59.4.

Item 58.6 - Sidewalks
The West concrete sidewalk has isolated areas of minor scaling along the back of the granite curbs.

Item 58.7 - Parapets
There is a 1 foot long hairline crack with efflorescence and an area of moderate efflorescence leaching from bottom of the West parapet, at the North end.

Item 58.8 - Railing
The East bridge rail has a 5 inch diameter area of delamination to the top of one post near midspan. The end posts have minor hairline map cracking. The remainder of both bridge rails have several minor hairline cracks throughout the caps and bases.

APPROACHES

Approaches a - Appr. Pavement Condition
There is full width moderate transverse cracking and break up to both approach to deck transitions. **See Photo 1**. Both approaches have minor transverse and longitudinal cracking throughout.

Approaches b - Appr. Roadway Settlement
There is minor settlement at both approach to deck transitions.

Approaches c - Appr. Sidewalk Settlement
There is up to 1/2 inch of settlement to both approach sidewalks.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams
There is heavy active leakage and moderate water and efflorescence staining through joints #3 and #7. **See Photo 2.** Joint #7 has several pieces of joint filler hanging down.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
The South breastwall has a full height hairline crack under beam #2 and a 5 foot high hairline crack under beam #7.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J2**	**U-02-008**	**U02008-1J2-MUN-NBI**	**SEP 7, 2011**

REMARKS

Item 60.1.e - Wingwalls
There is an area of hairline map cracking with effflorescence leaching, and an 18 inch long diagonal hairline crack at the top of the Northwest wingwall.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.4 - Vegetation
There is minor to moderate vegetation growing at all four corners of the bridge.

Item 61.7 - Aggradation
There is minor aggradation along the North rip-rap.

TRAFFIC SAFETY

Item 36a - Bridge Railing
See Item 58.8.

Item 36b - Transitions
All transitions are not sufficiently stiffened.

Item 36d - Approach Guardrail Ends
The Northwest, Southeast, and Northeast terminal ends have minor collision damage.

Photo Log
Photo 1 : Typical cracking to the approach to deck transitions.
Photo 2 : Leakage and effflorescence along joint #7, typical of joint #3.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
UXBRIDGE	**1J2**	**U-02-008**	**U02008-1J2-MUN-NBI**	**SEP 7, 2011**

PHOTOS

Photo 1: **Typical cracking to the approach to deck transitions.**

Photo 2: **Leakage and efflorescence along joint #7, typical of joint #3.**

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Hartford Avenue East over the West River (Bridge No. U-02-017)

Priority 24

AVAILABLE INFORMATION

Hartford Avenue is classified as a Rural Major Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a double-barrel concrete box culvert. The structure length is 105'-0", while both boxes have equal spans of 9'-0" each. The hydraulic opening of each box culvert is 6'-0" high by 9'-0" wide. The flow was 25" deep at the time of inspection and flowing southward. The structure is considerably lower than the roadway and as a result the depth of fill over the structure is approximately 16'.

The roadway width over the structure is approximately 35'-6" with no sidewalks on either side and consists of an asphaltic wearing surface. There are moderate horizontal and vertical curves with low visibility at both approaches. Residential driveways are also located at both approaches.

Overhead wires run along the north side of the roadway. At the culvert approaches, there are catch basins that connect to a drainage line running down the center of the roadway.

The safety barrier consists of standard SS highway guardrail that is continuous on both sides.

There were no signs noted at the approaches.

FINDINGS

The overall condition of the structure is good with few minor deficiencies noted.

The concrete box culverts are in good condition. Both boxes typically exhibit minor spalling at the culvert joints. There is also random spalling on the roof of the west box (See Photo 5). Both the inside of the culverts and all wingwalls have minor scaling up to 12" above the waterline.

There is a large accumulation of debris at the upstream entrance of the culvert. The west box also has random debris throughout the concrete culvert floor.

The SS guardrails are continuous across the culvert and are in good condition. Minor collision damage at the southwest corner of the approach rail was noted.

RECOMMENDATIONS

The overall condition of this structure is good and requires little maintenance at the present time. BETA recommends the following:

- Repair all spalled areas in the concrete box joint and roof.

- Remove all debris from the upstream opening and inside the western box .

Conduct routine inspections at intervals not exceeding two years

BUDGETARY COST ESTIMATE

Repairs

Construction:	$10,000
Engineering:	$5,000
Total:	$15,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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315 NORWOOD PARK SOUTH
NORWOOD, MA 02062
781.255.1982
EMAIL: BETA@BETA-INC.COM

BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

HARTFORD AVENUE EAST
OVER
THE WEST RIVER

BRIDGE NO.
U-02-017

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-017

General:

Street Name: Hartford Avenue East **Waterway:** West River **Culvert ID:** U-02-017

Inspectors:

Name: Tood Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/14/2011 **Weather:** Partly Cloudy **Temp:** 75°F

General Culvert Information:

Culvert Type: Double Barrel Concrete Boxes **Construction Date:** N/A

Dimensions Of Hydraulic Opening Height (Inches): 72 **Length of Culvert Feet:** 105

Dimensions Of Hydraulic Opening Width (Inches): 108 **Depth of Fill Over Culvert Inches:** 192"

Depth of Flow During Inspection: 25" **Direction of Flow:** South

Utilities Carried By Structure: Overhead utilities

Drainage Structures: Drain pipe down center with catch basins

Other: Asphalt-lined channel NorthEast of culvert

Abutments/Culvert Sidewalls:

Abutment North Sidewall: N/A

Abutment South Sidewall: N/A

Abutment East Sidewall: Typical: Minor scaling up to 12" above waterline. Otherwise good shape

Abutment West Sidewall: Typical: Minor scaling up to 12" above waterline. Otherwise good shape

Abutment North Sidewall Rating: N/A **Abutment South Sidewall Rating:** N/A

Abutment East Sidewall Rating: N/A **Abutment West Sidewall Rating:** 4

Culvert Roof:

Culvert Roof Notes: Random Spalling on roof of West box. Few random cracks w/efflo. Both: Typical spalling at culvert joints

Culvert Roof Rating: 4

Culvert Floor, Entrance, Exit

Floor Rating: 3

Floor Scour: None detected **Debris:** West Box - Random Debris

Floor Notes: Concrete floor. Good condition, but large debris accumulating at upstream entrance.

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-017

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 4

North East Wall: Typical. Minor scaling up to 12" above waterline. Overall good condition

North West Wall: Wingwall **North West Wall Type:** Concrete **North West Wall Rating:** 4

North West Wall: Typical. Minor scaling up to 12" above waterline. Overall good condition

South East Wall: Wingwall **South East Wall Type:** Concrete **South East Wall Rating:** 4

South East Wall: Typical. Minor scaling up to 12" above waterline. Overall good condition

South West Wall: Wingwall **South West Wall Type:** Concrete **South West Wall Rating:** 4

South West Wall: Typical. Minor scaling up to 12" above waterline. Overall good condition

Head Wall: Concrete Box Headwall **Head Wall Type:** Concrete **Head Wall Rating:** 3

Head Wall Notes: None

Roadway Condition:

North Roadway Approach Condition: N/A **North Roadway Inches:** N/A

North Roadway Approach Settlement: N/A **North Roadway Rating:** N/A

North Roadway Approach Alignement: N/A

South Roadway Approach Condition: N/A **South Roadway Inches:** N/A

South Roadway Approach Settlement: N/A **South Roadway Rating:** N/A

South Roadway Approach Alignement: N/A

East Roadway Approach Condition: Small asphalt patch, catch basins **East Roadway Inches:** 425

East Roadway Approach Settlement: None **East Roadway Rating:** 4

East Roadway Approach Alignement: Driveways. Horiz curve, Low vis + high speeds.

West Roadway Approach Condition: Catch Basins, Good **West Roadway Inches:** 425

West Roadway Approach Settlement: None **West Roadway Rating:** 4

West Roadway Approach Alignement: Driveways. Horiz curve, Low vis + high speeds.

Safety Barrier

Guard Rail Type: Highway guardrail cont.

Guard Rail Condition: Collision damage SW

Guard Rail Rating: 4

Guard Rail Notes: None

Photo 1 Looking South: North Culvert Elevation

Photo 2 Looking North: Underside of East Box

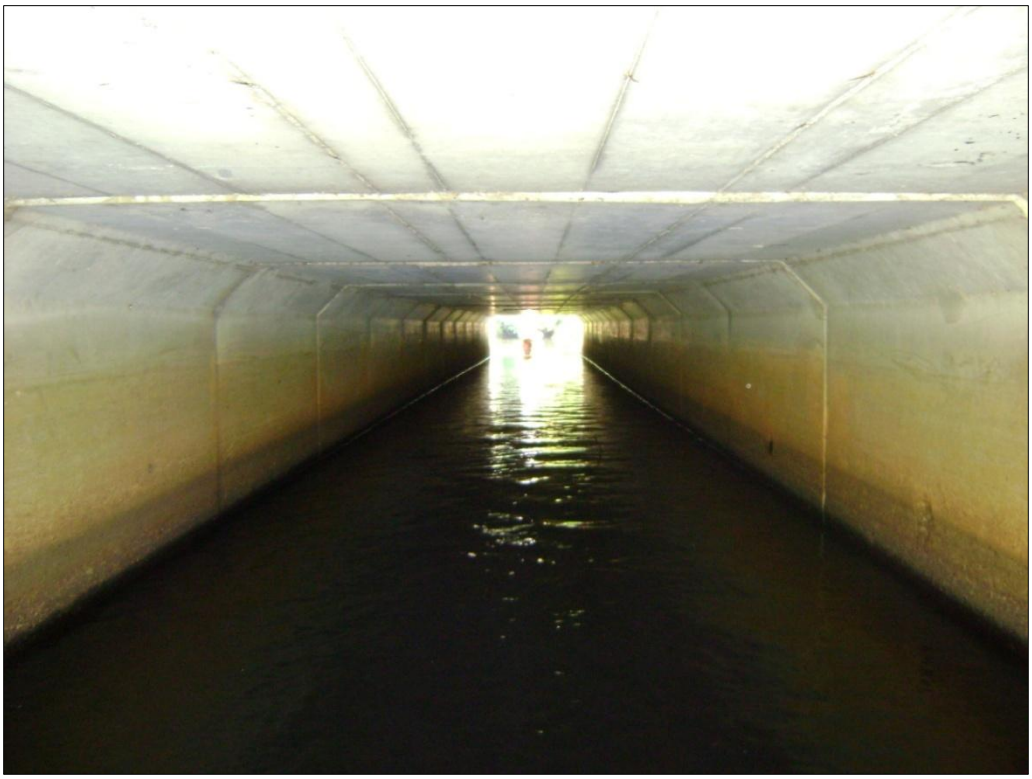

Photo 3 Looking South: Underside West Box

Photo 4 Looking Up: Random Spall in Roof of West Box

Photo 5 Looking West: Typical Deterioration of West Box Joint

Photo 6 Looking North: South Culvert Elevation

Photo 7 Looking West: East Approach

Photo 8 Looking East: West Approach

Photo 9 Looking East: Typical Guardrail over Culvert

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Blackstone Street over Meadow Brook
(Bridge No. U-02-037)

Priority 25

AVAILABLE INFORMATION

Blackstone Street is classified as a Rural Major Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

This structure consists of a mortared stone masonry arch with corrugated iron lining. The date of construction as noted by existing bridge plans is August 1938. The structure has an out-to-out width of 50'-6" with a clear span of 9'-0". The hydraulic opening of the arch structure is approximately 12'-0" high by 10'-0" wide. The depth of flow at the time of inspection was 48". The depth of fill over the structure is approximately 6'-6"

The roadway width over the structure is 25'-0" with no sidewalks on either side and consists of an asphaltic wearing surface. There are sharp horizontal curves with poor visibility at both approaches. Also, there are driveways directly adjacent to the structure at the north approach.

Overhead wires run along the west side of the roadway. There are also paved waterways at the east side of the north approach and the west side of the south approach.

The bridge guardrail consists of standard highway guardrail that runs continuously from approach to approach on both sides of the roadway.

The structure is posted at both approaches for a weight limit of 20T, 36T, 52T for Type H, Type 3, and Type 3S2 trucks, respectively. However, no rating report is on file with the Massachusetts Department of Transportation.

FINDINGS

The overall condition of the structure is good with few minor deficiencies noted.

The corrugated lining at the underside of the arch shows no signs of corrosion or missing connection bolts (See Photo 2).

The concrete abutment caps are also in good condition. However, both typically exhibit light-to-moderate scaling at the waterline. Also noted on the masonry portion of the abutments are large voids, up to 7" deep, between the stone masonry wall and concrete cap at the west opening (Photo 5).

All wingwalls and headwalls are in good condition with minor loss of pointing at the waterline. No scour was detected.

The roadway shows minor cracking and clear pavement markings. Both approaches have limited visibility as a result of the horizontal curves. The SS guardrail is also in good condition. It is also noted that the roadway is narrower than the bridge. As a result of the

roadway width and depth of fill over the bridge, steep embankments extend down the structures headwalls at both openings.

RECOMMENDATIONS

The overall condition of this structure is good and requires little maintenance at the present time. However, it is recommended that the existing posting be enforced. BETA recommends the following:

- Fill all voids in masonry abutments.
- Fill all voids and re-point masonry wingwalls.
- Repair cracks in concrete abutment caps.
- The Town to follow up and clarify the origins and validity of current posting and/or loading restrictions.

Conduct routine inspections at intervals not exceeding two years

BUDGETARY COST ESTIMATE

Repairs

Construction:	$20,000
Engineering:	$5,000
Total:	$25,000

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

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BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

BLACKSTONE STREET
OVER
MEADOW BROOK

BRIDGE NO.
U-02-037

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-037

General:

Street Name: Blackstone Street **Waterway:** Meadow Brook **Culvert ID:** U-02-037

Inspectors:

Name: Todd Warzecki **Position:** Senior Project Engineer

Name: Chris Frano **Position:** Engineer

Name: None **Position:** None

Inspection Conditions:

Date: 7/14/2011 **Weather:** Partly Cloudy **Temp:** 75°F

General Culvert Information:

Culvert Type: Stone Masonry Arch w/corr. Iron lining **Construction Date:** 1938

Dimensions Of Hydraulic Opening Height (Inches): See Construction Plans **Length of Culvert Feet:** 50.5

Dimensions Of Hydraulic Opening Width (Inches): See Construction Plans **Depth of Fill Over Culvert Inches:** 78"

Depth of Flow During Inspection: 24-48" - see Culvert notes **Direction of Flow:** West

Utilities Carried By Structure: Overhead utilities

Drainage Structures: 2 paved waterways at NorthEast and SouthWest approaches

Other: Roadway width much narrower than culvert length, so the embankments slope down from pavement to top of headwall. Depth of flow 48" under, E approach channel 24"

Abutments/Culvert Sidewalls:

Abutment North Sidewall: Stone masonry walls w/concrete cap. Moderate to heavy scaling of concrete cap at waterline (TYP).

Abutment South Sidewall: Channel wall: Large voids between masonry wall and concrete cap at west opening. Approx. 7" deep

Abutment East Sidewall: N/A

Abutment West Sidewall: N/A

Abutment North Sidewall Rating: 4 **Abutment South Sidewall Rating:** 4

Abutment East Sidewall Rating: 4 **Abutment West Sidewall Rating:** N/A

Culvert Roof:

Culvert Roof Notes: Corrugated metal arch. No corrosion noted. All bolts present. Great condition

Culvert Roof Rating: 5

Culvert Floor, Entrance, Exit

Floor Rating: 4

Floor Scour: None detected **Debris:** Sand and Boulders

Floor Notes: None

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-037

Training/Wingwalls:

North East Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 4

North East Wall: Typical, hardly any loss of mortar except at waterline. Concreate cap on top of masonry.

North West Wall: Wingwall **North West Wall Type:** Mortared Masonry **North West Wall Rating:** 4

North West Wall: Typical, hardly any loss of mortar except at waterline.

South East Wall: Wingwall **South East Wall Type:** Mortared Masonry **South East Wall Rating:** 4

South East Wall: Typical, hardly any loss of mortar except at waterline. Concrete cap on top of masonry.

South West Wall: Wingwall **South West Wall Type:** Mortared Masonry **South West Wall Rating:** 4

South West Wall: Typical, hardly any loss of mortar except at waterline.

Head Wall: N/A **Head Wall Type:** N/A **Head Wall Rating:** N/A

Head Wall Notes: N/A

Roadway Condition:

North Roadway Approach Condition: Minor cracking **North Roadway Inches:** 300

North Roadway Approach Settlement: None **North Roadway Rating:** 4

North Roadway Approach Alignement: Driveways, horiz curve w/poor visibility

South Roadway Approach Condition: Minor cracking **South Roadway Inches:** 300

South Roadway Approach Settlement: None **South Roadway Rating:** 4

South Roadway Approach Alignement: Driveways, horiz curve w/poor visibility

East Roadway Approach Condition: N/A **East Roadway Inches:** N/A

East Roadway Approach Settlement: N/A **East Roadway Rating:** N/A

East Roadway Approach Alignement: N/A

West Roadway Approach Condition: N/A **West Roadway Inches:** N/A

West Roadway Approach Settlement: N/A **West Roadway Rating:** N/A

West Roadway Approach Alignement: N/A

Safety Barrier

Guard Rail Type: Standard highway guardrail continuous from approaches across culvert.

Guard Rail Condition: Unlikely that guardrail posts extend deep enough across culvert. Guardrails offset several feet from fascias.

Guard Rail Rating: 4

Guard Rail Notes: All pavement markings clear.

Photo 1 Looking West: East Bridge Elevation

Photo 2 Looking West: Typical Inside of Culvert

Photo 3 Looking West: North Channel Wall

Photo 4 Looking West: South Channel Wall

Photo 5 Looking Southeast: Void in South Channel Wall at West Opening

Photo 6 Looking Northeast: West Elevation

Photo 7 Looking North: South Approach

Photo 8 Looking North: Typical Guardrail Over Culvert

Photo 9 Looking South: North Approach

Photo 10 Looking Southeast: Paved Waterway at Northeast Corner

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River Road over Ironstone Brook
(Bridge No. U-02-030)

Priority 26

AVAILABLE INFORMATION

River Road is classified as a Rural Minor Collector according to the MassDOT Office of Transportation Planning.

BRIDGE DESCRIPTION

The River Road Bridge is to be replaced by MassDOT with a folded plate girder superstructure founded on concrete abutments.

FINDINGS

The bridge replacement project was under construction at the time of inspection. (See Photo 1)

RECOMMENDATIONS

BETA has no recommendations for this bridge as it is currently under construction.

BUDGETARY COST ESTIMATE

NA

Attachments

Locus Map

Culvert Inspection Checklist

Inspection Photos

BETA
ENGINEERING SUCCESS TOGETHER
315 NORWOOD PARK SOUTH
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EMAIL: BETA@BETA-INC.COM

BRIDGE AND CULVERT EVALUATION
UXBRIDGE, MASSACHUSETTS

SCALE: 1" = 500'

RIVER ROAD
OVER
IRONSTONE BROOK

BRIDGE NO.
U-02-030

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Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-030

General:

Street Name: River Road **Waterway:** Ironstone Brook **Culvert ID:** U-02-030

Inspectors:

Name: **Position:**

Name: **Position:**

Name: **Position:**

Inspection Conditions:

Date: **Weather:** **Temp:**

General Culvert Information:

Culvert Type: **Construction Date:**

Dimensions Of Hydraulic Opening Height (Inches): **Length of Culvert Feet:** 0

Dimensions Of Hydraulic Opening Width (Inches): **Depth of Fill Over Culvert Inches:**

Depth of Flow During Inspection: **Direction of Flow:**

Utilities Carried By Structure:

Drainage Structures:

Other: Under Construction, Everything N/A

Abutments/Culvert Sidewalls:

Abutment North Sidewall:

Abutment South Sidewall:

Abutment East Sidewall:

Abutment West Sidewall:

Abutment North Sidewall Rating: **Abutment South Sidewall Rating:**

Abutment East Sidewall Rating: **Abutment West Sidewall Rating:**

Culvert Roof:

Culvert Roof Notes:

Culvert Roof Rating:

Culvert Floor, Entrance, Exit

Floor Rating:

Floor Scour: **Debris:**

Floor Notes:

Town of Uxbridge, Massachusetts

Culvert Inspection Checklist

U-02-030

Training/Wingwalls:

North East Wall: **North West Wall Type:** **North West Wall Rating:**

North East Wall:

North West Wall: **North West Wall Type:** **North West Wall Rating:**

North West Wall:

South East Wall: **South East Wall Type:** **South East Wall Rating:**

South East Wall:

South West Wall: **South West Wall Type:** **South West Wall Rating:**

South West Wall:

Head Wall: **Head Wall Type:** **Head Wall Rating:**

Head Wall Notes:

Roadway Condition:

North Roadway Approach Condition: **North Roadway Inches:**

North Roadway Approach Settlement: **North Roadway Rating:**

North Roadway Approach Alignement:

South Roadway Approach Condition: **South Roadway Inches:**

South Roadway Approach Settlement: **South Roadway Rating:**

South Roadway Approach Alignement:

East Roadway Approach Condition: **East Roadway Inches:**

East Roadway Approach Settlement: **East Roadway Rating:**

East Roadway Approach Alignement:

West Roadway Approach Condition: **West Roadway Inches:**

West Roadway Approach Settlement: **West Roadway Rating:**

West Roadway Approach Alignement:

Safety Barrier

Guard Rail Type:

Guard Rail Condition:

Guard Rail Rating:

Guard Rail Notes:

Photo 1 Looking East: Construction at River Road over Ironstone Brook