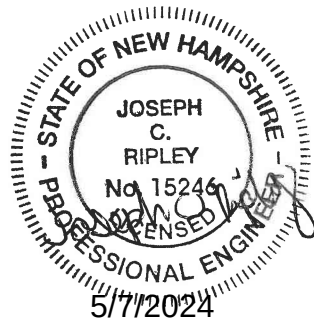




Town Wide Bridge and Culvert Assessment Amherst, New Hampshire

Project No. 23.919101.01
May 2024

Prepared for:
Town of Amherst, NH



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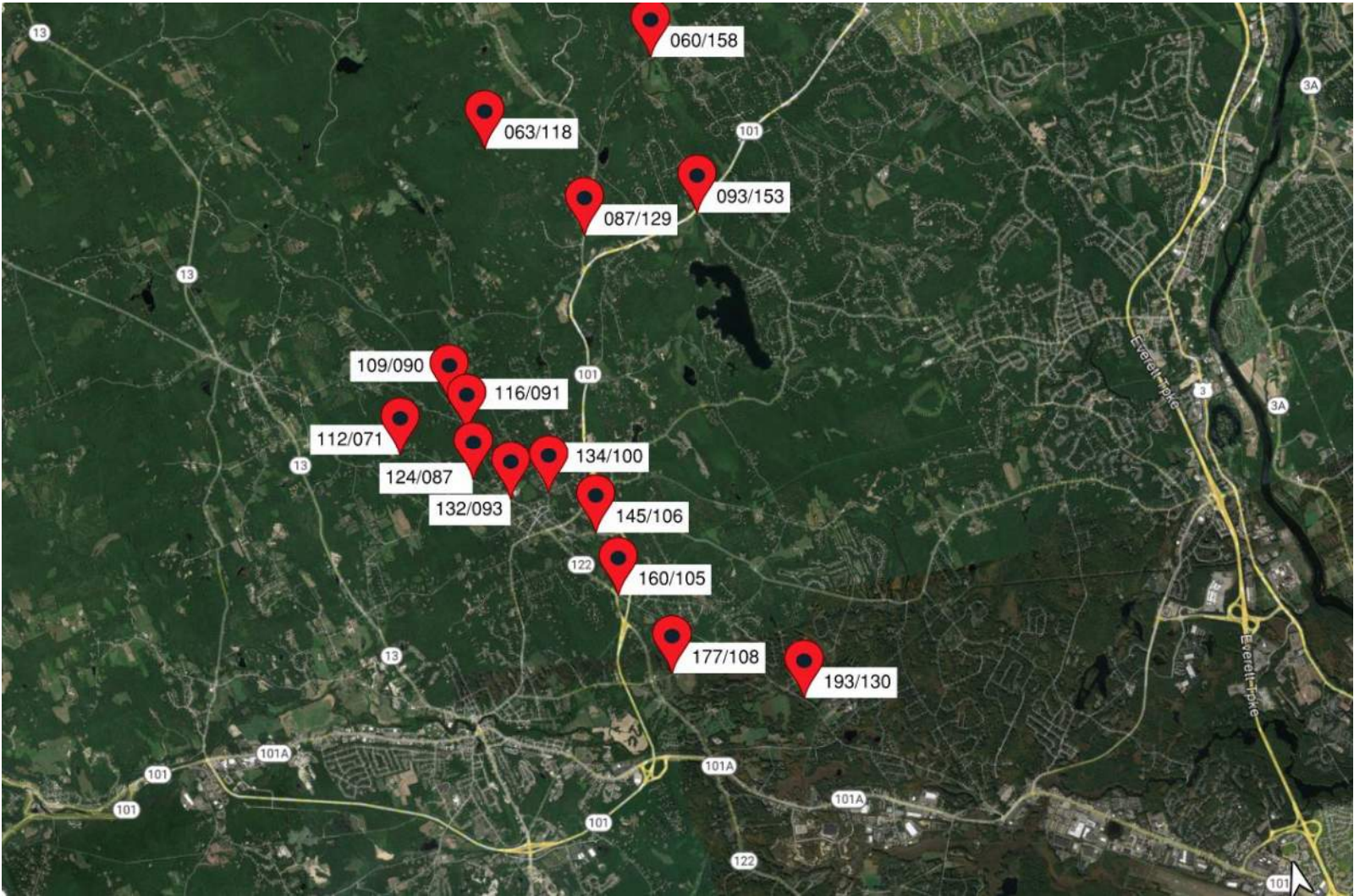
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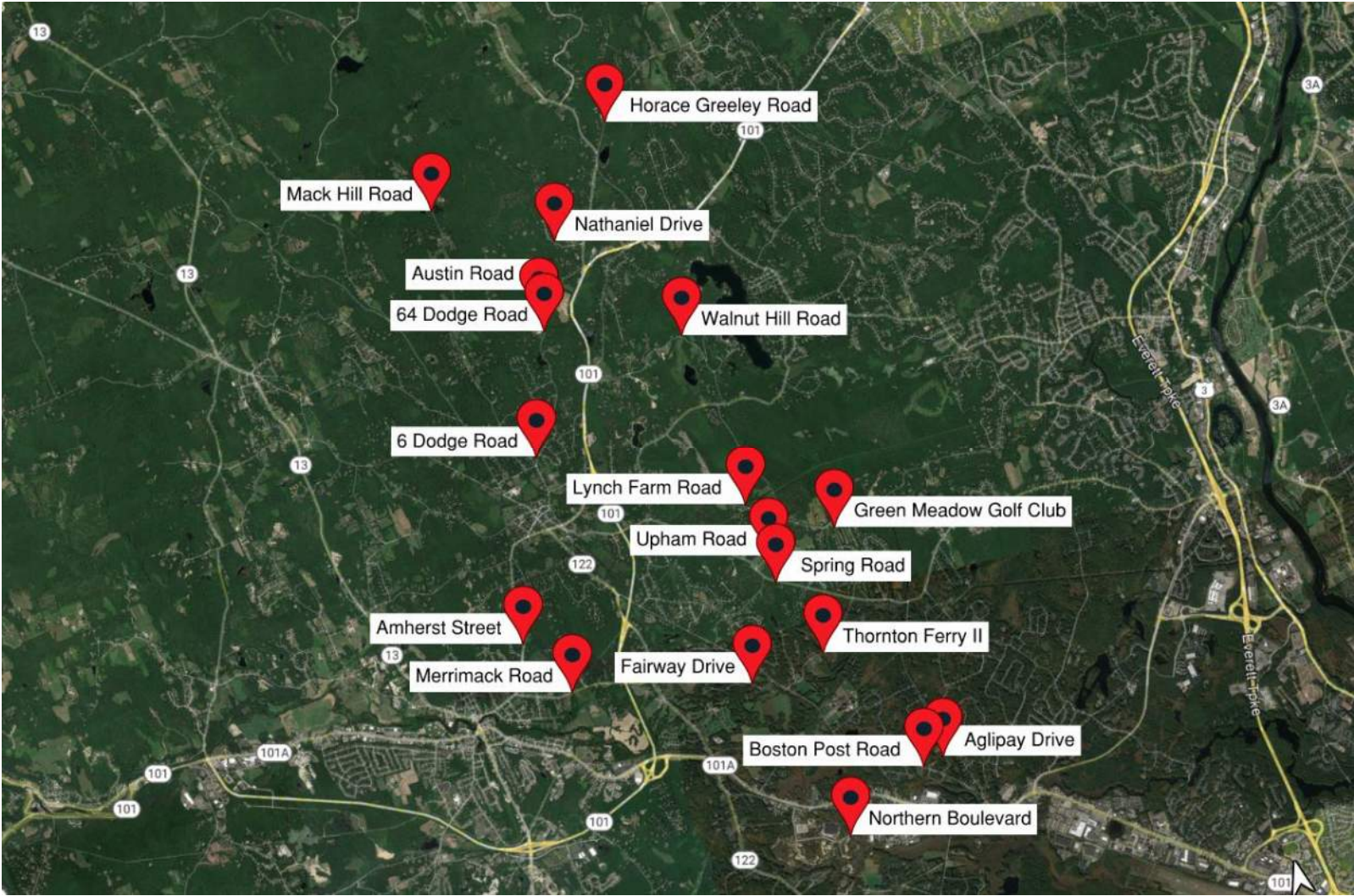
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1 INTRODUCTION

1.1 Location Map – Town Owned Bridges



1.2 Location Map – Town Owned Culverts



1.3 Executive Summary

The Town of Amherst (Town) retained Hoyle, Tanner & Associates, Inc. (Hoyle Tanner) to perform visual observations of select Town owned bridges and culverts (together referred to as crossings) for the purpose of identifying maintenance, rehabilitation, or replacement priorities for each crossing based on the observed condition, the crossing priority, the Town's budgetary constraints, and current environmental permitting considerations.

Hoyle Tanner personnel reviewed available data from the Town, NHDOT Bridge Inspection Reports (as available), and the NH Stream Crossing Initiative GIS database, and performed limited field observations to develop the priorities and recommendations of this Report. The goal of this Report is to formulate a plan that recommends maintenance, rehabilitation, or replacement work for each crossing that can be accomplished within the Town's budgetary constraints. Based on the field observations and the noted crossings' conditions, the following priority list has been developed as a guide for internal Town planning and budgeting purposes. The "DPW Priority" column has been provided to identify major work (repair, rehabilitation, or replacement) that can likely be completed by Department of Public Works staff and equipment. Conceptual costs for this work have been provided as if the work will be designed and publicly bid for construction by a contractor, however, there will likely be significant savings if this work is completed by Department of Public Works forces.

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Table 1. Bridge and Culvert Priorities

Priority Ranking	DPW Priority	NHDOT Bridge Number	Location
1			Thornton Ferry Rd. II/ Green Meadow GC
2	D1		64 Dodge Road
3		124/087	Boston Post Road over Beaver Brook
4		116/091	New Boston Road over Beaver Brook
5		193/130	Boston Post Road over Souhegan River
6			28 Thornton Ferry Road II
7	D2		82 Amherst Street
8		160/105	Boston Post Road over Beaver Brook
9		132/093	Boston Post Road over Beaver Brook
10		177/108	Merrimack Road over Beaver Brook
11		093/153	Camp Road over Baboosic Brook
12	D3	063/118	Brook Road over Joe English Brook
13			168 Mack Hill Road
14			Northern Boulevard
15	D4		3 Fairway Drive
16	D5		Upham Road
17			15 Aglipay Drive
18	D6		29 Austin Road
19	D7		6 Dodge Road
20			Horace Greeley Road over Joe English Brook
21		109/090	New Boston Road over Beaver Brook
22			64 Stearns Road (Honey Pot Pond)*
23			69 Walnut Hill
24		134/100	Manchester Road over Beaver Brook
25		060/158	Horace Greeley Road over Pulpit Brook
26			75 Spring Road*
27			Lynch Farm Road
28		112/071	Mont Vernon Road over Ceasars Brook*
29		145/106	Thornton Ferry Road over Beaver Brook*
30			13 Nathaniel Drive
31			Merrimack Road at 2 Holt Road*
32			485 Boston Post Road*
33			78 Horace Greeley Road*

Notes:

1. Ranking is relative to the Town owned bridges and culverts included in this Report.
2. "*" Indicates a crossing that was not observed by Hoyle Tanner as part of this Report. See Section 1.4 for additional information.

Using Table 1 above, recommendations for repair, rehabilitation, or replacement are categorized short-term, intermediate-term, and long-term needs, which should be addressed within the next 0-2 years, 3-9 years, and beyond 10 years, respectively. A year-by-year capital expenditures matrix is provided in Appendix A and a Capital Reserve Fund (CRF) cash flow analysis is included in Appendix B to assist the Town with planning and fund appropriation. For repair timeframes that span several years (such as the intermediate-term repairs that span years 2 through 9), recommendations in Appendix A are ordered based on the overall crossing priority (with some exceptions for similar crossings that can be bundled together to reduce overall project cost). Table 2 below summarizes the total costs in these timeframes.

Table 2. Anticipated Capital Expenditure Summary

Timeframe	Total Anticipated Cost (Rounded)¹
Short-Term 0-2 Years	\$1,170,300
Intermediate-Term 3-9 Years	\$2,854,500
Long-Term 10+ Years	\$5,228,700
Total Capital Expenditures (Rounded)	\$9,253,500

Notes: 1. All costs include a 15% contingency and 3% yearly inflation.

Refer to the individual bridge and culvert assessments in Sections 2 and 3 of this Report for a complete list of all observed deficiencies and crossing specific recommendations.

General routine maintenance is suggested to be completed on a regular basis for all crossings and can likely be performed utilizing Department of Public Works staff and equipment. These maintenance items, if performed on a routine basis, can significantly prolong the useful service life of the Town's bridge and culverts, and postpone significant repair, rehabilitation, or replacement. Refer to Appendix C for recommended routine maintenance items and a maintenance schedule. Some bridge-specific or culvert-specific routine maintenance recommendations are included in Report Sections 2 and 3 for select crossings; however, the general routine maintenance recommended in Appendix C are applicable to all crossings, including those with specific maintenance recommendations.

1.4 Report Limitations

Based on Hoyle Tanner's coordination with the Town in the preparation of the scope of this project, only the bridges and culverts discussed in Table 1 are considered in this Report.

The Town of Amherst currently has 16 municipally owned bridges (see Section 1.5 below for the definition of a bridge). The following limitations apply to the bridges considered in this Report.

- Bridges 092/129 – Pine Road over Joe English Brook and 159/105 – Bypassed Boston Post Road over Beaver Brook are historic structures that are closed to traffic. As such, they were not observed by Hoyle Tanner and are not considered in this Report.
- Bridges 112/071 - Mont Vernon Road over Caesars Brook and 145/106 - Thornton Ferry Road I over Beaver Brook were not observed since 112/071 was replaced in the summer of 2023 and 145/106 is scheduled for replacement in 2024. Recommendations and maintenance for these bridges are included in Section 2 below.

The Town of Amherst owns many culvert water crossings that support vehicular traffic but do not meet

the definition of a bridge (see Section 1.5 below for the definition of a bridge). The following limitations apply to the culverts considered in this Report.

- Culverts at 485 Boston Post Road, 78 Horace Greeley Road, Merrimack Road at 2 Holt Road, 75 Spring Road, and 64 Stearns Road were not observed for this Report. These culverts have been recently observed by Hoyle Tanner under separate contracts with the Town. However, evaluations and recommendations are still included Section 3 below.
- There are additional culvert crossings not included in this Report that should be assessed soon to determine if any of these additional culverts have a higher priority ranking than structures included in this Report.

1.5 Observation Purpose and Methods

Hoyle Tanner personnel visited each crossing (except those discussed in Section 1.4) between October 16, 2023 and October 18, 2023 to perform limited field observations and to gather information for the preparation of this Report. The purpose of the site visits was to develop crossing priorities, identify the necessary work for each crossing, and to aid in the development of conceptual cost estimates for the identified work. The site visits included visual observations of all exposed crossing components and “hands-on” observation of all portions of the crossings that could be accessed by foot or waders. It is important to note that visual observations alone are not likely to reveal deficiencies beyond those that could be noted during a routine inspection. Advanced inspection including material sampling / testing was beyond the scope of this Report. Subsurface Utility Engineering (SUE) to locate and identify underground utilities was beyond the scope of this project. Underground utilities that could be identified visually (shutoff valves, exposed pipes, manholes, etc.) have been noted and taken into consideration in the development of the recommendations.

The most current NHDOT Bridge Inspection Reports were reviewed for each bridge prior to performing the site visits. Deficiencies noted in the reports were reviewed to evaluate if the deficiencies previously identified have increased in size and severity.

Any crossing structure in New Hampshire with a clear span of 10’ or greater is defined as a “bridge” per RSA 234:2. This definition also considers certain multi-span culvert crossings as bridges so long as the overall combined span is 10’ or more and if the distance between culverts is half the diameter of the culvert or less. All crossings that meet the definition of a bridge and are on public roadways are inspected by NHDOT. As part of this inspection, NHDOT assigns a condition rating based on the Federal Highway Administration’s (FHWA) Coding Guide. In this system, bridge components are assigned a numeric value from 9 to 0 which corresponds to a condition rating of “excellent” to “failed”, respectively. Condition ratings are used to compare the bridge to the condition of a new bridge, and it may not necessarily have any implications to the bridge’s structural or load carrying capacity. Explanations of all numeric values 9 to 0 and “excellent condition” to “failed condition” are provided with this Report in Appendix E. Culverts with spans less than 10 which do not meet the New Hampshire definition of a bridge are not inspected by NHDOT and the components are not assigned condition ratings. However, for the purposes of this Report, and to provide the Town with a more holistic understanding of the relative condition of all crossings, Hoyle Tanner has provided condition ratings based on the FHWA Coding Guide for all the of the culverts included in this Report.

A complete list of all deficiencies observed for the individual bridges and culverts are reported in Sections 2 and 3 below, respectively.

1.6 Environmental Permitting

Any work that creates temporary or permanent impacts to wetlands and / or surface waters will require environmental permitting. It is important to note that these impacts include construction access, water diversion, and the placement of equipment in jurisdictional areas for bridge repairs and maintenance. For complete bridge or culvert replacements discussed in Sections 2 and 3 below, permitting recommendations have been provided and are based on the requirements of the NHDES Wetlands Bureau and the USACE effective as of the date of this Report. Specific permitting requirements for bridge and culvert maintenance and repair activities that create impacts to jurisdictional areas are not discussed in detail in this Report. For repairs and maintenance of crossings with small watersheds (less than one square mile in upstream watershed size), it is likely that the Town can secure a NHDES Registration for Routine Roadway Maintenance Activities permit which has no application fee and is effective within five days of submission to NHDES. However, for bridges and culvers with a watershed larger than one square mile or with priority resource areas at or adjacent to the crossing, a NHDES Standard Dredge and Fill Wetlands Permit will likely be required.

The current process involved with applying for and receiving a Wetland Permit can take up to 6 months and often dictates the overall project design schedule. This process includes:

- Pre-application coordination with NHDES to ensure the project will meet the state wetland rules and to identify any potential conflicts with the proposed design and the amount or type of jurisdictional impacts.
- Preparation of the Wetland Permit Application. This step requires that all NHDES and USACE jurisdictional impacts be finalized. Additionally, all abutters to the project within 10' of any jurisdictional impact must be notified of the project and permission from the abutter to submit the permit application must be received.
- Once the Wetland Permit Application is received by NHDES and is considered administratively complete, NHDES has 50 days for projects involving less than one acre of jurisdictional impacts, or 75 days for all other projects to review or comment on the application. During this time additional information may be requested.
- Once NHDES has approved the Wetland Permit Application, the USACE has 30 days to issue the NH General Permit for the project.

2 TOWN OWNED BRIDGE EVALUATIONS

Bridge descriptions are taken from the NHDOT Bridge Inspection Reports and presented in sequential order based on the NHDOT bridge number designation.

Recommendations are based on the following:

- General recommendations based on the bridge type and the age of the bridge components. These recommendations are based on the 2018 NHDOT Bridge Program Recommended Investment Strategy (RIS). The RIS provides a typical recommended investment strategy (work items and frequency) to maximize the service life and minimize the life cycle costs of New Hampshire bridges. A copy of the RIS is included in Appendix D.
- Bridge specific deterioration that may or may not be covered in the RIS noted above.
- Hoyle Tanner's experience with the Town of Amherst to understand bridge usage, environmental permitting constraints, the Town's goals, and the Town's budgetary limitations.

2.1 Amherst 060/158 – Horace Greeley Road over Pulpit Brook

Priority: 25

Description

Amherst 060/158, constructed in 2018, carries Horace Greeley Road over Pulpit Brook. For the purposes of this Report, Pulpit Brook flows from north to south. The 40' long bridge consists of ten 3' wide prestressed concrete deck beams. The bridge has an out-to-out width of 30' and carries two lanes of traffic on a 26' wide exposed concrete deck. There is T2 galvanized bridge rail on both sides of the roadway. Overhead utilities consist of single-phase power and telecommunications that run along the north edge of Horace Greeley Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

- Deck: 8 Very Good Condition
- Superstructure: 8 Very Good Condition
- Substructure: 8 Very Good Condition



Upstream Bridge Elevation

Observations

The concrete deck exhibits minor vegetation growth at deck joints. The concrete deck and approach pavement are in very good condition. There is minor soil erosion behind guardrail posts. In the northeast quadrant, the approach guardrail exhibits minor scrapes and vehicular impact damage. The upstream brush curb exhibits frequent transverse hairline cracking with efflorescence. At the bridge rail posts, the hairline crack extends through the full brush curb width. The top surface of the cheek walls exhibits minor concrete scaling approximately ¼-inch in depth. At the time of observation, the water level was too high to assess the deck beams and abutment condition.

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

Recommendations

Short Term Recommendations:

- Apply a water repellent to the scaled area of the cheek wall (see Bridge Specific Maintenance)

Intermediate Term Recommendations:

- Clean and seal cracks in brush curbs.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- Apply a water repellent to the scaled area of the cheek wall.
- Monitor and remove vegetation in joints as needed.



Typical Brush Curb Cracking

2.2 Amherst 063/118 – Brook Road over Joe English Brook

Priority: 12 – DPW Priority 3 (For Short Term Repairs Only)

Description

Amherst 063/118, constructed in 1985, carries Brook Road over Joe English Brook. For the purposes of this Report, Joe English Brook flows from north to south. The 25' long bridge consists of three 6' diameter corrugated metal pipes (CMPs). For the purposes of this Report, the three CMPs are designated as Barrel #1, #2, and #3 from east to west. The bridge has an out-to-out width of 25 feet and carries a single alternating lane of traffic on a 16' wide gravel roadway. Guardrail is not present at the bridge. The bridge has mortared stone masonry headwalls. Overhead utilities consist of single-phase power and telecommunications that run along the north edge of Brook Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:



Bridge Upstream (Northwest) Elevation

- Culvert: 5 Fair

Observations

The gravel roadway is in good condition. There is a minor sinkhole behind the upstream headwall at Barrel #2. Additionally, there is side slope / bank erosion within the northeast quadrant. Along the upstream



Bridge Outlet Southeast Elevation

side, all three barrels are undermined by up to 6" deep for 2' to 4' along the length of the culvert. Barrels #1 to #3 have 6", 1', and 1' scour depths at the upstream pipe inverts, respectively. The upstream headwall exhibits voids along the edge of each barrel. On the downstream side, the headwall stones have settled and shifted downward between 2.5" to 5", especially at Barrel #2 which is noticeably lower than Barrels #1 and #3. The east end of the downstream headwall has a large 3' by 4' void assumed to have been caused by a missing headwall stone. The downstream channel exhibits some aggradation with sand build up between the barrels.

Each CMP barrel has an internal bituminous coating that has failed at and below the waterline. There is also moderate rusting and corrosion at the pipe inverts and sagging in the crown of the CMPs near roadway centerline.

The field observations made for this Report show that the existing bridge is likely in Poor (4) Condition as compared to the Fair (5) Condition Rating in the latest NHDOT Bridge Inspection Report.

Recommendations

Short Term Recommendations:

- Place grout bags or cutoff walls along the upstream inverts to alleviate further undermining.
- Re-point stone masonry headwalls.
- Repair the southeast headwall void.
- Remove vegetation from the headwalls.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Replace the existing bridge. The existing drainage area for this crossing is 5.88 square miles. Therefore, this crossing is classified by NHDES as a Tier 3 crossing. Tier 3 crossings must be designed as a span structure or an open-bottomed culvert per the NHDES Wetland Rules (Env-Wt 904.05). Brook Road is a low volume dead end street. The bridge is located near the end of Brook Road and there are no residences beyond the bridge. However, the bridge provides the only access to the Peabody Mill Environmental Center and to parking for the Joe English Conservation Land. As such, based on the usage of the bridge, it is unlikely that the Town will receive state funding to replace the existing structure; however, maintaining access to the facilities beyond the bridge is important for the citizens of Amherst. Based on the above constraints, Hoyle Tanner recommends that the temporary bridge currently in use for Bridge 145/106 – Thornton Ferry Road I Over Beaver Brook (see Section 2.11) be repurposed as the replacement bridge for the Brook Road crossing of Joe English Brook. This will provide a structure that is cost effective, greatly improves the existing hydraulics, and provides a natural channel.

Bridge Specific Maintenance:

- Monitor and remove vegetation as needed.

2.3 Amherst 087/129 – Horace Greeley Road over Joe English Brook

Priority: 20

Description

Amherst 087/129, constructed in 1989, carries Horace Greeley Road over Joe English Brook. For the purposes of this Report, Joe English Brook flows from west to east. The 38' long bridge consists of five W24x94 weathering steel stringers. The bridge has an out-to-out width of 30' and carries two lanes of traffic on a 27' paved deck. There is 2-Bar aluminum bridge rail on both sides of the roadway. Overhead utilities consist of single-phase power and telecommunications that run along the east edge of Horace Greeley Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

- Deck: 7 Good
- Superstructure: 7 Good
- Substructure: 7 Good



Bridge Inlet Elevation

Observations

The bridge and approaches have been recently repaved and are in excellent condition. The bridge exhibits light cracking on top of the brush curbs and deck soffit with minor efflorescence on the deck soffit at the northwest corner. Five of the seven posts on the eastern bridge rail have scrape or gouge damage. Two posts are bent, and the underside of the top aluminum rail in the northeast quadrant exhibits a gouged hole. In the southeast quadrant, the approach guardrail has a missing offset block. In the southwest quadrant, the approach guardrail has a split wood offset block. There is minor spalling on top of the northwest and southwest wingwalls with delamination occurring at the northeast wingwall. Otherwise, the concrete is sound. The steel stringers are in good condition. Corrosion has initiated at the north end of the eastern most beam. The bearing at this location exhibits laminar corrosion between the sole and masonry plate. Otherwise, there is minor surface corrosion on all bearings.



Northeast Fixed Bearing
Laminar Corrosion

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

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Recommendations

Short Term Recommendations:

- Per the NHDOT Bridge Inspection Report, this bridge is not load restricted.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- As of the date of this report, the subject bridge is 35 years old. As such, the recommended work is taken from the NHDOT RIS for structures at 40 years of service since these repairs will take place in the “long term” timeframe. This work includes:
 - Repair and patch the deck and substructure.
 - Replace membrane and pavement.
 - Replace the bearings.
 - Replace the silicone joint sealant.
- Additional site-specific work not covered in the NHDOT RIS includes:
 - Rehabilitate the bridge rail.
 - Replace guardrail end terminals with four EAGRT units.

Bridge Specific Maintenance:

- Clean the bridge deck annually. Monitor and remove vegetation and debris as needed.

2.4 Amherst 093/153 – Camp Road over Baboosic Brook

Priority: 11

Description

Amherst 093/153, constructed in 1951, carries Camp Road over Baboosic Brook. For the purposes of this Report, Baboosic Brook flows from west to east. The bridge is an 18' long concrete rigid frame. The bridge has an out-to-out width of 43' and carries two lanes of traffic on a 22' wide paved travel way. There is galvanized w-beam guardrail on both sides of the roadway. Overhead utilities consist of three-phase power and telecommunications that run along the east edge of Camp Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:



Bridge Upstream Elevation

- Culvert: 6 Satisfactory

Observations



**Cracking with Rust Staining
on Slab Soffit**

The roadway pavement is in good condition. At the time of observation, there was ponding on the eastern shoulder. In the northeast and northwest quadrants, the approach guardrail exhibits minor scrapes and vehicular impact damage. The western culvert headwall exhibits light cracking with moderate efflorescence. The deck slab soffit edge exhibits concrete cracking with rust staining and minor delamination below the upstream and downstream headwall. On the eastern edge, the bottom of the top slab has two additional spalls. The concrete frame legs and wingwalls exhibit hairline cracking and minor abrasion at water level. There is no joint sealant between the frame and the wingwalls.

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- Repair deteriorated concrete on the headwalls and slab soffit.

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- Replace damaged guardrail.
- Place silicone joint sealant in the frame-to-wingwall joints.

Long Term Recommendations:

- The existing bridge is 73 years old as of the writing of this report. Per the NHDOT RIS, the general recommendation is to replace concrete culvert bridges at an 80-year service life. Based on the condition of the bridge, and if the intermediate recommendations are completed on schedule, the remaining service life of this bridge will likely exceed 80 years.

Bridge Specific Maintenance:

- Monitor and remove vegetation and debris as needed.

2.5 Amherst 112/071 – Mont Vernon Road over Ceasars Brook

Priority: 28

Description

Amherst 112/071, constructed in 2023, carries Mont Vernon Road over Ceasars Brook. For the purposes of this report, Ceasars Brook flows from north to south. The bridge consists of a 24' clear span precast concrete rigid frame. The bridge has an out-to-out width of 27'-3" feet and carries two lanes of traffic on a 24'-3" wide roadway. There is T2 galvanized bridge rail on both sides of the bridge. Overhead utilities consist of single-phase power and telecommunications that run along the south edge of Mont Vernon Road. According to the latest NHDOT Bridge Inspection Report dated December 26, 2023, the bridge condition is as follows:

- Culvert: 9 Excellent



Bridge Inlet Elevation

Observations

Site observations of this bridge were not included in the scope for this project since the bridge was replaced in 2023 (see Section 1.4). The NHDOT Bridge Inspection Report does not include any observed deficiencies.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- None at this time.

2.6 Amherst 109/090 – New Boston Road over Beaver Brook

Priority: 21

Description

Amherst 109/090, constructed in 1966 and re-built in 1996, carries New Boston Road over Beaver Brook. For the purposes of this Report, Beaver Brook flows from west to east. The 15' clear span bridge consists of seven 4' wide prestressed deck beams. The bridge has an out-to-out width of 28 feet and carries two lanes of traffic on a 24' wide paved travel way. There is standard w-beam galvanized guardrail mounted to each brush curb and standard w-beam approach guardrail in each quadrant. Overhead utilities consist of single-phase power and telecommunications that run along the east edge of New Boston Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

- Deck: 7 Good
- Superstructure: 7 Good
- Substructure: 7 Good

Observations

The bridge and approach pavement are in good condition. Some pavement cracking was observed at the south deck end. Longitudinal pavement cracks were observed and have been sealed. The brush curbs exhibit minor cracking, with debris and vegetation growth along the gutter line. The bridge guardrail is substandard. The approach guardrail is substandard and does not have crash-worthy end terminals. The guardrail and bridge rail have scrapes and minor deformations throughout. The post-tensioning ducts along the deck beam fascia has minor cracking with efflorescence. The joints between adjacent deck beams exhibit signs of leaking as efflorescence and rust staining were observed throughout. The substructure, comprised of mortared stone masonry with cast-in-place concrete caps, is in good condition.

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.



Bridge Inlet Elevation



**Rusting and Efflorescence in
Prestressed Deck Beam Joint**

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Recommendations

Short Term Recommendations:

- Per the NHDOT Bridge Inspection Report, this bridge is not load restricted.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Replace bridge rail with new T101 bridge rail.
- Remove and replace approach guardrail including installation of new bridge approach rail and EAGRT end terminals.
- Replace the waterproofing membrane on the deck beams and repave the bridge deck.
- Replace silicone joint sealant along joints between the superstructure and substructure.

Bridge Specific Maintenance:

- Remove vegetation and debris from the bridge deck as needed.

2.7 Amherst 116/091 – New Boston Road over Beaver Brook

Priority: 4

Description

Amherst 116/091, constructed in 2006, carries New Boston Road over Beaver Brook. For the purposes of this Report, Beaver Brook flows from east to west. The bridge consists of a 10'-6" wide aluminum plate box culvert. The bridge has an out-to-out width of 42' and carries two lanes of traffic on a 21' wide paved roadway. There is w-beam guardrail with timber posts on each side of the roadway. Overhead utilities consist of single-phase power and telecommunications that run along the west edge of New Boston Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

- Culvert: 5 Fair



Bridge Inlet Elevation

Observations

The bridge and approach pavement are in good condition with sealed longitudinal cracks. The guardrail is substandard and has decayed timber posts, insufficient height, and insufficient end terminals in addition to minor scrapes and impact damage. The aluminum plates along the sides and top of the box culvert exhibit multiple small corrosion holes with efflorescence and water seepage in the middle of the box culvert. Based on research completed by Hoyle Tanner, this corrosion is likely caused by an electrochemical reaction between the aluminum, the bridge backfill, and moisture. There are some gaps between upstream headwall plates and the box culvert plates. The outlet apron is undermined across the entire culvert width. The box culvert is perched 1' above the natural channel causing a hydraulic drop. The northeast and northwest wingwalls are out of plumb and lean towards the waterway.



**Corrosion in Box Culvert
Plates at Roadway Centerline**

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

Recommendations

Short Term Recommendations:

- Per the NHDOT Bridge Inspection Report, this bridge is not load restricted.

Intermediate Term Recommendations:

- The existing bridge was constructed in 2006 and is one condition rating away from being considered in poor condition (NBIS rating of 4) and being placed on the NHDOT Municipal Red List. Based on our field observations, the condition rating of 5 is primarily due to the corrosion of the aluminum box culvert as discussed above. Arresting and/or mitigating the aluminum corrosion is important to keeping this bridge off the Municipal Red List and avoiding a costly and pre-mature full bridge replacement. Hoyle Tanner has coordinated with companies specializing in the mitigation of corrosion and it is likely that further corrosion can be prevented by:
 - Installing a sacrificial zinc anode to provide cathodic protection for the aluminum. Based on discussion with corrosion specialists, an effective cathodic protection technique for this bridge would be to clean the corrosion from the inside of the box culvert and apply a zinc rich paint to the interior face of the box culvert sheeting. The zinc will act as a galvanic anode to provide cathodic protection for the aluminum.
 - Installing an impervious waterproofing membrane within the bridge backfill to prevent water from accessing the soil and aluminum interface. Water is required for electrochemical corrosion.
- Replace guardrail with new w-beam rail and crash-worthy end terminals.
- Place grout bags at the outlet invert to alleviate further undermining.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- Monitor and remove vegetation as needed.

2.8 Amherst 124/087 – Boston Post Road over Beaver Brook

Priority: 3

Description

Amherst 124/087, constructed in 1970, carries Boston Post Road over Beaver Brook. For the purposes of this Report, Beaver Brook flows from north to south. The 24' long culvert consists of two 7'-10" span by 5'-8" rise CMPs. The bridge carries two lanes of traffic on a 20' wide paved travel way. There is standard w-beam guardrail with timber posts on both sides of the roadway. Overhead utilities consist of single-phase power and telecommunications that run along the south edge of Boston Post Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

- Culvert: 5 Fair



Bridge Inlet Elevation (Western Barrel)

Observations

The bridge and approach pavement are in good condition. There is minor soil erosion behind guardrail posts at the southern end of the bridge. At the CMPs, the guardrail posts are omitted resulting in a 25' span between posts. There is no double nesting of the w-beam guardrail at the location of omitted posts. The northwest headwall masonry is tipping out toward the waterway. The western CMP is clogged with debris. The eastern barrel exhibits minor deformation at the crown for the entire pipe length. Both CMP's exhibit corrosion with some section loss at the spring line. A void between the eastern CMP and the inlet headwall was observed.



Culvert Corrosion in Eastern Barrel

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- The existing bridge is one condition rating away from being considered in poor condition (NBIS rating of 4) and being placed on the NHDOT Municipal Red List. Based on our field observations,

the condition rating of 5 is primarily due to the corrosion of the CMPs as above. Arresting and/or mitigating the CMP corrosion is important to keeping this bridge off the Municipal Red List and avoiding a costly and pre-mature full bridge replacement. Hoyle Tanner recommends that a spray applied geopolymer lining be installed to the interior of both CMP's. Geopolymer is an engineered mortar that will bond to the steel CMP forming a robust lining that is corrosion resistant and can support structural stresses caused by the loads acting on the culvert meaning that the geopolymer is not dependent on the CMPs for structural strength. Geopolymer linings offer several advantages over other culvert slip lining options because they do not significantly reduce the hydraulic opening and will conform to the existing geometry of the CMP (including any deformation). The final thickness of the lining will be determined by the product manufacturer; however, it will likely be on the order of 3" thick. A hydraulic analysis of the culverts should be completed prior to this repair to determine the influence of the repair on the hydraulic performance of the culvert (considering changes in flow area and Manning's Roughness Coefficient), however, based on field observations, it is likely that this culvert has sufficient freeboard to accommodate flood events. This repair will require environmental permitting.

- Other repairs that should be completed as part of the geopolymer installation include:
 - Add additional w-beam section to stiffen the guardrail over the CMP's.
 - Remove beaver dam and debris from the western barrel. Install beaver screen.
 - Remove vegetation from the headwalls.
 - Repoint masonry.

Long Term Recommendations:

- None at this time

Bridge Specific Maintenance:

- Monitor and remove vegetation as needed.
- Monitor and remove accumulated beaver dam debris.

2.9 Amherst 132/093 – Boston Post Road over Beaver Brook

Priority: 9

Description

Amherst 132/093, constructed in 1969, carries Boston Post Road over Beaver Brook. For the purposes of this Report, Beaver Brook flows from west to east. The 21' long bridge consists of a cast-in-place concrete box culvert. The bridge has an out-to-out width of 37' and carries two lanes of traffic on a 28' deck in addition to a 5' wide sidewalk. There is 3 bar aluminum bridge rail on both sides of the roadway. Overhead utilities consist of three-phase power and telecommunications that run along the west edge of Boston Post Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

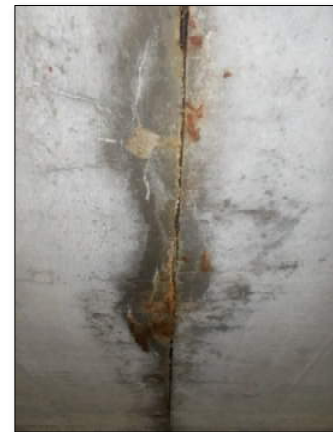
- Deck: 6 Satisfactory
- Superstructure: 6 Satisfactory
- Substructure: 7 Very Good



Bridge Outlet Elevation

Observations

The bridge and approach pavement are in good condition and exhibit a longitudinal crack at the roadway crown. As is typical for these structures, the pavement exhibits transverse cracking at the limits of the bridge. The concrete brush curb and sidewalk have minor spalling and minor longitudinal cracking along the interface with the granite curb. Vegetation is growing at the interface of the granite curb and pavement and the granite curb and concrete. The bridge rail exhibits impact damage, and the west rail has a fractured splice bar at the joint between the bridge and approach rail. A tree is encroaching over the bridge in the eastern quadrant. The top slab soffit exhibits minor leaking and rust staining at the centerline construction joint. The slab fascia exhibits hairline cracking. The walls of the box culvert exhibit minor cracking and moderate abrasion at the waterline. The eastern bank on the downstream side exhibits some undercutting just downstream of the bridge.



Top Slab Construction Joint

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- As of the date of this report, the subject bridge is 55 years old. The recommended work in the NHDOT RIS for a concrete slab bridge at 60 years of service is a complete slab replacement. However, based on Hoyle Tanner's observations as well as the deck condition rating of 6, Satisfactory, Hoyle Tanner recommends a deck repair project as is completed as opposed to a complete slab replacement. This work includes:
 - Repair and patch the box culvert top slab and wingwalls.
 - Install new barrier membrane on the top slab of the box culvert and repave the roadway.
- Additional site-specific work not covered in the NHDOT RIS includes:
 - Remove the existing granite curb from the bridge brush curb and sidewalk and install new cast-in-place concrete curb faces.
 - Remove the tree at the eastern quadrant rail.
 - Add riprap to the eastern bank just downstream of the bridge to alleviate undercutting.
 - Replace the western bridge rail splice bar.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- Remove debris from the bridge deck.

2.10 Amherst 134/100 – Manchester Road over Beaver Brook

Priority: 24

Description

Amherst 134/100, constructed in 2015, carries Manchester Road over Beaver Brook. For the purposes of this Report, Beaver Brook flows from west to east. The 44' long bridge consists of eight 4' wide and two 3' wide prestressed deck beams with a variable width partial length flared beam at the north abutment. The bridge has an out-to-out width of 38 feet at the south abutment and 44'-6" at the north abutment and carries two lanes of traffic on a variable width deck. A 5'-6" sidewalk is located on the downstream (east) side of the bridge. There is powder coated T4 galvanized bridge rail on both sides of the roadway. Overhead utilities consist of single-phase power and telecommunications that run along the west edge of Manchester Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

- Deck: 8 Very Good
- Superstructure: 8 Very Good
- Substructure: 8 Very Good

Observations

The pavement is in good condition. The pavement exhibits a moderate longitudinal joint crack along the center line of roadway from the south approach to the north end of the bridge. The asphaltic plug joints have begun to crack.

The substructure is in good condition. The silicone joint sealant at the southeast construction joint is missing. The north abutment exhibits vertical hairline splits that span the entire height of the abutment under beams 6 and 9.

The beams are in very good condition. The east exterior beam 10) fascia exhibits hairline longitudinal cracking. The northeast post tensioning duct exhibits efflorescence.

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.



Bridge Downstream Elevation



**Vertical Hairline Cracking in
North Abutment**

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Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- As of the date of this report, the subject bridge is 9 years old. As such, the recommended work is taken from the NHDOT RIS for structures at 10 years of service since these repairs will take place in the “intermediate” timeframe. This work includes:
 - Pavement inlay on approaches and bridge deck.
 - Replace plug joints.
- Additional site-specific work not covered in the NHDOT RIS includes:
 - Replace all silicone joint sealants.
 - Route and seal longitudinal crack at mid-height of beam 10 fascia.
 - Route and seal north abutment vertical cracks.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- Remove vegetation and debris from the bridge deck as needed.

2.11 Amherst 145/106 – Thornton Ferry Road I over Beaver Brook

Priority: 29

Description and Observation

Amherst 145/106, constructed in 1970, carries Thornton Ferry Road I over Beaver Brook. For the purposes of this Report, Beaver Brook flows from north to south. Site observation of this bridge was not included in the scope for this Report since the bridge is scheduled for replacement in 2024 (see Section 1.4). The existing bridge consists of two 9'-7" span by 6'-6" rise corrugated metal pipes and was closed to traffic on July 15, 2022 due to their deteriorated condition. A temporary bridge was installed in the Spring of 2023 to temporarily re-open the bridge to traffic prior to the upcoming complete replacement.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- None at this time.

2.12 Amherst 160/105 – Boston Post Road over Beaver Brook

Priority: 8

Description

Amherst 160/105, constructed in 1984, carries Boston Post Road over Beaver Brook. For the purposes of this Report, Beaver Brook flows from north to south. The bridge is located adjacent to the intersection of Boston Post Road and NH Route 122. The 36' long bridge consists of a twin cell cast-in-place concrete box culvert. Each cell has a 15' clear span. The bridge has an out-to-out width of 44' and carries two lanes of traffic with a 40' curb to curb width. There is 2 bar aluminum bridge rail on both sides of the roadway. Overhead utilities consist of single-phase power and telecommunications that run along the north edge of Boston Post Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:



Bridge Upstream Elevation

- Deck: 6 Satisfactory
- Superstructure: 6 Satisfactory
- Substructure: 7 Good

Observations



Cracking with Efflorescence and Rust Staining on Top Slab Soffit

The approach guardrail in the northeast and northwest quadrant exhibit impact damage with the northwest approach rail exhibiting three consecutive broken posts. The approach guardrail in the southeast and southwest quadrant has substandard “tip down” end treatments. Each approach exhibits 1” of settlement measured at the curbs. The top slab soffit exhibits widespread cracking with efflorescence and rust staining. Based on Hoyle Tanner’s records and previous experience with this bridge, Boston Post Road was repaved in 2018. At that time, it was discovered that the existing bridge did not have any waterproofing membrane on the top of the top slab. It is likely that this efflorescence and rust staining is a result of water

infiltration due to the missing barrier membrane on the bridge. The box culvert sidewalls exhibit abrasion at the waterline. The silicone joint sealant has failed at all four wingwall to box culvert joints.

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

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Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- As of the date of this report, the subject bridge is 40 years old. As such, the recommended work is taken from the NHDOT RIS for structures at 40 years of service since these repairs will take place in the “intermediate” timeframe. This work includes:
 - Repair and patch the box culvert top slab and wingwalls.
 - Install a new barrier membrane on the top slab of the box culvert and repave the roadway.
- Additional site-specific work not covered in the NHDOT RIS includes:
 - Replace the silicone joint sealant at the wingwall joints.
 - Replace the damaged approach guardrail and install new crash-worthy end terminals.
 - Repair the box culvert top slab soffit cracks using an epoxy injection repair.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- None at this time.

2.13 Amherst 177/108 – Merrimack Road over Beaver Brook

Priority: 10

Description

Amherst 177/108, constructed in 1986, carries Merrimack Road over Beaver Brook. For the purposes of this Report, Beaver Brook flows from North to South. The 34' long bridge consists of a twin cell cast-in-place concrete box culvert. Each cell has a 15' clear span. The bridge has an out-to-out width of 34' and carries two lanes of traffic with a 30' curb to curb width. There is 2 bar aluminum bridge rail on both sides of the roadway. Overhead utilities consist of single-phase power and telecommunications that run along the south edge of Merrimack Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:

- Deck: 7 Good
- Superstructure: 7 Good
- Substructure: 8 Very Good



Bridge Upstream Elevation

Observations

Minor horizontal sealed cracking was observed on the pavement with no other defects to the wearing surface noted. The northwest quadrant exhibits 1 ½" of settlement measured at the curb. Several wooden approach rail posts are rotten or broken on the northwest and southwest approach. Additionally, the northwest and southwest approach rail has substandard "tip down" end treatments. The northeast and southeast approach posts are constructed from galvanized steel. The top slab fascia at the upstream side exhibits minor cracking with efflorescence at the center pier between box culvert cells. The silicone joint sealant has failed at all four wingwall to box culvert joints. A beaver dam was observed at the outlet of the east box culvert cell. Local scour observed immediately upstream of the east box culvert cell, however, there were no signs of box culvert undermining.



Northwest Approach Rail "Tip Down"

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- As of the date of this report, the subject bridge is 38 years old. As such, the recommended work is taken from the NHDOT RIS for structures at 40 years of service since these repairs will take place in the “intermediate” timeframe. This work includes:
 - Repair and patch the box culvert top slab and wingwalls.
 - Install a new barrier membrane on the top slab of the box culvert and repave the roadway.
- Additional site-specific work not covered in the NHDOT RIS includes:
 - Replace the silicone joint sealant at the wingwall joints.
 - Replace the northwest and northeast approach guardrail and install new crash-worthy end terminals.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- None at this time.

2.14 Amherst 193/130 – Boston Post Road over Souhegan River

Priority: 5

Description

Amherst 193/130 carries Boston Post Road over Souhegan River. The original date of construction of the stone abutments is unknown, however, the existing superstructure was constructed in 1977. For the purposes of this Report, Souhegan River flows from west to east. The 88' long bridge consists of five weathering steel wide-flange beams with a concrete deck. Each abutment consists of stone masonry with a five-pile bent constructed immediately in front of the abutment face. The pile bents support the superstructure. Two of the piles on the North end have been enclosed in a concrete breast wall, and the remaining piles are encased in a circular concrete column. The bridge has an out-to-out width of 31' and carries two lanes of traffic with a 24' curb to curb width. A 4' wide sidewalk is located on the west side of the bridge deck. The bridge rail is substandard and consists of steel posts, steel tube rails, and a w-beam rail. Standard w-beam guardrail is located in each approach. The bridge carries a watermain attached to the western exterior beam and concrete sidewalk. Overhead utilities consist of three-phase power and telecommunications that run along the west edge of Boston Post Road. According to the latest NHDOT Bridge Inspection Report dated October 10, 2023, the bridge condition is as follows:



Underside of Bridge on Upstream Side

- Deck: 6 Satisfactory
- Superstructure: 7 Good
- Substructure: 6 Satisfactory

Observations

The following deficiencies were observed:

Deck and Rail

- Minor delamination along the deck soffit.
- Minor efflorescence staining on the deck soffit.
- Deck drains are plugged with debris.
- Debris build-up with vegetation growth at the gutter lines.
- Corrosion and section loss on the back side of the w-beam rail attached to the bridge rail.



North Asphaltic Plug

Deck Superstructure

- Freckled rusting of the north end of Beam 2.

Substructure

- Minor delamination of the pile bent columns and cap.

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- The north pile bent cap exhibits spalling with exposed rebar on the east end.
- The south pile bent cap exhibits map cracking with exposed rebar on the east end.
- The south stone abutment exhibits voids with missing mortar throughout.

Wearing Surface

- The deck joints are failing. The fixed end crack control joint exhibits significant pavement potholing at the joint.
- 1½" settlement of the sidewalk at the south approach.

The field observations made for this Report are in general agreement with the latest NHDOT Bridge Inspection Report.

Recommendations

Immediate Recommendations:

- None at this time.

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- As of the date of this Report, the subject bridge is 47 years old. As such, the recommended work is taken from the NHDOT RIS for structures at 40 years of service since these repairs will take place in the "intermediate" timeframe. The 40-year recommendations primarily consist of deck repairs whereas the 60-year recommendations consist of a deck replacement. Given Hoyle Tanner's observations of the deck, it is likely that a deck replacement is not warranted for this structure at this time. This work includes:
 - Repair and patch the deck, sidewalk, and substructure.
 - Install a new barrier membrane on the deck and repave the roadway.
 - Replace the deck joints.
 - Rehabilitate the steel bearings.
- Additional site-specific work not covered in the NHDOT RIS includes:
 - Replace the silicone joint sealant at the wingwall joints.
 - Replace the bridge rail with new crash-worthy rail.
 - Replace the bridge approach rail and end terminals.
 - Repoint mortared stone masonry abutments.

Long Term Recommendations:

- None at this time.

Bridge Specific Maintenance:

- Clean the deck drains and remove all accumulated debris from the gutter lines.

3 TOWN OWNED CULVERT EVALUATIONS

The culvert descriptions are taken from the Town's list of water crossings provided to Hoyle Tanner in 2022 and are presented in this Report alphabetically by roadway name.

Recommendations are based on the following:

- Culvert specific deterioration in conjunction with Hoyle Tanner's experience with similar structures.
- Hoyle Tanner's experience with the Town of Amherst to understand culvert usage, environmental permitting constraints, the Town's goals, and the Town's budgetary limitations.

3.1 15 Aglipay Drive

Priority: 17

Culvert Description

The culvert at 15 Aglipay Drive conveys an Unnamed Brook. For the purposes of this report, the Unnamed Brook flows from east to west. The 56' long culvert consists of a 52" diameter reinforced concrete pipe (RCP) comprised of seven segments. The headwalls are comprised of dry-stacked stone masonry. The side slopes at the inlet and outlet are vegetated. The inlet side slope vegetation was recently mowed down. The culvert carries an 18'-6" wide paved roadway without line striping. Guardrail is not present on either side of the roadway. Directly upstream of the culvert is a wide wetland floodplain. Directly downstream is a similarly wide floodplain that has a more prominent channel. Overhead utilities consist of single-phase power and telecommunication lines along the eastern side of Aglipay Drive.



Culvert Inlet Elevation

Observations

The pavement is in satisfactory condition and exhibits a sealed transverse crack along the culvert centerline and a 3' diameter patch adjacent to the culvert. The culvert is located at the low point of a vertical sag curve along Aglipay Drive. The pavement shoulders have collected roadway debris (e.g., sand and silt) at the culvert. A beaver screen was observed at the culvert inlet.

The headwalls are in poor condition. Both headwalls have voids up to 1.5' deep throughout. The inlet headwall backfill is encapsulated with geotextile fabric; however, the outlet headwall backfill is not. At the outlet, the headwall is missing base stones causing settlement of the stones. The voids at the outlet are up to 4' deep.



Culvert Outlet Elevation



Spalling at the Culvert Outlet

The RCP is in poor condition. There is minor abrasion and algae growth throughout the culvert at the normal water elevation. The inlet and outlet bevels have large spalls primarily at the crown. Within the culvert, a 1'-7" tall by 8" long spall was observed along the southern wall at the culvert inlet. This spall exhibited exposed corroded welded wire fabric reinforcement; however, no steel section loss was observed. Within the last 20' of the pipe before the outlet, the culvert exhibits significant spalling along the northern wall. At this location, the welded wire fabric exhibits 100% section loss. The RCP segments are misaligned.

The RCP outlet is perched 26" above the channel. There is minor undermining up to 5" deep at the outlet. There are voids exceeding 4' deep on each side of the RCP at the outlet. The channel was comprised of soft soils without riprap armoring. The outlet banks had minor undercutting. The beaver screen was not fully in place.

Overall, the culvert is in Poor (4) condition.

Recommendations

Short Term Recommendations:

- Reset or replace the upstream beaver screen (see also "Culvert Specific Maintenance" below).

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Full replacement of the existing culvert. The existing drainage area for this crossing is 1.07 square miles. Therefore, this crossing is classified by NHDES as a Tier 3 crossing. Tier 3 crossings must be designed as a span structure or an open-bottomed culvert per the NHDES Wetland Rules (Env-Wt 904.05) and as such, the replacement structure will likely require construction of a three-sided concrete rigid frame or a partially buried precast concrete box culvert.

Culvert Specific Maintenance:

- Reset or replace the upstream beaver screen.
- Remove vegetation from around the culvert.
- Inspect culvert on a biennial basis.

3.2 82 Amherst Street

Priority: 7 – DPW Priority 2

Culvert Description

The culvert at 82 Amherst Street conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from west to east. The 50' long culvert consists of a 30" diameter RCP. The headwalls are comprised of a cast-in-place concrete with mortared granite slab stone masonry constructed above the concrete. The culvert carries a 24' wide roadway and a 9' wide sidewalk. Guardrail is present on both sides of the roadway. Directly upstream of the culvert is a private dam and pond/impoundment. Directly downstream, Unnamed Brook flows in a well defined channel. Overhead utilities consist of three-phase power and telecommunication lines along the eastern side of Amherst Street.



Culvert Outlet Elevation

Observations



Culvert Inlet Elevation

The roadway has recently been paved and is in excellent condition. The guardrail is in excellent condition. The guardrail does not have crash-worthy end terminals.

The headwalls are in fair condition. Both headwalls exhibit voids where the granite slabs terminate into the steep banks, and both stone masonry portions of the headwalls are out of plumb. The outlet headwall exhibits missing mortar throughout. The cast-in-place concrete portion of the outlet headwall has a 16" wide by 10" tall and over 3' deep void. The remaining portions of the inlet and outlet concrete headwalls have minor abrasion, cracks, delamination, and spalling.

The RCP is in good condition. There is minor abrasion throughout the culvert at the normal water elevation. At the outlet, the RCP is perched 12" above the

channel. A 1' deep scour hole was observed in the channel near the outlet.

The upstream and downstream banks are very steep (close to 1' horizontal for every 1' vertical). The

downstream banks within 8' of the outlet are armored with riprap but, further downstream where riprap terminates, the banks exhibit undercutting.

The privately-owned dam prior to the pipe inlet is in poor to serious condition. The cast-in-place concrete dam is 1' thick and 3' tall with a significant lean of at least 6" toward the culvert. The dam is undermined and has active flow beneath and around the dam.

Overall, the culvert is in Poor (4) to Fair (5) condition.



**Private Dam Immediately Upstream of the
Culvert**

Recommendations

Short Term Recommendations:

- Begin discussions with the owner of the private dam to either remove or replace the existing structure.

Intermediate Term Recommendations:

- The primary concern with this crossing is the steep banks on the outlet side, the perched condition of the culvert outlet, and the stability/condition of the downstream headwall. As such, these concerns can be alleviated by extending the culvert by approximately 7' to 8'. This will allow for a culvert elevation that matches the existing channel (eliminating the perched condition) while also reducing the height of fill to be retained by the headwall. The drainage area for this culvert is 0.24 square miles. Therefore, this crossing is classified by NHDES as a Tier 1 crossing. Additionally, this culvert is not located within a priority resource area according to the NHDES's Wetland Permit Planning Tool (WPPT). As such, the culvert extension can likely be permitted through the under the NHDES Registration for Routine Roadway Maintenance Activities RR-2: Culvert Extension.
- Additional recommendations include:
 - Repoint masonry portions of the headwalls.
 - Repair voids and spalls in the cast-in-place concrete headwalls.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.3 29 Austin Road

Priority: 18 - DPW Priority: D6

Culvert Description

The culvert at 29 Austin Road conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from north to south. The 20' long culvert consists of dry laid masonry with an opening height of 3' and width of 4'. The inlet has no headwall, and the outlet headwall is comprised of dry-stacked stone masonry. The culvert top slab is comprised of 10" thick granite slabs under approximately 1'-10" of fill. The culvert walls are comprised of dry stacked stones. These stones are irregular in shape and size and were not cut or shaped to achieve firm bearing. The culvert carries a 20' wide gravel roadway. Guardrail is not present on either side of the roadway. Overhead utilities consist of single-phase power and telecommunication lines that run diagonally over the culvert from the southwest to the northeast.



Culvert Inlet Elevation

Observations

The north roadway edge is eroding due to the lack of a headwall at the culvert inlet. There are likely some voids between the stones that comprise the culvert walls, but there were no signs of roadway settlement or roadway fill in the brook which would indicate that soil is migrating through the voids. Timber bracing was observed at the center of the culvert.



Culvert Interior Looking Downstream

Overall, the culvert is in Satisfactory (6) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Construct a new stone masonry headwall on the upstream side of the culvert to retain the roadway side slope.
- Perform a load rating of the granite top slab to determine the live load capacity of the culvert.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.4 485 Boston Post Road

Priority: 32

Culvert Description and Observations

The culvert conveys an Unnamed Brook under Boston Post Road. For the purposes of this Report, the Unnamed Brook flows from north to south. The 40' long culvert consists of two 48" diameter HDPE smooth interior pipes with precast concrete headwalls. A 2' diameter HDPE overflow pipe is located to the west of the 48" diameter pipes and has dry stacked stone masonry headwalls. Observations of this culvert were not included in the scope of this Report (see Section 1.4); however, Hoyle Tanner is familiar with the culvert as Hoyle Tanner partnered with the Town in 2021 and 2022 to design, permit, and administer the construction of this crossing which was an emergency replacement for two CMPs which were in critical condition.



Culvert Outlet Elevation

Overall, the culvert is in Excellent (9) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.5 6 Dodge Road

Priority: 19 – DPW Priority 7

Culvert Description

The culvert at 6 Dodge Road conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from north to south. The 41' long culvert consists of a 24" diameter RCP. The headwalls are comprised of dry-stacked stone masonry. The culvert carries a 23' wide roadway without line striping. Guardrail is not present on either side of the roadway. Overhead utilities consist of single-phase power and telecommunication lines along the northern side of Dodge Road.

Observations

The culvert exhibits minor misalignment at one of the RCP joint. The RCP exhibits abrasion throughout with minor spalling of the inlet of the pipe. The downstream roadway side slope in the southwest quadrant is steep and exhibits erosion due to a lack of wingwall or retaining wall at this location. The pavement is in very good condition.

Overall, the culvert is in Satisfactory (6) condition.

Recommendations

Immediate Recommendations:

- None at this time.

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Lengthen southwest wingwall by 8 feet to alleviate roadway side slope erosion.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.



Culvert Inlet Elevation



Culvert Misalignment

3.6 64 Dodge Road

Priority: 2 – DPW Priority 1

Culvert Description

The culvert at Dodge Road conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from west to east. The 25' long culvert consists of dry laid masonry with a 9" thick granite top slab. The culvert has a 3'-6" square opening. The headwalls are comprised of dry-stacked stone masonry. The culvert carries a 17' wide gravel roadway. Guardrail is not present on either side of the roadway. Overhead utilities consist of single-phase power and telecommunication lines along the center of Dodge Road over the culvert.

Observations

The culvert exhibits a split top slab stone at the culvert inlet. The split stone is supported by friction between the slab and the west culvert wall. The split stone is adjacent to the edge of the gravel roadway and does not support traffic loading. The broken granite top slab has dimensions 3'-9" wide x 7' long x 9" thick. The inlet headwall exhibits settlement with voids up to 3 feet between the stones. Bank erosion was observed at the outlet. The roadway is in good condition.

The culvert is in serious (3) condition due to the top slab split. Otherwise, the overall culvert is in fair (5) condition.

Recommendations

Short Term Recommendations:

- Replace top slab granite stone at Inlet.
- Rebuild inlet headwall.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.



Culvert Inlet Elevation



Top Slab Split at Culvert Inlet

3.7 3 Fairway Drive

Priority: 15 – DPW Priority 4

Culvert Description

The culvert at 3 Fairway Drive conveys an Unnamed Brook. Directly upstream and downstream of the culvert is a wide floodplain resulting in very slow flow velocity during normal conditions. For the purposes of this Report, the Unnamed Brook flows from east to west. The 48' long culvert consists of a 42" - diameter RCP. The headwalls are comprised of dry-stacked stone masonry. The culvert carries a 21' wide roadway without line striping. Guardrail is not present on either side of the roadway. Overhead utilities consist of single-phase power and telecommunication lines along the eastern side of Fairway Drive. Fairway Drive is a dead-end road with approximately 20 residences past the culvert.



Culvert Inlet Elevation

Observations

The pavement is in satisfactory condition and exhibits cracking along the roadway centerline.

The upstream headwall is in poor condition with typical voids up to 2' deep. A tree stump is present in the headwall and the voids adjacent to the stump are up to 4' deep. The downstream headwall is in poor condition and exhibits some settlement and voids up to 1' deep.

The RCP is in satisfactory condition. There is significant abrasion at the spring line and spalling with exposed reinforcing steel at the culvert outlet.



Abrasion At Spring Line

There was no scour or undermining of the RCP pipe observed at the time of our observations.

Overall, the culvert is in Fair (5) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Remove the stump in eastern headwall and reconstruct both headwalls. Check masonry voids.
- Repair concrete spall at outlet.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.8 78 Horace Greeley Road

Priority: 33

Culvert Description and Observations

The culvert conveys an Unnamed Brook under Horace Greeley Road. For the purposes of this Report, the Unnamed Brook flows from north to south. The 62' long culvert consists of a 42" diameter RCP. Observations of this culvert were not included in the scope of this Report; however, Hoyle Tanner is familiar with the culvert as Hoyle Tanner partnered with the Town in 2022 to permit the construction of this culvert through NHDES.

Overall, the culvert is in excellent (9) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- None at this time.

3.9 Lynch Farm Road

Priority: 27

Culvert Description

The culvert on Lynch Farm Road conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from north to south. The 24' long culvert consists of a 30" diameter RCP. The headwalls are comprised of dry-stacked stone masonry. The culvert carries a 12' wide gravel roadway. Guardrail is not present on either side of the roadway. No overhead utilities are present at the culvert site. The roadway accommodates minimal traffic volumes and has a relatively short detour.

Observations

The roadway is in good condition with no indication of settlement.

The headwalls are in poor condition. The upstream headwall exhibits shifting and a void between the top stone and the RCP that is 6' long by 3' deep (horizontally) by 1'-5" wide. Voids were observed around the sides of the RCP and were measured to be over 4' deep. A minor sink hole is present directly behind the inlet headwall. Minor local scour was observed around the pipe inlet.

The downstream headwall exhibits voids in the stones up to 3' deep. The southeast wingwall masonry is bulging and misaligned. No scour was observed at the outlet. Voids on the west side of the pipe outlet were observed and are up to 2' deep.

The RCP is in poor condition. The RCP was fully inundated at the time of observation (10/18/23), and during a previous observation conducted by Hoyle Tanner on 10/31/18. The RCP ends exhibit moderate abrasion with moss growth and spalling of the edges.

Overall, the culvert is in poor (4) condition.

Recommendations

Short Term Recommendations:

- None at this time.



Culvert Inlet Elevation



Culvert Outlet Elevation

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Replace the existing culvert. The existing drainage area for this crossing is 0.6 square miles. Therefore, this crossing is classified by NHDES as a Tier 2 crossing. Additionally, the Tier 2 crossing has a total hydraulic opening of less than 48 inches in diameter and therefore, the culvert may likely qualify for in-kind replacement under the NHDES Registration for Routine Roadway Maintenance Activities RR-1: Culvert Replacement or Repair. However, according to the NHDES WPPT, the project is in an area classified as “Flood Plain Wetlands Adjacent to Tier 3 Streams” which is a priority resource area. This appears to be mislabeled in the NHDES WPPT and further coordination with NHDES will be required. If an RR-1 can be used, the replacement will likely be a 3’ diameter HDPE pipe with two precast headwalls pending a hydraulic analysis.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.10 168 Mack Hill Road

Priority: 13

Culvert Description

The culvert at 168 Mack Hill Road connects Fearon Farm Pond to Glen Echo Pond via an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from west to east. The 41' long culvert consists of a 42" diameter CMP. The headwalls are comprised of dry-stacked stone masonry. The culvert carries a 21'-3" wide roadway. Guardrail is not present on either side of the roadway. Directly downstream of the culvert is Glen Echo Pond. Directly upstream, the Unnamed Brook is wide, and the flow is close to stagnant (due to the backwater condition from Glen Echo Pond). Overhead utilities consist of single-phase power and telecommunication lines along the eastern side of Mack Hill Road.



Culvert Inlet Elevation

Observations

The roadway has recently been paved and is in excellent condition. The roadway profile follows a sag curve with its low point at the culvert.

The headwalls are in poor condition. At the outlet, there is a tree growing out of the wall causing stone displacement, settlement, and a partial collapse. At the outlet headwall, the northwestern quadrant has two trees growing out of the wall.

The CMP is in poor condition. At the inlet, the pipe is completely submerged with 100% section loss for an undetermined extent. At the outlet, the pipe has 100% section loss at and above spring line. The outlet hydraulic opening was measured as 42" wide by 31" high.

The inlet is suspected to be plugged by a beaver dam from auditory observation. The channel was comprised of soft soils without riprap armoring at both the inlet and outlet.

Overall, the culvert is in poor (4) condition.



Submerged CMP at Outlet

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Replace the existing culvert. The existing drainage area for this crossing is 0.62 square miles. Therefore, this crossing is classified by NHDES as a Tier 2 crossing. Additionally, the Tier 2 crossing has a total hydraulic opening of less than 48 inches in diameter and is not located within a priority resource area. Therefore, the culvert may likely qualify for in-kind replacement under the NHDES Registration for Routine Roadway Maintenance Activities RR-1: Culvert Replacement or Repair.
- To improve the hydraulic and environmental condition of the culvert, removal, and replacement of the CMP with a precast concrete rigid frame or box culvert is recommended as compared to an in-kind replacement.

Culvert Specific Maintenance:

- Remove vegetation from around the culvert.
- Inspect culvert on a biennial basis.

3.11 Merrimack Road at 2 Holt Road

Priority: 31

Culvert Description and Observations

The culvert conveys an Unnamed Brook under Merrimack Road. For the purposes of this Report, the Unnamed Brook flows from north to south. The 42' long culvert consists of a 48" diameter HDPE smooth interior pipe. Observations of this culvert were not included in the scope of this Report; however, Hoyle Tanner is familiar with the culvert as Hoyle Tanner partnered with the Town in 2019 to permit the construction of this culvert through NHDES.

Overall, the culvert is in excellent (9) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- None at this time.



Culvert Outlet Elevation

3.12 13 Nathaniel Drive

Priority: 30

Culvert Description

The culvert at 13 Nathaniel Drive conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from west to east. The 123' long culvert consists of a 24" diameter RCP. The headwalls are comprised of dry stacked stone masonry. The culvert is under approximately 20' of fill. The culvert carries a 21' wide roadway without line striping. Guardrail is not present on either side of the roadway. The Unnamed Brook is an intermittent stream with a drainage area of 165 acres (0.26 square miles). Overhead utilities consist of single-phase power and telecommunication lines that run diagonally over the culvert from the southeast to the northwest.

Observations

The pavement is in fair condition with significant map cracking throughout. The roadway exhibits steep slopes on each side. There is no guardrail present on site. Wood posts are present but are fully rotted and do not support a rail system.

The culvert inlet protrudes from the upstream headwall and roadway side slope by approximately 4'. The culvert outlet is found on top of a boulder. The outlet headwall is in fair condition.

The RCP is in satisfactory condition. The pipe exhibits abrasion along the spring line with no signs of spalling. The pipe exhibits two "step down" vertical kinks between the pipe segments that create pooling at the center of the pipe. There is minor soil buildup at the pipe outlet.

The culvert was not conveying flow during our observations.

Overall, the culvert is in satisfactory (6) condition.

Recommendations

Short Term Recommendations:

- None at this time.



Culvert Inlet Elevation



Culvert Pipe Interior from Outlet

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.13 Northern Boulevard

Priority: 14

Culvert Description

The culvert at Northern Boulevard Road conveys an Unnamed Brook. For the purposes of this Report, the Brook flows from north to south. The 100' long culvert consists of two CMP's each with a width of 5'-3" and a height of 3'-6". The CMPs have steel end sections and are mitered to follow the roadway side slope. The culvert carries a 24' wide roadway with no striping. Guardrail is not present on either side of the roadway. Directly upstream of the culvert is a wide wetland with noted beaver activity. Directly downstream of the culvert, the Unnamed Brook has a well-defined channel and flows through forested floodplains. Overhead utilities consist of single-phase power and telecommunication lines along the southeast side of Northern Boulevard. Underground utilities consist of a water main and gas line which pass between the roadway surface and the crown of the CMPs. Northern Boulevard is a commercial street; however, it currently provides access to a single business and carries minimal traffic.



East Culvert Inlet Elevation



Typical Culvert Condition

Observations

The pavement is in fair condition with transverse and map cracking throughout.

There are two sink holes above the western pipe near the inlet. The sink hole to the west of the pipe is 2' wide by 3' long and 1' deep. The second sink hole directly adjacent to the first on the East side of the pipe is 1' wide by 1' long and 1' deep. A beaver dam almost entirely obstructs the inlet of the East CMP. The same beaver dam partially clogs the west pipe. There is approximately 1' of sediment in each pipe throughout the length of the culvert.

The CMPs are in poor condition. Both CMPs exhibit significant corrosion and section loss throughout. The Water is actively flowing into the east pipe from a break or gap in the CMP sidewall. Due to the small size and long length of the pipe, access to the leak to determine the cause cannot be achieved without confined space entry techniques or using a remote-controlled camera. Both CMP inlets exhibit significant rusting with section loss and deformation.

Overall, the culvert is in poor (4) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Replace the existing culvert. The existing drainage area for this crossing is 0.24 square miles. Therefore, this crossing is classified by NHDES as a Tier 1 crossing. However, the existing crossing has a total hydraulic opening of more than 48 inches in diameter and therefore does likely qualify for in-kind replacement under the NHDES Registration for Routine Roadway Maintenance Activities RR-1: Culvert Replacement or Repair. As such, the replacement culvert will require a NHDES Wetland Permit. Hydraulic modeling of the crossing will be required to determine if in-kind replacement (replacing the existing culverts with new culverts) is permissible or if a larger span structure or an open-bottomed culvert will be required. Due to the observed beaver activity upstream of the existing crossing as well as the amount of beaver dam debris obstructing the CMP inlets, it is assumed that the replacement structure will be a three-sided concrete rigid frame or a partially buried precast concrete box culvert as opposed to in-kind replacement with new culvert pipes for cost estimation purposes.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.14 75 Spring Road

Priority: 26

Culvert Description

The culvert at 75 Spring Road conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from north to south. The 41' long culvert consists of two adjacent CMP culverts each with a span of 3'-0" and a rise of 2'-6". The headwalls are comprised of mortared stone masonry. The culvert carries a 22'-3" wide roadway. Standard W-beam guardrail is located behind each headwall. Directly upstream of the culvert is a wide wetland floodplain. Directly downstream of the culvert, the Unnamed Brook has a well-defined channel and flows along forested floodplains. Overhead utilities consist of single-phase power and telecommunication lines along the southern side of Spring Road.

Observations

Site observation of this culvert was not included in the scope for this project since Hoyle Tanner is familiar with the site and has recently completed the design, permitting, and construction for replacement headwalls at this culvert.

The pavement is in good condition. The guardrail length is likely insufficient for the site and the guardrail end terminals are substandard and consist of "boxing glove" end sections.

The headwalls were constructed in 2023 and are in excellent condition.

The CMPs exhibit significant rusting and section loss up to 100% along the spring line for 3' along the inlet and outlet of the culvert. The channel is comprised of soft organic soils overlaying sand and gravels. The upstream and downstream banks are armored with riprap for approximately 5' beyond the limits of the headwall.



Downstream Headwall

Overall, the culvert is in satisfactory (6) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Replace the existing culvert. The existing drainage area for this crossing is 0.65 square miles. Therefore, this crossing is classified by NHDES as a Tier 2 crossing. However, the culvert is located within a Priority Resource Area and therefore, the replacement crossing will require a Standard Wetlands Dredge and Fill Permit. Hydraulic modeling of the crossing will be required to determine if in-kind replacement (replacing the existing culverts with new culverts) is permissible or if a larger span structure or an open-bottomed culvert will be required (ENV-Wt 904.04(b)). As such, the cost of culvert replacement included in Appendix A is based on construction of a three-sided concrete rigid frame or a partially buried precast concrete box culvert as opposed to in-kind replacement with new culvert pipes.

Culvert Specific Maintenance:

- None at this time.

3.15 64 Stearns Road

Priority: 22

Culvert Description

The culvert at 64 Stearns Road conveys the outlet of Honey Pot Pond below Boston Post Road. For the purposes of this Report, the Honey Pot Pond outlet flows from east to west. The 52' long culvert consists of an 18" diameter HDPE culvert. The inlet of the culvert projects from the vegetated roadway side slope. A dry stacked stone masonry headwall is located at the culvert outlet. The culvert carries a 24'-0" wide roadway. There is no guardrail at the culvert. Honey Pot Pond is located directly upstream of the culvert. Directly downstream of the culvert, the outlet to Honey Pot Pond has well defined banks for approximately 20' before widening into a small impoundment on the property of 64 Stearns Road. Overhead utilities consist of three-phase power and telecommunication lines along the eastern side of Boston Post Road. A watermain is the only known underground utility at the crossing.



Culvert Outlet

The pavement is in good condition. The roadway side slope at the inlet is steep and there are locations of erosion despite the side slope being heavily vegetated. The outlet headwall is in fair condition. The wall is stable with no signs of settlement or shifting; however, large voids between the stones were observed.

The HDPE pipe is in good condition; however, the inlet section exhibits some damage including a crack in the pipe.

Overall, the culvert is in satisfactory (6) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Observations

Site observation of this culvert was not included in the scope for this project since Hoyle Tanner is familiar with the site and has recently completed a feasibility letter Report dated February 24, 2022 which evaluated options for providing pedestrian accommodations along Boston Post Road at the subject culvert. The feasibility letter Report included an evaluation of the culvert and recommendations for constructing a sidepath for pedestrian accommodations.

The pavement is in good condition. The roadway side slope at the inlet is steep and there are locations of

Long Term Recommendations:

- None at this time, however, a cost for constructing a shared use path at the existing crossing is provided in Appendix A. The cost for this work is based on the findings of the February 2022 Feasibility Letter Report which recommends construction of an 8-foot-wide paved side path separated from Boston Post road with a 5-foot-wide grass panel. To accommodate the widened roadway, the existing culvert will be lengthened by approximately 10' and the widened roadway side slopes will be stabilized with stone riprap.

Culvert Specific Maintenance:

- None at this time.

3.16 28 Thornton Ferry Road II

Priority: 6

Culvert Description

The culvert at 28 Thornton Ferry Road II conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from north to south. The 48' long culvert consists of a circular CMP with an approximate diameter of 24". The north end exhibits a dry stacked stone masonry headwall. The south end protrudes from the roadway side slope and into the waterway by approximately 5' with no visible headwall. Directly upstream and downstream of the culvert is a wide wetland floodplain. There is no visual flow between the two floodplains. The existing culvert was fully submerged at the time of our observations (10/17/2023) and the existing crown was 1' below the top of water elevation. The culvert carries a 22' roadway with centerline stripping. Guardrail is not present on either side of the roadway. Overhead utilities consist of single-phase power and telecommunication lines along the northern side of Thornton Ferry road II.



Culvert Inlet at Collapsed Headwall

Observations

Direct visual observations of the culvert could not be made since the existing crown was 1' below the water surface. The North headwall has collapsed, and it is likely that the culvert is in poor condition. The water elevation in the board floodplains upstream and downstream of the culvert are likely equalized by seepage through the roadway embankment as well as the minimal flow accommodated by the culvert. The pavement is in satisfactory condition with sealed longitudinal cracks observed.

Overall, the culvert is in poor (4) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- Replace the existing culvert. The existing drainage area for this crossing is 0.34 square miles. Therefore, this crossing is classified by NHDES as a Tier 2 crossing. Additionally, the Tier 2 crossing has a total hydraulic opening of less than 48 inches in diameter and is not located within a priority resource area. Therefore, the culvert may likely qualify for in-kind replacement under the NHDES Registration for Routine Roadway Maintenance Activities RR-1: Culvert Replacement or Repair. The culvert is within 0.25 miles of the Souhegan River (a designated river) and as such, coordination with the Local Advisory Committee (LAC) for the Souhegan River will be required to determine the final structure and permit type.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- Inspect culvert on a biennial basis.

3.17 Thornton Ferry Road II / Green Meadow Golf Club

Priority: 1

Culvert Description

The culvert at Thornton Ferry Road II at the Green Meadow Golf Club conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from west to east. The 40' long culvert consists of three CMPs. The headwalls are comprised of dry-stacked stone masonry. The culvert carries a 21' wide roadway with centerline striping. W-beam guardrail is present on both sides of the roadway. There are no overhead utilities at the culvert. The closest overhead utilities are on the south end of Spring Road which is approximately 125' north of the culvert.



Observations



100% Section Loss At Culvert Outlet

#3 exhibits 100% section loss of the last 5'. CMP #3 exhibits visual sagging of the top of the pipe at midspan. Similar section loss was observed at the inlets for each pipe.

Overall, the culvert is in serious (3) condition.

Recommendations

Immediate Recommendations:

- None at this time.

Culvert Inlet Elevation

The pavement is in fair condition with map cracking throughout. The majority of timber guardrail posts are rotten.

The downstream headwall exhibits tipping and bulging throughout. A sink hole measuring 1' wide by 2' long by 1'-10" depth was observed behind the upstream headwall. The upstream headwall exhibits voids up to 5' deep. Both headwalls exhibit significant vegetation growth including small trees between the masonry.

All three CMPs are in serious condition. CMPs are numbered #1 to #3 from south to north respectively. CMP #1 and #2 exhibit rusting with 100% section loss for last 3' of the pipe on the downstream end. CMP

Short Term Recommendations:

- Replace the existing culvert. The existing drainage area for this crossing is 2.66 square miles. Therefore, this crossing is classified by NHDES as a Tier 3 crossing. Tier 3 crossings must be designed as a span structure or an open-bottomed culvert per the NHDES Wetland Rules (Env-Wt 904.05) and as such, the replacement structure will likely require construction of a three-sided concrete rigid frame or a partially buried precast concrete box culvert.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- None at this time.

Culvert Specific Maintenance:

- Inspect culvert every six months due to its serious condition.

3.18 Upham Road at Brad Knight Property

Priority: 16 – DPW Priority 5

Culvert Description

The culvert at the Brad Knight Property on Upham Road conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from north to south. The 30' long culvert consists of a 48" diameter RCP. The headwalls are comprised of dry-stacked stone masonry. The culvert carries a 21' wide roadway without line striping. Guardrail is present on both sides of the roadway. Directly upstream of the culvert is a wide wooded floodplain. Directly downstream is a similarly wide floodplain. Overhead utilities consist of single-phase power and telecommunication lines along the southern side of Upham Road.



Observations

The pavement is in satisfactory condition with sealed crack above the culvert centerline as well as some pavement depressions in the northern lane. The guardrail has scraping and impact damage throughout as well as missing posts.

Culvert Inlet Elevation



Culvert Outlet Elevation

thalweg. The outlet has a 1' deep scour hole.

Overall, the culvert is in poor (4) condition.

Recommendations

Short Term Recommendations:

- None at this time.

The headwalls are in poor condition. Both headwalls have voids up to 2.5-feet deep throughout. Additionally, the inlet headwall shows signs of settlement and is leaning towards the waterway. A beaver screen was observed at the culvert inlet. There is significant vegetation on top of the outlet headwall.

The RCP is in fair condition. There is exposed reinforcing and spalling at the inlet and outlet, primarily at the crown. The RCP exhibits moderate abrasion at and below the waterline. There is excess beaver dam debris in the pipe at the inlet.

The RCP inlet is 18" higher than the inlet channel

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Replace the existing guardrail and add install crash-worthy end terminals.
- Chink the headwall voids.
- Fill in the channel scour holes.

Culvert Specific Maintenance:

- Remove vegetation from around the culvert.
- Inspect culvert on a biennial basis.

3.19 69 Walnut Hill Road

Priority: 23

Culvert Description

The culvert at 69 Walnut Hill Road conveys an Unnamed Brook. For the purposes of this Report, the Unnamed Brook flows from south to north. The 37' long culvert consists of a 30" HDPE pipe. The headwalls are comprised of precast concrete and bricks and mortar are used to block-up the gap between the circular headwall opening and the culvert pipe. Beaver deterrents are placed at the inlet and outlet to prevent clogging. The culvert carries an 18'-6" wide roadway with centerline striping. A timber guardrail system is present on each side of Walnut Hill Road. Directly upstream of the culvert is a wide wetland floodplain. Directly downstream is a similarly wide floodplain that has a more prominent channel. Overhead utilities consist of single-phase power and telecommunication lines along the northern side of Walnut Hill Road.



Culvert Upstream

Observations

The pavement is in satisfactory condition with minor sealed map cracking. The wooden guardrail exhibits minor scrapes but is otherwise in very good condition. The culvert is located on a horizontal curve with a small radius.

A beaver lodge is located upstream from the culvert. A "beaver deceiver" is located at the culvert inlet.

The headwalls are in good condition. The outlet exhibits locations of mortar patching failure between the precast culvert opening and the HDPE pipe. The side slopes around the headwall exhibit bank erosion. The inlet headwall mortar patching is cracking. The inlet headwall exhibits bank erosion around each side of the headwall.



Culvert Outlet Elevation

The HDPE pipe exhibits sagging at midspan but is otherwise in good condition.

Overall, the culvert is in good (7) condition.

Recommendations

Short Term Recommendations:

- None at this time.

Intermediate Term Recommendations:

- None at this time.

Long Term Recommendations:

- Patch headwall.

Culvert Specific Maintenance:

- Maintain beaver deterrents.
- Replace the cracked or missing mortar around the HDPE as required.
- Inspect culvert on a biennial basis.

4 SUMMARY

Assessing the condition and needs of the Town's bridge and culvert inventory is an important first step in determining the extent and timing of future capital expenditures. The work recommended in this Report is divided into four categories: short-term, intermediate-term, and long-term recommendations as well as on-going maintenance (both routine and site specific). Short-term, intermediate-term and long-term recommendations should be completed within 0-2 years, 3-9 years, and beyond 10 years, respectively. Although a priority table has been presented in this Report based on the overall condition of the crossings and the severity of the observed deficiencies, it is encouraged that the recommendations for lower priority crossings still be completed within the timeframes presented in this Report. Further, the same or similar repair recommendations are made for multiple crossings. Therefore, work on multiple crossings can be completed simultaneously, which may lower the total cost of the repairs.

The Recommended 15-Year Capital Expenditure Summary is provided in Appendix A. This matrix includes the estimated costs for the specific recommendations discussed above. For repair timeframes that span several years (such as the intermediate-term repairs that span years 3 through 9), recommendations are ordered based on the overall culvert priority with some exceptions based on the roadway usage, the total project cost, and the potential to "bundle" similar projects to achieve economies of scale. The engineering costs and the estimated probable construction costs are based on Hoyle Tanner's experience with similar design and construction projects and current NHDOT weighted bid prices. A 15% contingency is included because the conceptual cost estimates were prepared using the limited data collected during field observations completed for this Report and are not based on detailed designs. The estimated costs are in 2024 dollars, therefore, an inflation rate of 3% has been applied to increase the cost of the work for the expected calendar year.

Appendix B has been developed jointly with Hoyle Tanner and the Town to aid in the management of the Town's Capital Reserve Fund (CRF) for water crossings. Historically, the Town has been successful in funding the CRF through warrant articles passed at the annual Town meeting. Based on collaboration with the Town, recommendations in this Report that are time sensitive (such as high-priority crossings), or recommendations that are unlikely to qualify for outside funding are assumed to be funded through the CRF. As such, Appendix B has been developed to analyze the annual CRF cash flow as well as develop a strategy for increasing the annual CRF Appropriation to meet the recommendations of this Report.

Funding grants and programs are available to the Town to assist in reducing the Town's total capital expenditure.

- NHDOT administers the Municipal State Aid Bridge (SAB) program which reimburses municipalities for 80% of the total costs for designing and constructing bridge rehabilitation or replacement projects so long as the requirements of the SAB program are met. This program cannot be used on crossings that do not meet the definition of a bridge per RSA 234:2 or for maintenance activities. The SAB Program is currently closed and NHDOT is not processing new applications; however, we understand that when the SAB program reopens, there will be a new application that will need to be submitted by interested Municipalities. Projects will be distributed based on location and ranked based on condition, traffic volume, detour lengths, etc. As such, it is unlikely that the Town will receive significant SAB funding, if any, to assist with completing the recommendations in this Report.
- The Federal Emergency Management Agency (FEMA) administers the Building Resilient Infrastructure and Communities (BRIC) program. BRIC is an annual program with the Notice of Funding Opportunities (NOFOs) opening in September and closing in January, and it is not tied to a declared hazard event which allows eligible applicants to plan and apply accordingly. The

BRIC Project Scoping Activities Program allows communities to complete scoping services that determine if a project is eligible for further BRIC funding. The BRIC Project Scoping program pays 75% of the cost (with the remaining 25% consisting of a local match) for developing the scoping report which is used to determine if the Benefit/Cost Analysis (BCA) will score above a 1.0. Projects with BCAs above 1.0 mean that the benefits associated with the project are more than the construction costs. If the BCA scores above 1.0, the project may be awarded a Hazard Mitigation Grant to fund design and construction. State Hazard Mitigation Officers can assist with application submissions.

Performing routine maintenance and repair is an important part of increasing the useful service life of the Town's bridges and culverts. If maintenance tasks and repairs are deferred for a significant amount of time, the deterioration rate of the culvert can occur at an accelerated rate and lead to costlier repairs, rehabilitations, or replacements. On the other hand, when routine maintenance and repairs are completed on a defined schedule the overall repair cost may be less and the crossing's useful service life can be extended. Appendix C has been prepared to provide general routine maintenance for the Town's bridges culverts which can likely be completed by Department of Public Works forces. Bridge and culvert specific maintenance items identified during our field visits have been provided in the recommendation section of each culvert.

This Report has been completed utilizing information available as of May 2024. This information may include permitting requirements, field data obtained by Hoyle Tanner, and reports prepared by others, which are subject to change. The condition of an existing bridge or culvert can change rapidly, or the bridge or culvert could be damaged through manmade or natural events that could alter the conclusions reached herein. Therefore, estimates of cost and conclusions reached in this Report should not be relied upon for an extended period.

APPENDIX A

Recommended 15-Year Capital Expenditure Summary

RECOMMENDED 15- YEAR CAPITAL EXPENDITURES

TOWN OF AMHERST, NH



Priority	DPW Priority ¹	Crossing	Recommendations	Short Term			Intermediate Term							Long Term					
				Year 0 FY 24	Year 1 FY 25	Year 2 FY 26	Year 3 FY 27	Year 4 FY 28	Year 5 FY 29	Year 6 FY 30	Year 7 FY 31	Year 8 FY 32	Year 9 FY 33	Year 10 FY 34	Year 11 FY 35	Year 12 FY 36	Year 13 FY 37	Year 14 FY 38	Year 15 FY 39
1		Thornton Ferry Rd. II/ Green Meadow GC	Replace Existing Crossing																
			<i>Engineering & Bidding</i> ⁶		\$ 153,603														
			Construction			\$ 695,000													
			Construction Engineering (10%)		\$ -	\$ 69,500													
			Contingency (15%) & 3%/Yr. Inflation			\$ 161,233													
			Total Conceptual Project Cost		\$ 153,603	\$ 925,733													
2	D1	64 Dodge Road	Replace Cracked Stone in Top Slab																
			<i>Engineering</i>	\$ 2,000															
			Construction	\$ 5,000															
			Construction Engineering (0%)	\$ -															
			Contingency (15%) & 3%/Yr. Inflation	\$ 1,050															
			Total Conceptual Project Cost	\$ 7,000															
3		124/087 - Boston Post Road over Beaver Brook	Geopolymer Lining and Repair Work																
			<i>Engineering & Bidding</i> ²				\$ 63,000												
			Construction					\$ 215,000											
			Construction Engineering (10%)				\$ -	\$ 21,500											
			Contingency (15%) & 3%/Yr. Inflation				\$ 15,292	\$ 65,158											
			Total Conceptual Project Cost				\$ 78,292	\$ 301,658											
4		116/091 - New Boston Road over Beaver Brook	Membrane Installation and Bridge Repairs																
			<i>Engineering & Bidding</i> ²				\$ 58,000												
			Construction					\$ 130,000											
			Construction Engineering (10%)				\$ -	\$ 13,000											
			Contingency (15%) & 3%/Yr. Inflation				\$ 14,078	\$ 39,398											
			Total Conceptual Project Cost				\$ 72,078	\$ 182,398											
5		193/130 - Boston Post Road over Souhegan River	Deck Preservation & Substructure Repairs																
			<i>Engineering & Bidding</i> ²					\$ 56,000											
			Construction						\$ 195,000										
			Construction Engineering (10%)						\$ 19,500										
			Contingency (15%) & 3%/Yr. Inflation					\$ 15,428	\$ 66,339										
			Total Conceptual Project Cost					\$ 71,428	\$ 280,839										
6		28 Thornton Ferry Road II	Replace Existing Crossing																
			<i>Engineering & Bidding</i> ²									\$ 80,000							
			Construction										\$ 300,000						
			Construction Engineering (10%)									\$ -	\$ 30,000						
			Contingency (15%) & 3%/Yr. Inflation									\$ 33,342	\$ 150,075						
			Total Conceptual Project Cost									\$ 113,342	\$ 480,075						
7	D2	82 Amherst Street	Repair Headwall and Lengthen Culvert																
			<i>Engineering</i>						\$ 13,000										
			Construction							\$ 20,000									
			Construction Engineering (0%)							\$ -									
			Contingency (15%) & 3%/Yr. Inflation						\$ 4,021	\$ 6,881									
			Total Conceptual Project Cost						\$ 17,021	\$ 26,881									
8		160/105 - Boston Post Road over Beaver Brook	Deck Preservation and Misc. Repairs ³																
			<i>Engineering & Bidding</i> ²								\$ 26,000								
			Construction									\$ 125,000							
			Construction Engineering (10%)									\$ 12,500							
			Contingency (15%) & 3%/Yr. Inflation								\$ 9,877	\$ 57,306							
			Total Conceptual Project Cost								\$ 35,877	\$ 194,806							
9		132/093 - Boston Post Road over Beaver Brook	Deck Preservation and Misc. Repairs ³																
			<i>Engineering & Bidding</i> ²								\$ 26,000								
			Construction									\$ 83,000							
			Construction Engineering (10%)									\$ 8,300							
			Contingency (15%) & 3%/Yr. Inflation								\$ 9,877	\$ 38,051							
			Total Conceptual Project Cost								\$ 35,877	\$ 129,351							
10		177/108 - Merrimack Road over Beaver Brook	Deck Preservation and Misc. Repairs ³																
			<i>Engineering & Bidding</i> ²								\$ 26,000								
			Construction									\$ 106,000							
			Construction Engineering (10%)									\$ 10,600							
			Contingency (15%) & 3%/Yr. Inflation								\$ 9,877	\$ 48,595							
			Total Conceptual Project Cost								\$ 35,877	\$ 165,195							
11		093/153 - Camp Road over Baboosic Brook	Headwall and Misc. Repairs																
			<i>Engineering & Bidding</i> ²								\$ 30,000								
			Construction									\$ 35,000							
			Construction Engineering (10%)									\$ 3,500							
			Contingency (15%) & 3%/Yr. Inflation								\$ 11,396	\$ 16,046							
			Total Conceptual Project Cost								\$ 41,396	\$ 54,546							

RECOMMENDED 15- YEAR CAPITAL EXPENDITURES
TOWN OF AMHERST, NH



RECOMMENDED 15- YEAR CAPITAL EXPENDITURES
TOWN OF AMHERST, NH



Priority	DPW Priority ¹	Crossing	Recommendations	Short Term			Intermediate Term							Long Term					
				Year 0 FY 24	Year 1 FY 25	Year 2 FY 26	Year 3 FY 27	Year 4 FY 28	Year 5 FY 29	Year 6 FY 30	Year 7 FY 31	Year 8 FY 32	Year 9 FY 33	Year 10 FY 34	Year 11 FY 35	Year 12 FY 36	Year 13 FY 37	Year 14 FY 38	Year 15 FY 39
33		78 Horace Greeley Road																	
			Total Conceptual Project Cost																
		Biennial Culvert Inspections	Assumed cost for site visits and preparation of a brief letter report (Increased by 3%/Yr. for inflation)			\$ 10,609		\$ 11,255		\$ 11,941		\$ 12,668		\$ 13,439		\$ 14,258		\$ 15,126	
		General Routine Maintenance	Annual allowance for DPW forces, equipment, and material (Increased by 3%/Yr. for inflation)	\$ 20,000	\$ 20,600	\$ 21,218	\$ 21,855	\$ 22,510	\$ 23,185	\$ 23,881	\$ 24,597	\$ 25,335	\$ 26,095	\$ 26,878	\$ 27,685	\$ 28,515	\$ 29,371	\$ 30,252	\$ 31,159
Yearly Total Capital Expenditures =				\$ 38,500	\$ 174,203	\$ 957,560	\$ 209,506	\$ 589,249	\$ 327,592	\$ 69,423	\$ 173,624	\$ 695,243	\$ 789,851	\$ 1,124,901	\$ 429,654	\$ 2,306,826	\$ 366,026	\$ 818,149	\$ 183,168
Total Cost (Rounded) =																			\$ 9,254,000

- Notes:
- 1. DPW Priority indicates bridges and culverts which have major work items that can be completed by DPW forces.
 - 2. Engineering and Bidding Costs based on assumed values to prepare contract documents, including specifications, and administer a public bid based on Hoyle Tanner's experience with similar projects.
 - 3. Costs for 160/105, 132/093, and 117/108 are based on these projects being bundled into a single design and construction project. If these are separated into stand alone project, the total project cost will exceed the cost provided in this table.
 - 4. Engineering costs are not provided for this work. It is assumed that this work can be included in the Town's annual "Multi-Road Construction" contract.
 - 5. Engineering Costs for 063/118 assume that Town forces will complete the culvert repairs.
 - 6. The engineering and bidding cost for Thornton Ferry Rd. II/ Green Meadow GC is based on the scope and fee prepared by Hoyle Tanner dated April 12, 2024.

APPENDIX B

Capital Reserve Fund Cash Flow Analysis

Note: The following matrix is a modified version of Appendix A “Recommended 15-Year Capital Expenditure Summary”. The intent of the matrix provided in Appendix B is to quantify the costs of projects that are anticipated to be funded solely by the Town’s CRF.



RECOMMENDED 15- YEAR CAPITAL RESERVE FUND WITHDRAWALS
TOWN OF AMHERST, NH



Priority	DPW Priority ¹	Crossing	Recommendations	Short Term			Intermediate Term							Long Term					
				Year 0 FY 24	Year 1 FY 25	Year 2 FY 26	Year 3 FY 27	Year 4 FY 28	Year 5 FY 29	Year 6 FY 30	Year 7 FY 31	Year 8 FY 32	Year 9 FY 33	Year 10 FY 34	Year 11 FY 35	Year 12 FY 36	Year 13 FY 37	Year 14 FY 38	Year 15 FY 39
1		Thornton Ferry Rd. II/ Green Meadow GC	Replace Existing Crossing																
			Engineering & Bidding ⁶		\$ 153,603														
			Construction			\$ 695,000													
			Construction Engineering (10%)		\$ -	\$ 69,500													
			Contingency (15%) & 3%/Yr. Inflation			\$ 161,233													
			Total Conceptual Project Cost		\$ 153,603	\$ 925,733													
2	D1	64 Dodge Road	Replace Cracked Stone in Top Slab																
			Engineering																
			Construction																
			Construction Engineering (0%)																
			Contingency (15%) & 3%/Yr. Inflation																
			Total Conceptual Project Cost																
3		124/087 - Boston Post Road over Beaver Brook	Geopolymer Lining and Repair Work																
			Engineering & Bidding ²				\$ 63,000												
			Construction					\$ 215,000											
			Construction Engineering (10%)				\$ -	\$ 21,500											
			Contingency (15%) & 3%/Yr. Inflation				\$ 15,292	\$ 65,158											
			Total Conceptual Project Cost				\$ 78,292	\$ 301,658											
4		116/091 - New Boston Road over Beaver Brook	Membrane Installation and Bridge Repairs																
			Engineering & Bidding ²				\$ 58,000												
			Construction					\$ 130,000											
			Construction Engineering (10%)				\$ -	\$ 13,000											
			Contingency (15%) & 3%/Yr. Inflation				\$ 14,078	\$ 39,398											
			Total Conceptual Project Cost				\$ 72,078	\$ 182,398											
5		193/130 - Boston Post Road over Souhegan River	Deck Preservation & Substructure Repairs																
			Engineering & Bidding ²					\$ 56,000											
			Construction						\$ 195,000										
			Construction Engineering (10%)						\$ 19,500										
			Contingency (15%) & 3%/Yr. Inflation					\$ 15,428	\$ 66,339										
			Total Conceptual Project Cost					\$ 71,428	\$ 280,839										
6		28 Thornton Ferry Road II	Replace Existing Crossing																
			Engineering & Bidding ²									\$ 80,000							
			Construction																
			Construction Engineering (10%)									\$ -							
			Contingency (15%) & 3%/Yr. Inflation									\$ 33,342							
			Total Conceptual Project Cost									\$ 113,342							
7	D2	82 Amherst Street	Repair Headwall and Lengthen Culvert																
			Engineering						\$ 13,000										
			Construction							\$ 20,000									
			Construction Engineering (0%)							\$ -									
			Contingency (15%) & 3%/Yr. Inflation						\$ 4,021	\$ 6,881									
			Total Conceptual Project Cost						\$ 17,021	\$ 26,881									
8		160/105 - Boston Post Road over Beaver Brook	Deck Preservation and Misc. Repairs ³																
			Engineering & Bidding ²								\$ 26,000								
			Construction									\$ 125,000							
			Construction Engineering (10%)									\$ 12,500							
			Contingency (15%) & 3%/Yr. Inflation								\$ 9,877	\$ 57,306							
			Total Conceptual Project Cost								\$ 35,877	\$ 194,806							
9		132/093 - Boston Post Road over Beaver Brook	Deck Preservation and Misc. Repairs ³																
			Engineering & Bidding ²								\$ 26,000								
			Construction									\$ 83,000							
			Construction Engineering (10%)									\$ 8,300							
			Contingency (15%) & 3%/Yr. Inflation								\$ 9,877	\$ 38,051							
			Total Conceptual Project Cost								\$ 35,877	\$ 129,351							
10		177/108 - Merrimack Road over Beaver Brook	Deck Preservation and Misc. Repairs ³																
			Engineering & Bidding ²								\$ 26,000								
			Construction									\$ 106,000							
			Construction Engineering (10%)									\$ 10,600							
			Contingency (15%) & 3%/Yr. Inflation								\$ 9,877	\$ 48,595							
			Total Conceptual Project Cost								\$ 35,877	\$ 165,195							
11		093/153 - Camp Road over Baboosic Brook	Headwall and Misc. Repairs																
			Engineering & Bidding ²								\$ 30,000								
			Construction									\$ 35,000							
			Construction Engineering (10%)									\$ 3,500							
			Contingency (15%) & 3%/Yr. Inflation								\$ 11,396	\$ 16,046							
			Total Conceptual Project Cost								\$ 41,396	\$ 54,546							

[illegible]

				Short Term			Intermediate Term								Long Term						
Priority	DPW Priority ¹	Crossing	Recommendations	Year 0 FY 24	Year 1 FY 25	Year 2 FY 26	Year 3 FY 27	Year 4 FY 28	Year 5 FY 29	Year 6 FY 30	Year 7 FY 31	Year 8 FY 32	Year 9 FY 33	Year 10 FY 34	Year 11 FY 35	Year 12 FY 36	Year 13 FY 37	Year 14 FY 38	Year 15 FY 39		
23		69 Walnut Hill	Headwall Repairs																		
			Engineering & Bidding ²															\$ 10,000			
			Construction															\$ 10,000			
			Construction Engineering (10%)															\$ 1,000			
			Contingency (15%) & 3%/Yr. Inflation															\$ 12,989			
Total Conceptual Project Cost																\$ 33,989					
24		134/100 - Manchester Road over Beaver Brook	Pavement Inlay and Replace Joints																		
			Engineering & Bidding ⁴																		
			Construction				\$ 25,000														
			Construction Engineering (10%) ⁴																		
			Contingency (15%) & 3%/Yr. Inflation				\$ 6,068														
Total Conceptual Project Cost						\$ 31,068															
25		060/158 - Horace Greeley Road over Pulpit Brook	Crack Seal Pavement																		
			Engineering & Bidding ⁴																		
			Construction				\$ 5,000														
			Construction Engineering (10%) ⁴																		
			Contingency (15%) & 3%/Yr. Inflation				\$ 1,214														
Total Conceptual Project Cost						\$ 6,214															
26		75 Spring Road	Replace Existing Crossing																		
			Engineering & Bidding ⁴																		
			Construction																		
			Construction Engineering (10%)																		
			Contingency (15%) & 3%/Yr. Inflation																		
Total Conceptual Project Cost																					
27		Lynch Farm Road	Culvert Replacement with New Pipe															\$ 40,000			
			Engineering & Bidding ²																\$ 40,000		
			Construction																\$ 4,000		
			Construction Engineering (10%)																\$ 26,504		
			Contingency (15%) & 3%/Yr. Inflation																\$ 66,504	\$ 75,151	
Total Conceptual Project Cost																					
28		112/071 - Mont Vernon Road over Ceasars Brook	Crack Seal Pavement																		
			Engineering & Bidding ⁴																		
			Construction					\$ 5,000													
			Construction Engineering (10%) ⁴																		
			Contingency (15%) & 3%/Yr. Inflation					\$ 1,546													
Total Conceptual Project Cost								\$ 6,546													
29		145/106 - Thornton Ferry Road over Beaver Brook	Crack Seal Pavement																		
			Engineering & Bidding ⁴																		
			Construction					\$ 5,000													
			Construction Engineering (10%) ⁴																		
			Contingency (15%) & 3%/Yr. Inflation					\$ 1,720													
Total Conceptual Project Cost								\$ 6,720													
30		13 Nathaniel Drive																			
			Total Conceptual Project Cost																		
31		Merrimack Road at 2 Holt Road																			
			Total Conceptual Project Cost																		
32		485 Boston Post Road																			
			Total Conceptual Project Cost																		



RECOMMENDED 15- YEAR CAPITAL RESERVE FUND WITHDRAWALS
TOWN OF AMHERST, NH



Priority	DPW Priority ¹	Crossing	Recommendations	Short Term			Intermediate Term							Long Term					
				Year 0 FY 24	Year 1 FY 25	Year 2 FY 26	Year 3 FY 27	Year 4 FY 28	Year 5 FY 29	Year 6 FY 30	Year 7 FY 31	Year 8 FY 32	Year 9 FY 33	Year 10 FY 34	Year 11 FY 35	Year 12 FY 36	Year 13 FY 37	Year 14 FY 38	Year 15 FY 39
33		78 Horace Greeley Road																	
			Total Conceptual Project Cost																
		Biennial Culvert Inspections	Assumed cost for site visits and preparation of a brief letter report (Increased by 3%/Yr. for inflation)																
		General Routine Maintenance	Annual allowance for DPW forces, equipment, and material (Increased by 3%/Yr. for inflation)																
Yearly Total Capital Expenditures =				\$ -	\$ 153,603	\$ 925,733	\$ 187,652	\$ 555,484	\$ 304,406	\$ 33,601	\$ 149,026	\$ 657,240	\$ 167,299	\$ 591,591	\$ 210,190	\$ 357,383	\$ 336,655	\$ 772,772	\$ 152,009
Total CRF Withdrawals (Rounded) =																			\$ 5,555,000

- Notes:
1. DPW Priority indicates bridges and culverts which have major work items that can be completed by DPW forces.
 2. Engineering and Bidding Costs based on assumed values to prepare contract documents, including specifications, and administer a public bid based on Hoyle Tanner's experience with similar projects.
 3. Costs for 160/105, 132/093, and 117/108 are based on these projects being bundled into a single design and construction project. If these are separated into stand alone project, the total project cost will exceed the cost provided in this table.
 4. Engineering costs are not provided for this work. It is assumed that this work can be included in the Town's annual "Multi-Road Construction" contract.
 5. Engineering Costs for 063/118 assume that Town forces will complete the culvert repairs.
 6. The engineering and bidding cost for Thornton Ferry Rd. II/ Green Meadow GC is based on the scope and fee prepared by Hoyle Tanner dated April 12, 2024.

NOTES AND ASSUMPTIONS

- Based on discussions with the Town, the approximate CRF balance as of January 2024 is \$700,000.
- This cash flow analysis is based on the annual withdrawal rate as shown in the "15-Year Recommended Capital Reserve Fund Withdrawal" table.
- This cash flow analysis assumes the CRF funds appropriated by the Town is available at the start of the fiscal year (July 1).

Year	Fiscal Year	Starting Balance	CRF Appropriation	Withdrawals	Ending Balance
0	2024				\$ 700,000.00
1	2025	\$ 700,000.00	\$ 250,000.00	\$ (153,603.00)	\$ 796,397.00
2	2026	\$ 796,397.00	\$ 300,000.00	\$ (925,733.05)	\$ 170,663.95
3	2027	\$ 170,663.95	\$ 300,000.00	\$ (187,651.78)	\$ 283,012.17
4	2028	\$ 283,012.17	\$ 300,000.00	\$ (555,484.09)	\$ 27,528.09
5	2029	\$ 27,528.09	\$ 325,000.00	\$ (304,406.22)	\$ 48,121.86
6	2030	\$ 48,121.86	\$ 325,000.00	\$ (33,601.31)	\$ 339,520.56
7	2031	\$ 339,520.56	\$ 325,000.00	\$ (149,026.38)	\$ 515,494.18
8	2032	\$ 515,494.18	\$ 350,000.00	\$ (657,239.64)	\$ 208,254.54
9	2033	\$ 208,254.54	\$ 350,000.00	\$ (167,298.92)	\$ 390,955.62
10	2034	\$ 390,955.62	\$ 350,000.00	\$ (591,590.89)	\$ 149,364.74
11	2035	\$ 149,364.74	\$ 375,000.00	\$ (210,190.04)	\$ 314,174.70
12	2036	\$ 314,174.70	\$ 375,000.00	\$ (357,382.57)	\$ 331,792.13
13	2037	\$ 331,792.13	\$ 400,000.00	\$ (336,655.01)	\$ 395,137.11
14	2038	\$ 395,137.11	\$ 400,000.00	\$ (772,771.70)	\$ 22,365.41
15	2039	\$ 22,365.41	\$ 400,000.00	\$ (152,009.10)	\$ 270,356.31

Summation	\$ 5,125,000.00	\$ (5,554,643.69)
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APPENDIX C

General Routine Bridge and Culvert Maintenance Plan

General Routine Maintenance:

The Town should continue to perform routine maintenance of all their culverts in order for the structures to reach their intended design service life and, therefore, attain the lowest life-cycle cost of each culvert investment. Routine maintenance is defined as scheduled work at regular intervals with the goal of preserving structures in their present condition and protecting them from inevitable deterioration due to environmental factors, traffic, and deicing chemicals. This type of work is typically performed on structures in 'fair' or better condition with significant remaining service life. Minor repairs may be necessary to maintain the integrity of the structure and prevent major rehabilitation. Structures that are not maintained are more likely to deteriorate at a faster rate and require costlier treatments sooner than maintained structures. Therefore, it is cost effective to maintain structures to avoid the need for replacement or major rehabilitation. A routine culvert maintenance plan is presented below summarizing suggested maintenance tasks and the recommended frequency for each.

SUGGESTED GENERAL ROUTINE BRIDGE AND CULVERT MAINTENANCE PLAN

Annual Routine Maintenance		
Maintenance Task	Date Completed	Notes/Identified Issues
<u>General:</u> Remove brush and vegetation around structure.		
<u>Roadway Curb Lines and Sidewalks:</u> Sweep away sand and other debris.		
<u>Wearing Surface (Pavement):</u> Check for excessive cracking and deterioration. Seal any cracks with a flexible asphaltic sealer. Pay special attention to the pavement above the culvert for any signs of depressions or distress.		
<u>Roadway Side Slopes:</u> Check for any loose soil or sinkholes.		
<u>Culvert Opening:</u> Check the accumulation of debris, siltation or other flow impediments at inlets and outlets. Remove debris from inside culverts. Check for proper function of beaver screens		
<u>Channel:</u> Check for scour, undermining, or changes in the banks (lateral migration, undercutting, etc.)		
<u>Bridge Joints:</u> Remove debris and inspect for plow damage and / or leaks		
<u>Guardrail:</u> Inspect for damage, loose or missing bolts, sharp edges, or protrusions.		

Note: annual routine maintenance is typically completed in the spring.

Biennial Routine Maintenance		
Maintenance Task	Date Completed	Notes/Identified Issues
<u>Routine Inspection:</u> Structural and functional inspection of the bridge / culvert and waterway. Check for soil erosion of banks and scour / undermining of inlets and outlets.		
<u>HDPE, RCP, and CMP Specific Inspection:</u> Check for deformation in the pipes or misalignment of the joints. Check for corrosion in metal culverts		
<u>Masonry Arch and Masonry Frame Specific Inspection:</u> Check for cracked, shifting or missing stones.		
<u>Concrete Box Culvert Specific Inspection:</u> Check for segment alignment at joints, check for leaking at joint locations.		
<u>Bridge Bearings:</u> Remove debris from on and around bridge bearings. Note bearing deformation and correlate movement to ambient temperature.		

Periodic (~5 Year) Routine Maintenance)		
Maintenance Task	Date Completed	Notes/Identified Issues
<u>Exposed Concrete Surfaces:</u> Power wash exposed concrete surfaces and re-apply water repellent.		
<u>Exposed Concrete Surfaces:</u> Inspect and repair areas of deterioration and seal all cracks		
<u>Exposed Timber Surfaces:</u> Replace rotten or split members as required.		
<u>Painted Steel Surfaces:</u> Remove all surface corrosion and re-apply paint at locations of paint failure.		

APPENDIX D

NHDOT Bridge Program Recommended Investment Strategy

NHDOT Bridge Program **Recommended Investment Strategy**

Approved By:  Date: July 31, 2018
L. Robert Landry, PE
Chair, NHDOT Bridge Management Committee

NHDOT Bridge Program

Recommended Investment Strategy

Introduction

The NHDOT Bridge Management Committee (BMC) has developed Recommended Investment Strategies (RIS) for all five bridge types (girder, truss, moveable, timber, and culvert). The goal of these schedules is to maximize the service life and minimize the life cycle costs of New Hampshire bridges so they can continue to remain in service and provide an efficient transportation network.

Like most structures, bridges last longer when timely investments are made at prescribed intervals for needed maintenance, preservation, and rehabilitation activities. To appropriately apply these efforts, schedules have been developed for specific activities that, through experience, are shown to extend the service life of each type of bridge. Consequently, appropriate funding levels are required for these activities to be performed in accordance with the schedules developed for each type of bridge. These schedules were based on data compiled from past efforts, the issues or concerns associated with each activity, and the overall knowledge and experience of the BMC and supporting staff.

These strategies are used to develop estimated system-wide levels of investment for the overall Bridge Program and are not specific for individual bridge investments. Costs to perform these activities on individual bridges can vary considerably based on a number of site-specific factors. Thus, the information presented herein should only be used for system-wide funding recommendations. The RIS also assumes that the recommended actions have been made on all bridges to date, which is not the case, especially with the older bridges in the inventory. It also assumes that the ages of each type of bridge are distributed uniformly throughout the life cycle of each bridge type, which again is not the case. However, these are necessary assumptions for developing these recommended work schedules and funding levels.

As shown in the tables below (December 31, 2017 data), the girder bridge is the dominant structure type for all ownership groups, particularly State-owned bridges. Please note that this data includes only the NH-owned deck area of bridges that are shared with adjoining states.

Data for State (non-Turnpike) bridges by Bridge Type

<u>Bridge Type</u>	<u>Count</u>	<u>Deck Area (sq. ft.)*</u>	<u>Percentage By Deck Area</u>
Girder	1,147	6,528,490	83.6%
Truss	39	217,654	2.8%
Moveable	4	121,474	1.5%
Timber	38	52,714	0.7%
Culvert	762	888,320	11.4%
Totals:	1,990	7,808,653	100%

Data for State Turnpike bridges by Bridge Type

<u>Bridge Type</u>	<u>Count</u>	<u>Deck Area (sq. ft.)*</u>	<u>Percentage By Deck Area</u>
Girder	147	2,121,468	90.9%
Truss	2	118,781	5.1%
Moveable	0	0	0.0%
Timber	0	0	0.0%
Culvert	22	92,414	4.0%
Totals:	171	2,332,663	100%

Data for Municipally (and Other) bridges by Bridge Type

<u>Bridge Type</u>	<u>Count</u>	<u>Deck Area (sq. ft.)*</u>	<u>Percentage By Deck Area</u>
Girder	709	1,746,292	68.0%
Truss	37	172,051	6.7%
Moveable	0	0	0.0%
Timber	221	208,007	8.1%
Culvert	721	440,149	17.2%
Totals:	1,688	2,566,499	100%

Data for all bridges by Bridge Type

<u>Bridge Type</u>	<u>Count</u>	<u>Deck Area (sq. ft.)*</u>	<u>Percentage By Deck Area</u>
Girder	2,003	10,396,250	81.8%
Truss	78	508,486	4.0%
Moveable	4	121,474	1.0%
Timber	259	260,721	2.0%
Culvert	1,505	1,420,884	11.2%
Totals:	3,849	12,707,815	100%

* Includes NH portion only of bridge deck areas for bridges shared with adjoining states.

(I) Analysis

As can be seen from the above data, girder bridges represent the largest number of bridges throughout the state, and thus have the greatest effect on where the available bridge funds are applied. Investment strategies and schedules for recommended work activities to be performed on girder bridges were then developed for two life cycles: 80-years and 120-years. The costs for these activities over the different life cycles were then compared and evaluated. The results indicated that the schedule for the 120-year life cycle (\$8.10 per year per sq. ft.) was about 15% more economical than the schedule for the 80-year life cycle (\$9.60 per year per sq. ft.), with the difference being \$1.50 per year per sq. ft. (See Appendix “A” and Appendix “B” for information on development of these life cycle schedules.)

It would be appropriate to review and update the Recommended Investment Strategy for each type of bridge every five (5) years to ensure that current data is used as the basis for Bridge Program funding recommendations. A comparison of the work activities and associated costs for the different investment schedules and life cycles could demonstrate whether the goals of cost savings and an overall increase in the longevity of the state’s bridges are being attained.

(II) Typical Bridge Recommend Investment Strategy

The value of bridges in New Hampshire to our citizens, visitors, and economy cannot be overstated. The connectivity they provide to the local communities, as well as their contribution to the effectiveness of the transportation system could be considered irreplaceable on a statewide scale. The cost to replace every bridge in New Hampshire (state and municipal) would easily amount to billions of dollars. For this reason, the tremendous investment made in the past to construct these bridges must be protected so that they remain safe and available for use by the traveling public.

For the bridge owner (state or municipalities) to protect this investment and ensure that it can provide safe and continual service, a schedule for routine work activities should be followed for each bridge in their inventory. It is recognized that schedules for work activities for individual bridges will vary depending on the type of bridge and the site-specific factors, such as traffic volume, topography, streamflow, etc.

Tables 1 through 5 present the recommended schedule of work activities for each bridge type.

(A) Girder Bridges include the following classifications of bridges:

• BAIB – Bailey or similar bridge	• Jack – Jack Arch Concrete on I-Beams
• BGB – Beam Girder Bridge	• NEBT – Prestressed Bulb Tee
• CS – Concrete Slab	• NEXT – Northeast Extreme Tee
• CTB – Concrete Tee Beam	• PBB – Prestressed Butted Boxes
• DPG – Deck Plate Girder	• PIB – Prestressed I-Beams
• IB – I Beams without Deck	• PSB – Prestressed Spread Boxes
• IB-BP – I Beams with Bridge Plank	• PSC – Prestressed Concrete
• IB-C – I Beams with Concrete Deck	• PTB – Prestressed Tee Beams
• IB-G – I Beams with Steel Grid	• PVS – Prestressed Voids Slabs
• IB-S – I Beams with Steel Plate	• SRF – Steel Rigid Frame
• INVER – Inverset I-Beam/Concrete	• TPG – Thru Plate Girder

Table 1: Recommended Schedule of Work Activities for Girder Bridges

Year (Frequency)	Work Effort/Activity	Category of Work	Responsible Bureau
Annually	Clean and Seal; Clear Debris	Maintenance	Bridge Maintenance
5	Crack Seal Pavement	Preservation	Highway Design
10	Pavement Inlay	Preservation	Highway Design
15	Crack Seal Pavement	Preservation	Highway Design
20	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Rehab Bearings; Touch Up Paint (if applicable)	Preservation	Bridge Design
25	Crack Seal Pavement	Preservation	Highway Design
30	Pavement Inlay	Preservation	Highway Design
35	Crack Seal Pavement	Preservation	Highway Design
40	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Rehab Bearings; Touch Up Paint (if applicable)	Preservation	Bridge Design
45	Crack Seal Pavement	Preservation	Highway Design
50	Pavement Inlay	Preservation	Highway Design
55	Crack Seal Pavement	Preservation	Highway Design
60	Replace Deck, Membrane, Pavement, & Joints; Replace Bearings; Patch Substructure, New Paint (if applicable)	Rehabilitation	Bridge Design
65	Crack Seal Pavement	Preservation	Highway Design
70	Pavement Inlay	Preservation	Highway Design
75	Crack Seal Pavement	Preservation	Highway Design
80	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Rehab Bearings; Touch Up Paint (if applicable)	Preservation	Bridge Design
85	Crack Seal Pavement	Preservation	Highway Design
90	Pavement Inlay	Preservation	Highway Design
95	Crack Seal Pavement	Preservation	Highway Design
100	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Rehab Bearings; Touch Up Paint (if applicable)	Preservation	Bridge Design
105	Crack Seal Pavement	Preservation	Highway Design
110	Pavement Inlay	Preservation	Highway Design
115	Crack Seal Pavement	Preservation	Highway Design
120	Replace Bridge (or superstructure)	Replacement	Bridge Design

(B) Truss Bridges include the following classifications of bridges:

• DT – Deck Truss
• HT – High Truss
• LT – Low Truss
• SA – Steel Arch

Table 2: Recommended Schedule of Work Activities for Truss Bridges:

Year (Frequency)	Work Effort/Activity	Category of Work	Responsible Bureau
Annually	Clean and Seal; Clear Debris	Maintenance	Bridge Maintenance
5	Crack Seal Pavement	Preservation	Highway Design
10	Pavement Inlay	Preservation	Highway Design
15	Crack Seal Pavement	Preservation	Highway Design
20	Patch Deck and Substructure; Replace Membrane, Pavement, and Expansion Joints; Rehabilitate Bearings; Structural steel repairs; Touch Up Paint (if applicable)	Preservation	Bridge Design
25	Crack Seal Pavement	Preservation	Highway Design
30	Pavement Inlay	Preservation	Highway Design
35	Crack Seal Pavement	Preservation	Highway Design
40	Patch Deck and Substructure; Replace Membrane, Pavement, and Expansion Joints; Rehabilitate Bearings; Structural steel repairs; Touch Up Paint (if applicable)	Preservation	Bridge Design
45	Crack Seal Pavement	Preservation	Highway Design
50	Pavement Inlay	Preservation	Highway Design
55	Crack Seal Pavement	Preservation	Highway Design
60	Replace Deck; Patch Substructure; Replace Membrane, Pavement, and Expansion Joints; Replace Bearings; Structural steel repairs; New Paint (if applicable)	Rehabilitation	Bridge Design
65	Crack Seal Pavement	Preservation	Highway Design
70	Pavement Inlay	Preservation	Highway Design
75	Crack Seal Pavement	Preservation	Highway Design
80	Patch Deck and Substructure; Replace Membrane, Pavement, and Expansion Joints; Rehabilitate Bearings; Structural steel repairs; Touch Up Paint (if applicable)	Preservation	Bridge Design
85	Crack Seal Pavement	Preservation	Highway Design
90	Pavement Inlay	Preservation	Highway Design
95	Crack Seal Pavement	Preservation	Highway Design
100	Replace Bridge (or superstructure)	Replacement	Bridge Design

(C) Moveable Bridges include two very different types of moveable structures: bascule and vertical lift. These different moveable bridges require very different work tasks and treatments for their maintenance, preservation, and rehabilitation.

(C-1) Bascule Moveable Bridges include the following classification of bridges:

- BAS – Bascule Span

Table 3.1: Recommended Schedule of Work Activities for Bascule Moveable Bridges:

Year (Frequency)	Work Effort/Activity	Category of Work	Responsible Bureau
Annually	Clean & Seal Substructure; Clear Debris, Electrical & Mechanical Tasks	Maintenance	Bridge Maintenance
5	Crack Seal Pavement	Preservation	Highway Design
10	Pavement Inlay	Preservation	Highway Design
15	Crack Seal Pavement	Preservation	Highway Design
20	Pavement Inlay	Preservation	Highway Design
25	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Structural steel repairs; Touch Up Paint (if applicable) Electrical & Mechanical R&R; Replace Gates; Rehabilitate Fenders;	Preservation	Bridge Design
30	Crack Seal Pavement	Preservation	Highway Design
35	Pavement Inlay	Preservation	Highway Design
40	Crack Seal Pavement	Preservation	Highway Design
45	Pavement Inlay	Preservation	Highway Design
45	Crack Seal Pavement	Preservation	Highway Design
50	Replace Deck; Patch Substructure; Replace Membrane, Pavement, & Expansion Joints; Structural steel repairs; Complete Paint Removal/Application (if applicable); Replace Bearings; Electrical & Mechanical R&R; Replace Gates; Rehabilitate Fenders;	Rehabilitation	Bridge Design
55	Crack Seal Pavement	Preservation	Highway Design
60	Pavement Inlay	Preservation	Highway Design
65	Crack Seal Pavement	Preservation	Highway Design
70	Pavement Inlay	Preservation	Highway Design
75	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Structural steel repairs; Touch Up Paint (if applicable) Electrical & Mechanical R&R; Replace Gates; Rehabilitate Fenders;	Rehabilitation	Bridge Design
80	Crack Seal Pavement	Preservation	Highway Design
85	Pavement Inlay	Preservation	Highway Design
90	Crack Seal Pavement	Preservation	Highway Design
95	Pavement Inlay	Preservation	Highway Design
100	Replace Bridge (or superstructure)	Replacement	Bridge Design

(C-2) Vertical Lift Moveable Bridges include the following classification of bridges:

- LIFT – Vertical Lift

Table 3.2: Recommended Schedule of Work Activities for Moveable Bridges:

Year (Frequency)	Work Effort/Activity	Category of Work	Responsible Bureau
Annually	Clean & Seal Substructure; Clear Debris, Electrical & Mechanical Tasks	Maintenance	Bridge Maintenance
5	Crack Seal Pavement	Preservation	Highway Design
10	Pavement Inlay	Preservation	Highway Design
15	Crack Seal Pavement	Preservation	Highway Design
20	Pavement Inlay	Preservation	Highway Design
25	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Structural steel repairs; Touch Up Paint (if applicable) Replace Lift Ropes; Replace Counterweight Ropes; Electrical & Mechanical R&R; Replace Gates; Rehabilitate Fenders;	Preservation	Bridge Design
30	Crack Seal Pavement	Preservation	Highway Design
35	Pavement Inlay	Preservation	Highway Design
40	Crack Seal Pavement	Preservation	Highway Design
45	Pavement Inlay	Preservation	Highway Design
45	Crack Seal Pavement	Preservation	Highway Design
50	Replace Deck; Patch Substructure; Replace Membrane, Pavement, & Expansion Joints; Structural steel repairs; Complete Paint (if applicable); Replace Bearings; Replace Lift Ropes; Replace Counterweight Ropes; Electrical & Mechanical R&R; Replace Gates; Rehabilitate Fenders;	Rehabilitation	Bridge Design
55	Crack Seal Pavement	Preservation	Highway Design
60	Pavement Inlay	Preservation	Highway Design
65	Crack Seal Pavement	Preservation	Highway Design
70	Pavement Inlay	Preservation	Highway Design
75	Patch Deck and Substructure; Replace Membrane, Pavement, & Expansion Joints; Structural steel repairs; Touch Up Paint (if applicable) Replace Lift Ropes; Replace Counterweight Ropes; Electrical & Mechanical R&R; Replace Gates; Rehabilitate Fenders;	Rehabilitation	Bridge Design
80	Crack Seal Pavement	Preservation	Highway Design
85	Pavement Inlay	Preservation	Highway Design
90	Crack Seal Pavement	Preservation	Highway Design
95	Pavement Inlay	Preservation	Highway Design
100	Replace Bridge (or superstructure)	Replacement	Bridge Design

(D) Timber Bridges include the following classifications of bridges:

• CTC – Concrete Timber Composite
• IB-W – I-Beams with Wood Deck
• TB – Timber Bridge
• TB-C – Covered Bridge
• TB-CS – Timber Bridge Concrete Slab
• TS – Timber Slab
• TS-P – Prestressed Timber Slab

Table 4: Recommended Schedule of Work Activities for Timber Bridges

Year (Frequency)	Work Effort/Activity	Category of Work	Responsible Bureau
Annually	Clean and Seal Substructure; Clear Debris	Maintenance	Bridge Maintenance
5	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
10	Pavement Inlay (Paved timber decks only) Patch/Repair Deck and Substructure;	Preservation	Highway Design Bridge Maintenance
15	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
20	Replace Timber Deck; Repair Substructure; Replace Membrane & Pavement; (Paved timber decks only) Repair Expansion Joints; Rehabilitate Bearings; Rehabilitate Timbers;	Preservation	Bridge Design
25	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
30	Pavement Inlay (Paved timber decks only) Patch/Repair Deck and Substructure;	Preservation	Highway Design Bridge Maintenance
35	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
40	Replace Timber Deck; Repair Substructure; Replace Membrane & Pavement; (Paved timber decks only) Replace Expansion Joints; (if applicable) Replace Bearings; Rehabilitate Timbers;	Preservation	Bridge Design
45	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
50	Pavement Inlay (Paved timber decks only) Patch/Repair Deck and Substructure;	Preservation	Highway Design Bridge Maintenance
55	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
60	Replace Timber Deck; Repair Substructure; Replace Membrane & Pavement; (Paved timber decks only) Repair Expansion Joints; Rehabilitate Bearings; Rehabilitate Timbers;	Preservation	Bridge Design
65	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
70	Pavement Inlay (Paved timber decks only) Patch/Repair Deck and Substructure;	Preservation	Highway Design Bridge Maintenance
75	Crack Seal Pavement (Paved timber decks only)	Preservation	Highway Design
80	Replace bridge (or superstructure)	Replacement	Bridge Design

It is recognized that there are 48 covered bridges in New Hampshire (7 state; 41 municipal), however, the activities and funds needed to address deficiencies in these historic structures present unique challenges as they are much more complex than other timber bridges.

It is also recognized that very few timber bridges have paved decks and even fewer also have waterproofing membrane applied. The anticipated costs needed to perform the membrane and pavement work indicated above represents a small portion of the total estimated costs presented for timber bridges.

(E) Culvert Bridges include two very different types of structures: reinforced concrete (including masonry) and metal (steel and aluminum). These different materials require very different work tasks and treatments for their maintenance, preservation, and rehabilitation.

Of the total number of state and municipal culverts (metal or concrete) in the inventory, the majority (90%±) cross waterways. For this reason, these culverts would likely require preservation work due to the wear on the culvert invert from water flow and any debris or cobbles carried through them over time. The remaining 10%± of the total number of culverts are for recreational or other uses, and thus do not cross a waterway, would not experience the same wear, and would not require the same maintenance and work activities.

In addition, concrete culverts that are set “at grade” and are not completely buried will also require maintenance work to crack seal the pavement or to install a pavement in-lay, similar to the maintenance work indicated for bridges with concrete decks.

It is further recognized that metal (steel or aluminum) culverts that cross waterways often have a much reduced life span, sometimes much less than the 60-year service life anticipated for other culverts. For this reason, Bridge Design no longer allows metal (steel) sections of culverts to be installed below anticipated high water levels for waterway crossings.

(E-1) Metal Culvert Bridges include the following classifications of bridges:

• MP – Metal Pipe
• MP-A – Metal Plate Arch
• MP-B – Metal Plate Box Culvert

Table 5.1: Recommended Schedule of Work Activities for Metal Culvert Bridges:

Year (Frequency)	Work Effort/Activity	Category of Work	Responsible Bureau
Annually	Clean and Seal Substructure, Clear Debris	Maintenance	Bridge Maintenance
10	Install or Repair Invert (Waterway culverts only)	Preservation	Bridge Maintenance
20	Repair Invert (Waterway culverts only)	Preservation	Bridge Maintenance
30	Repair Invert (Waterway culverts only)	Preservation	Bridge Maintenance
40	Repair Invert (Waterway culverts only)	Preservation	Bridge Maintenance
50	Repair Invert (Waterway culverts only)	Preservation	Bridge Maintenance
60	Replace Culvert	Replacement	Bridge Design

(E-2) Concrete and Masonry Culvert Bridges include the following classifications of bridges:

• CA – Concrete Arch	• CPP – Concrete Polymer Pipe
• CACUL – Concrete Arch Culvert	• CRF – Concrete Rigid Frame
• CAR – Concrete Arch Rib	• CRF-P – Concrete Rigid Frame-Precast
• CB – Concrete Box	• MA – Masonry Arch
• CB-P – Concrete Box - Precast	• MA-CA – Masonry and Conc. Arch
• CP – Concrete Pipe	• MS – Masonry Slab

Table 5.2: Recommended Schedule of Work Activities for Concrete and Masonry Culvert Bridges:

Year (Frequency)	Work Effort/Activity	Category of Work	Responsible Bureau
Annually	Clean and Seal Substructure, Clear Debris	Maintenance	Bridge Maintenance
5	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
10	Pavement Inlay (Required for at-grade structures only)	Preservation	Highway Design
15	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
20	Pavement Inlay (Required for at-grade structures only)	Preservation	Highway Design
25	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
30	Pavement Inlay (Required for at-grade structures only)	Preservation	Highway Design
35	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
40	Pavement Inlay (Required for at-grade structures only)	Preservation	Highway Design
45	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
50	Pavement Inlay (Required for at-grade structures only)	Preservation	Highway Design
55	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
60	Pavement Inlay (Required for at-grade structures only)	Preservation	Highway Design
65	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
70	Pavement Inlay (Required for at-grade structures only)	Preservation	Highway Design
75	Crack Seal Pavement (Required for at-grade structures only)	Preservation	Highway Design
80	Replace Culvert	Replacement	Bridge Design

(III) Summary Comparison

This report outlines the recommended activities and schedules to maintain, preserve, rehabilitate, or replace all bridge types (girder, truss, moveable, timber, and culvert) in New Hampshire. The information summarized in Appendices A & B presents a cost comparison, using cost data from 2017, of two different investment strategies for girder bridges.

Appendix “A” outlines the costs of only performing minimal bridge work resulting in an 80-year bridge service life, whereas Appendix “B” outlines the costs of performing all recommended bridge work resulting in a 120-year bridge service life:

- Appendix “A”: Investment strategy resulting in an 80-year bridge service life = \$9.61 per sq. ft.
- Appendix “B”: Investment strategy resulting in a 120-year bridge service life = \$8.10 per sq. ft.
Savings = \$1.51 per sq. ft.

The cost of obtaining the 120-year bridge service life is \$1.51 per sq. ft. less than the cost for obtaining the 80-year bridge service life which also requires bridge replacement 40 years sooner. This data supports the Recommended Investment Strategy presented herein that performing scheduled maintenance and preservation activities results in a 50% longer bridge service life at a 15.7% lower cost over the 120-year projected service life of the bridge, when compared to only performing rehabilitation and replacement activities over an 80-year bridge service life.

Similar cost comparisons can be made for the four remaining types of bridges confirming that performing specific tasks at scheduled time intervals is the more economical approach to obtaining a longer bridge service life. The result of this strategy is that bridges that receive scheduled work activities will consistently be in better condition and have a much longer service life than bridges on which no maintenance or scheduled work activities are performed.

Appendix “A”: Investment Strategy and Schedule for Girder Bridge resulting in 80-year service life

Frequency (Year)	Work Activity	Category	Maintenance Cost/Sq. Ft.	Preservation Cost/Sq. Ft.	Rehabilitation Cost/Sq. Ft.	Replacement Cost/Sq. Ft.
Annual	Clean and seal	Maintenance	\$ 0.10	-	-	-
5	Crack seal	Preservation	-	\$ 0.07	-	-
10	Replace pavement	Preservation	-	\$ 1.60	-	-
15	Crack seal	Preservation	-	\$ 0.07	-	-
20	Replace pavement	Preservation	-	\$ 1.60	-	-
25	Crack seal	Preservation	-	\$ 0.07	-	-
30	Replace pavement	Preservation	-	\$ 1.60	-	-
35	Crack seal	Preservation	-	\$ 0.07	-	-
40	Replace deck, etc.	Rehabilitation	-	-	\$ 100.00	-
45	Crack seal	Preservation	-	\$ 0.07	-	-
50	Replace pavement	Preservation	-	\$ 1.60	-	-
55	Crack seal	Preservation	-	\$ 0.07	-	-
60	Replace pavement	Preservation	-	\$ 1.60	-	-
65	Crack seal	Preservation	-	\$ 0.07	-	-
70	Replace pavement	Preservation	-	\$ 1.60	-	-
75	Crack seal	Preservation	-	\$ 0.07	-	-
80	Replace bridge	Replacement	-	-	-	\$ 650.00

Deck service life = 40 years Bridge service life = 80 years	Cost / Sq. Ft. over 80-year bridge life	\$ 8.00	\$ 10.16	\$ 100.00	\$ 650.00
	Cost / Sq. Ft.	\$ 0.10	\$ 0.13	\$ 1.25	\$ 8.13
Costs per year	Cost/Sq. Ft. per year for 80-year bridge life: \$9.61 =	Maintenance (\$ 0.10)	+ Preservation (\$ 0.13)	+ Rehabilitation (\$ 1.25)	+ Replacement (\$ 8.13)

Appendix “B”: Investment Strategy and Schedule for Girder Bridge resulting in 120-year service life

Frequency (Year)	Work Activity	Category	Maintenance Cost/Sq. Ft.	Preservation Cost/Sq. Ft.	Rehabilitation Cost/Sq. Ft.	Replacement Cost/Sq. Ft.
Annual	Clean and seal	Maintenance	\$ 0.10	-	-	-
5	Crack seal	Preservation	-	\$ 0.07	-	-
10	Replace pavement	Preservation	-	\$ 1.60	-	-
15	Crack Seal	Preservation	-	\$ 0.07	-	-
20	Patch deck; Replace pavement, membrane, and expansion joints	Preservation	-	\$ 50.00	-	-
25	Crack Seal	Preservation	-	\$ 0.07	-	-
30	Replace Pavement	Preservation	-	\$ 1.60	-	-
35	Crack seal	Preservation	-	\$ 0.07	-	-
40	Patch deck; Replace pavement, membrane, and expansion joints	Preservation	-	\$ 50.00	-	-
45	Crack seal	Preservation	-	\$ 0.07	-	-
50	Replace pavement	Preservation	-	\$ 1.60	-	-
55	Crack Seal	Preservation	-	\$ 0.07	-	-
60	Replace deck, etc.	Rehabilitation	-	-	\$ 100.00	-
65	Crack Seal	Preservation	-	\$ 0.07	-	-
70	Replace pavement	Preservation	-	\$ 1.60	-	-
75	Crack seal	Preservation	-	\$ 0.07	-	-
80	Patch deck; Replace pavement, membrane, and expansion joints	Preservation	-	\$ 50.00	-	-
85	Crack Seal	Preservation	-	\$ 0.07	-	-
90	Replace pavement	Preservation	-	\$ 1.60	-	-
95	Crack seal	Preservation	-	\$ 0.07	-	-
100	Patch deck; Replace pavement, membrane, and expansion joints	Preservation	-	\$ 50.00	-	-
105	Crack Seal	Preservation	-	\$ 0.07	-	-
110	Replace pavement	Preservation	-	\$ 1.60	-	-
115	Crack seal	Preservation	-	\$ 0.07	-	-
120	Replace bridge	Replacement	-	-	-	\$ 650.00

Deck service life = 60 years Bridge service life = 120 years	Cost / Sq. Ft. over 120-year bridge life	\$ 12.00	\$ 210.44	\$ 100.00	\$ 650.00
	Cost / Sq. Ft.	\$ 0.10	\$ 1.75	\$ 0.83	\$ 5.42
Costs per year	Cost/Sq. Ft. per year for 120-year bridge life: \$8.10 =	Maintenance (\$ 0.10)	+ Preservation (\$ 1.75)	+ Rehabilitation (\$ 0.83)	+ Replacement (\$ 5.42)

APPENDIX E

FHWA Coding Guide Excerpt

<u>Code</u>	<u>Description</u>
N	NOT APPLICABLE
9	EXCELLENT CONDITION
8	VERY GOOD CONDITION - no problems noted.
7	GOOD CONDITION - some minor problems.
6	SATISFACTORY CONDITION - structural elements show some minor deterioration.
5	FAIR CONDITION - all primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
4	POOR CONDITION - advanced section loss, deterioration, spalling or scour.
3	SERIOUS CONDITION - 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.
2	CRITICAL CONDITION - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	"IMMINENT" FAILURE CONDITION - major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service.
0	FAILED CONDITION - out of service - beyond corrective action.

Item 61 - Channel and Channel Protection

1 digit

This item describes the physical conditions associated with the flow of water through the bridge such as stream stability and the condition of the channel, riprap, slope protection, or stream control devices including spur dikes. The inspector should be particularly concerned with visible signs of excessive water velocity which may affect undermining of slope protection, erosion of banks, and realignment of the stream which may result in immediate or potential problems. Accumulation of drift and debris on the superstructure and substructure should be noted on the inspection form but not included in the condition rating.

Rate and code the condition in accordance with the previously described general condition ratings and the following descriptive codes:

<u>Code</u>	<u>Description</u>
N	Not applicable. Use when bridge is not over a waterway (channel).
9	There are no noticeable or noteworthy deficiencies which affect the condition of the channel.
8	Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in a stable condition.
7	Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift.
6	Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor stream bed movement evident. Debris is restricting the channel slightly.
5	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel.
4	Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the channel.
3	Bank protection has failed. River control devices have been destroyed. Stream bed aggradation, degradation or lateral movement has changed the channel to now threaten the bridge and/or approach roadway.
2	The channel has changed to the extent the bridge is near a state of collapse.
1	Bridge closed because of channel failure. Corrective action may put back in light service.
0	Bridge closed because of channel failure. Replacement necessary.

Item 62 - Culverts

1 digit

This item evaluates the alignment, settlement, joints, structural condition, scour, and other items associated with culverts. The rating code is intended to be an overall condition evaluation of the culvert. Integral wingwalls to the first construction or expansion joint shall be included in the evaluation. For a detailed discussion regarding the inspection and rating of culverts, consult Report No. FHWA-IP-86-2, Culvert Inspection Manual, July 1986.

Item 58 - Deck, Item 59 - Superstructure, and Item 60 - Substructure shall be coded N for all culverts.

Rate and code the condition in accordance with the previously described general condition ratings and the following descriptive codes:

<u>Code</u>	<u>Description</u>
N	Not applicable. Use if structure is not a culvert.
9	No deficiencies.
8	No noticeable or noteworthy deficiencies which affect the condition of the culvert. Insignificant scrape marks caused by drift.
7	Shrinkage cracks, light scaling, and insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift with no misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
6	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
5	Moderate to major deterioration or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
4	Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joint permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.

(codes continued on the next page)

Item 62 - Culverts (cont'd)

- 3 Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
- 2 Integral wingwalls collapsed, severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undermining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.
- 1 Bridge closed. Corrective action may put back in light service.
- 0 Bridge closed. Replacement necessary.

APPENDIX F

NHDOT Bridge Inspection Reports

Bridge Inspection Report

NBI Structure Number: 000700600015800

Amherst 060/158

Date of Inspection: 06/06/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

HORACE GREELEY RD

over

PULPIT BROOK

Recommended Postings:Weight: **No Posting Required**☒ Weight Sign OKWidth: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 8 Very Good

Superstructure: 8 Very Good

Substructure: 8 Very Good

Culvert: N N/A (NBI)

Sufficiency Rating: 87.4 %

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Prestressed Concrete/Slab

Bridge Rail: Meets Standards

Rail Transition: Meets Standards

Bridge Approach Rail: Meets Standards

Approach Rail Ends: Meets Standards

NH Bridge Type: PVS (Prestressed Voided Slabs)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Low Slump Concrete

Membrane: None

Deck Protection: Epoxy Coated Reinforcing

Curb Reveal: 6 in

Plan Location: Electronic

Total Bridge Length: 45.0 ft

Right Curb/Sidewalk Width: 0.5 ft

Total Bridge Width: 30.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 2018/

Bridge Dimensions:

Length Maximum Span: 40.0 ft

Left Curb/Sidewalk Width: 0.5 ft

Width Curb to Curb: 26.0 ft

Approach Roadway Width: 26.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000700600015800

Amherst 060/158

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 762

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 1,127

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Rural, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 5 Above Tolerable

Underclearances: N Not applicable (NBI)

Approach Alignment: 6 Equal Min Criteria

Structural Evaluation: 8 Equal Desirable Crit

Channel/Channel Protection: 8 Protected

Waterway Adequacy: 9 Above Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: No Debris Present

Channel Notes: 12/6/18- 30" OF FREEBOARD, WATER DEPTH SEVEN FEET. ABLE TO INSPECT DUE TO LARGE STONE (RIP RAP) PLACED ALONG ABUTMENTS. CAN BE REMOVED FROM DIVE LIST IF DESIRED.

Bridge Inspection Report

NBI Structure Number: 000700600015800

Amherst 060/158

Element Details

No.	Description	Material Notes and Condition Notes:
39	Prestressed Concrete Slab	10 SECTIONS, 3' WIDE x 15" THICK. PRESTRESSED VOIDED SLABS WITH EXPOSED DECK.
215	Reinforced Concrete Abutment	CAST IN PLACE CONCRETE ABUTMENTS / WINGS.
300	Strip Seal Expansion Joint	RUBBER GLAND INSTALLED BETWEEN DECK END AND BACKWALL WITHOUT JOINT ARMOR ON BOTH ENDS.
310	Elastomeric Bearing	TWO ELASTOMERIC PADS PLACED UNDER EACH SLAB ON EACH END.
330	Metal Bridge Railing	RAIL- T-2 GALVANIZED BOX BEAM.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
39	Prestressed Concrete Slab	1,350	(SF)	100%	0%	0%	0%
215	Reinforced Concrete Abutment	136	ft	100%	0%	0%	0%
300	Strip Seal Expansion Joint	52	ft	100%	0%	0%	0%
310	Elastomeric Bearing	40	each	100%	0%	0%	0%
330	Metal Bridge Railing	203	ft	100%	0%	0%	0%

Bridge Notes:

12/6/18- NEW PRESTRESSED VOIDED SLABS WITH CAST IN PLACE WINGS / ABUTMENT. REMOVED FROM DIVE LIST.

Inspection Notes: 06/06/2023

NJL inspection comments-

DECK / SUPERSTRUCTURE: PRESTRESSED VOIDED SLABS WITH BARE DECK. CURBS- NO DAMAGE. BRIDGE RAIL- T-2 GALVANIZED BOX BEAM.

SUBSTRUCTURE: CAST-IN-PLACE CONCRETE ABUTMENTS / WINGS.

Previous Inspection Notes: 06/21/2021

NJL inspection comments-

DECK / SUPERSTRUCTURE: PRESTRESSED VOIDED SLABS WITH BARE DECK. CURBS- NO DAMAGE. BRIDGE RAIL- T-2 GALVANIZED BOX BEAM.

SUBSTRUCTURE: CAST-IN-PLACE CONCRETE ABUTMENTS / WINGS.

Approach and Roadway Notes:

APPROACH ASPHALT- NO DAMAGE. APPROACH W-BEAM RAIL- GALVANIZED POST WITH SYNTHETIC OFFSET BLOCKS.

Unusual or experimental features:

Bridge Inspection Report

NBI Structure Number: 000700600015800

Amherst 060/158

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/06/2023	NJL	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
06/21/2021	NJL	☒	☒	☐	☐	9	9	9	N	☐	No Posting Req'd
06/17/2019	NJL	☒	☒	☐	☐	9	9	9	N	☐	No Posting Req'd
12/06/2018	NJL	☒	☒	☐	☐	9	9	9	N	☐	No Posting Req'd
08/15/2018	NJL	☒	☒	☐	☐	N	N	N	1	☒	6 Tons
08/09/2017	KLM	☒	☒	☐	☒	N	N	N	2	☒	6 Tons
06/29/2017	KLM	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
10/12/2016	NJL	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
10/16/2015	KLM	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
10/21/2014	KLM	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
10/04/2013	NJL	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
12/12/2012	NJL	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
11/14/2012	JEL	☒	☒	☐	☒	N	N	N	3	☒	No Posting Req'd
10/21/2011	KLM	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
09/28/2010	NJL	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
10/30/2009	FNM	☒	☒	☐	☐	N	N	N	4	☒	No Posting Req'd
12/19/2008	RLM	☒	☒	☐	☒	N	N	N	4	☒	No Posting Req'd
01/30/2007	FNM	☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd
02/18/2005	JEL	☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
08/28/2003	JEL	☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
09/21/2001	FNM	☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
03/04/1999	RLM	☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
02/01/1997		☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
01/01/1995		☒	☒	☐	☐	N	N	N	8	☐	No Posting Req'd
01/01/1993		☒	☒	☐	☐	N	N	N	8	☐	No Posting Req'd

Inspection Frequency (mo.)

NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000700630011800

Amherst 063/118

Date of Inspection: 06/06/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

BROOK ROAD

over

JOE ENGLISH BROOK

Recommended Postings:Weight: **E-2**☒ Weight Sign OK

SIGNS IN PLACE. 6/6/23

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: N N/A (NBI)

Superstructure: N N/A (NBI)

Substructure: N N/A (NBI)

Culvert: 5 Fair

Sufficiency Rating: 81.5 %

Bridge Rail: N/A or not required

Rail Transition: N/A or not required

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 3

Number of Approach Spans: 0

Main Span Material and Design Type

Steel/Culvert

NH Bridge Type: MP (Metal Pipe)

Deck Type: N/A (NBI)

Wearing Surface: N/A (no deck (NBI))

Membrane: N/A (no deck (NBI))

Deck Protection: N/A (no deck (NBI))

Curb Reveal: Not Measured

Plan Location:

Total Bridge Length: 25.0 ft

Right Curb/Sidewalk Width: 0.0 ft

Total Bridge Width: 0.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1985

Bridge Dimensions:

Length Maximum Span: 6.0 ft

Left Curb/Sidewalk Width: 0.0 ft

Width Curb to Curb: 0.0 ft

Approach Roadway Width: 16.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000700630011800

Amherst 063/118

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 178

Percent Trucks: 0%

Year of AADT: 2021

Future AADT: 263

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Rural, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: N Not applicable (NBI)

Underclearances: N Not applicable (NBI)

Approach Alignment: 7 Above Min Criteria

Structural Evaluation: 5 Above Min Tolerable

Channel/Channel Protection: 6 Bank Slumping

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Fair Condition

Debris Present: Debris Present

Channel Notes: MODERATE TO HEAVY TREE DEBRIS AT INLET. MP'S UNDERMINED WITH UP TO 2 FEET OF PENETRATION CREATING LARGE VOIDS. SOUTHEAST WING MISSING STONES.

Bridge Inspection Report

NBI Structure Number: 000700630011800

Amherst 063/118

Element Details

No.	Description	Material Notes and Condition Notes:
217	Masonry Abutment	LARGE 3FT x 4FT VOID ON SOUTHEAST WING, STONE MISSING. VOIDS BETWEEN BARRELS, DOWNSTREAM. STONES SETTLED IN AREAS ON SOUTH.
L 1640	Masonry Displacement	FEW STONES OUT OF ALIGNMENT. LARGE THREE BY FOUR FOOT VOID ON SOUTHEAST WING, STONE MISSING.
240	Steel Culvert	3 MP'S: 6 '-3" x 4'-5". CORRUGATION 2-2/3" X 1/2" X 3/16" THICK. 18" TO 20" OF COVER. PIPE EXTENDS OUT FROM EDGE OF ROAD 11' ON SOUTH AND 10' ON NORTH. MP'S- LIGHT TO MODERATE RUST AND SCALE ON INVERTS. BARREL #1 (DEPTH 6"), BARREL #2 (DEPTH 1'), BARREL #3 (DEPTH 1'). SPAN #2 INVERT HOLED IN FIVE AREAS (QUARTER SIZE) AT INLET (NOT UNDER TRAVEL WAY). SAGS IN ROOF OF EACH NEAR CENTERLINE OF ROADWAY. MINOR MISALIGNMENT AT JOINTS.
L 1000	Corrosion	CORROSION AT BASE OF ALL THREE INVERTS, THIN IN AREAS. SPAN #2- INVERT HOLED IN FIVE AREAS (QUARTER SIZE) AT INLET. (NOT OVER TRAVEL WAY)
L 6000	Scour	ALL THREE BARRELS UNDERMINED, UPSTREAM. BARREL #1 (DEPTH 6") AND 1' OF PENETRATION, BARREL #2 (DEPTH 1') 3' OF PENETRATION, BARREL #3 (DEPTH 1') 1' OF PENETRATION

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
217	Masonry Abutment	60	ft	47%	43%	10%	0%
L 1640	Masonry Displacement	30	ft	0%	87%	13%	0%
240	Steel Culvert	121	ft	0%	98%	2%	0%
L 1000	Corrosion	106	ft	0%	98%	2%	0%
L 6000	Scour	15	ft	0%	100%	0%	0%

Bridge Notes:

Inspection Notes: 06/06/2023

BTB inspection comments -
GRAVEL ROAD. NO RAIL SYSTEM.

METAL CULVERT: MP'S- LIGHT TO MODERATE RUST AND SCALE ON INVERTS. INVERT HOLED IN FIVE AREAS (QUARTER SIZE) AT INLET IN SPAN #2 (NOT OVER TRAVEL WAY). SAGS IN ROOF OF EACH NEAR CENTERLINE OF ROADWAY. MINOR MISALIGNMENT AT JOINTS.

SCOUR- ALL THREE BARRELS UNDERMINE, UPSTREAM.

OTHER ABUTMENT: LARGE THREE BY FOUR FOOT VOID ON SOUTHEAST WING, STONE MISSING. VOIDS BETWEEN BARRELS, DOWNSTREAM. STONES SETTLED IN AREAS ON SOUTH.

PICTURES: D290-
47. WEST APPROACH.
48. SOUTH ELEVATION.

Bridge Inspection Report

NBI Structure Number: 000700630011800

Amherst 063/118

Previous Inspection Notes: 06/22/2021

NJL inspection comments -

GRAVEL ROAD. NO RAIL SYSTEM.

METAL CULVERT: MP'S- LIGHT TO MODERATE RUST AND SCALE ON INVERTS. INVERT HOLED IN FIVE AREAS (QUARTER SIZE) AT INLET, NOT OVER TRAVELWAY; SPAN #2. SAGS IN ROOF OF EACH NEAR CENTERLINE OF ROADWAY. MINOR MISALIGNMENT AT JOINTS.

SCOUR- ALL THREE BARRELS UNDERMINED WITH 2' OF PENETRATION, UPSTREAM. BARREL #1 (DEPTH 6"), BARREL #2 (DEPTH 1'), BARREL #3 (DEPTH 1').

OTHER ABUTMENT: LARGE THREE BY FOUR FOOT VOID ON SOUTHEAST WING, STONE MISSING. VOIDS BETWEEN BARRELS, DOWNSTREAM. STONES SETTLED IN AREAS ON SOUTH.

PICTURES: D258-

06. INVERT HOLED IN FIVE AREAS (QUARTER SIZE) AT INLET, NOT OVER TRAVELWAY; SPAN #2.

07. TREE DEBRIS IN SPAN #1 AT INLET.

Approach and Roadway Notes:

GRAVEL- GOOD CONDITION. NO APPROACH RAIL.

Unusual or experimental features:

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/06/2023	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
06/22/2021	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
06/20/2019	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
06/29/2017	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
07/22/2015	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
07/02/2013	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
07/05/2011	MHC	☒	☒	☐	☐	N	N	N	6	☐	E-2
06/24/2009	KLM	☒	☒	☐	☐	N	N	N	6	☐	E-2
01/30/2007	JEL	☒	☒	☐	☐	N	N	N	6	☐	E-2
02/18/2005	FNM	☒	☒	☐	☐	N	N	N	6	☐	E-2
07/15/2003	FNM	☒	☒	☐	☐	N	N	N	6	☐	E-2
01/23/2001	FNM	☒	☒	☐	☐	N	N	N	6	☐	E-2
03/04/1999	JEL	☒	☒	☐	☐	N	N	N	6	☐	E-2
02/01/1997		☒	☒	☐	☐	N	N	N	6	☐	E-2
01/01/1995		☒	☒	☐	☐	N	N	N	6	☐	E-2
01/01/1993		☒	☒	☐	☐	N	N	N	7	☐	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000700870012900

Amherst 087/129

Date of Inspection: 06/06/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

HORACE GREELEY RD

over

JOE ENGLISH BROOK

Recommended Postings:Weight: **No Posting Required**☒ Weight Sign OKWidth: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 7 Good

Superstructure: 7 Good

Substructure: 7 Good

Culvert: N N/A (NBI)

Sufficiency Rating: 86.5 %

Bridge Rail: Meets Standards

Rail Transition: Meets Standards

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Steel/Stringer/Girder

NH Bridge Type: IB-C (I Beams w/ Concrete Deck)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: Preformed Fabric

Deck Protection: Epoxy Coated Reinforcing

Curb Reveal: 6 in

Plan Location: 5-7-4-4

Total Bridge Length: 45.0 ft

Right Curb/Sidewalk Width: 0.5 ft

Total Bridge Width: 30.0 ft

Median: No median

Bridge Skew: 15.00°

Year Built/Rebuilt: 1989

Bridge Dimensions:

Length Maximum Span: 38.0 ft

Left Curb/Sidewalk Width: 0.5 ft

Width Curb to Curb: 27.0 ft

Approach Roadway Width: 22.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000700870012900

Amherst 087/129

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 1,978

Percent Trucks: 10 %

Year of AADT: 2021

Future AADT: 2,927

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Rural, Minor Collector

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 4 Tolerable

Underclearances: N Not applicable (NBI)

Approach Alignment: 8 Equal Desirable Crit

Structural Evaluation: 7 Above Min Criteria

Channel/Channel Protection: 7 Minor Damage

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: No Debris Present

Channel Notes:

Bridge Inspection Report

NBI Structure Number: 000700870012900

Amherst 087/129

Element Details

No.	Description	Material Notes and Condition Notes:
12	Reinforced Concrete Deck	8" CONCRETE DECK.
└ 510	Wearing Surfaces	CURBS- LIGHT CRACKS. UNDERSIDE OF DECK- MINOR CRACKS IN AREAS, MINOR LEAKING ON NORTHWEST.
└ 1120	Efflorescence/Rust Staining	ASPHALT- NO DAMAGE.
107	Steel Open Girder/Beam	MINOR CRACK WITH EFFLORESCENCE ON UNDERSIDE OF DECK AT NORTHWEST.
└ 517	Weathering Steel Protective Coating	CORROSION HAS INITIATED ON NORTHEAST.
└ 1000	Corrosion	
215	Reinforced Concrete Abutment	ABUTMENTS- MINOR SPALL ON TOP OF NORTHWEST AND SOUTHWEST WINGS.
└ 1080	Delamination/Spall/Patched Area	MINOR SPALL ON TOP OF NORTHWEST AND SOUTHWEST WINGS.
311	Movable Bearing	MINOR SURFACE RUST.
└ 515	Steel Protective Coating	
313	Fixed Bearing	MINOR SURFACE RUST.
└ 515	Steel Protective Coating	
└ 1000	Corrosion	CORROSION HAS INITIATED ON NORTHEAST.
330	Metal Bridge Railing	FEW SCRAPES, SOME POSTS GOUGED. TWO POSTS BENT AND UNDERSIDE OF TOP RAIL HOLED ON NORTHEAST.
└ 7000	Damage	TWO POST BENT AND UNDERSIDE OF TOP RAIL HOLED ON NORTHEAST.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
12	Reinforced Concrete Deck	1,350	sq.ft	100%	0%	0%	0%
└ 510	Wearing Surfaces	---	---	100%	0%	0%	0%
└ 1120	Efflorescence/Rust Staining	1	sq.ft	0%	100%	0%	0%
107	Steel Open Girder/Beam	226	ft	98%	2%	0%	0%
└ 517	Weathering Steel Protective Coating	---	---	95%	5%	0%	0%
└ 1000	Corrosion	4	ft	0%	100%	0%	0%
215	Reinforced Concrete Abutment	108	ft	98%	2%	0%	0%
└ 1080	Delamination/Spall/Patched Area	2	ft	0%	100%	0%	0%
311	Movable Bearing	5	each	100%	0%	0%	0%
└ 515	Steel Protective Coating	---	---	100%	0%	0%	0%
313	Fixed Bearing	5	each	80%	20%	0%	0%
└ 515	Steel Protective Coating	---	---	100%	0%	0%	0%
└ 1000	Corrosion	1	each	100%	0%	0%	0%
330	Metal Bridge Railing	190	ft	97%	2%	2%	0%
└ 7000	Damage	6	ft	0%	50%	50%	0%

Bridge Inspection Report

NBI Structure Number: 000700870012900

Amherst 087/129

Bridge Notes:

Inspection Notes: 06/06/2023

BTB inspection comments -

DECK: ASPHALT- NEW PAVEMENT. CURBS- LIGHT CRACKS. UNDERSIDE OF DECK- MINOR CRACKS IN AREAS, MINOR LEAKING ON NORTHWEST. RAIL- FEW SCRAPES, SOME POSTS GOUGED. TWO POSTS BENT AND UNDERSIDE OF TOP RAIL HOLED ON NORTHEAST.

SUPERSTRUCTURE: CORROSION HAS INITIATED ON NORTHEAST.

SUBSTRUCTURE: ABUTMENTS- MINOR SPALL AT TOP NORTHWEST AND SOUTHWEST WINGS.

PICTURES: D290-

49. SOUTH APPROACH, NEW PAVEMENT.

50. WEST ELEVATION.

Previous Inspection Notes: 06/22/2021

BTB inspection comments -

DECK: ASPHALT- SEVERAL CRACKS. CURBS- LIGHT CRACKS. UNDERSIDE OF DECK- MINOR CRACKS IN AREAS, MINOR LEAKING ON NORTHWEST. RAIL- FEW SCRAPES, SOME POSTS GOUGED. TWO POSTS BENT AND UNDERSIDE OF TOP RAIL HOLED ON NORTHEAST.

SUPERSTRUCTURE: CORROSION HAS INITIATED ON NORTHEAST.

SUBSTRUCTURE: ABUTMENTS- MINOR SPALL AT TOP NORTHWEST AND SOUTHWEST WINGS.

PICTURES: D258-

08. CRACKED, PATCHED AND POTHOLED WITH SETTLEMENT AT SOUTH DECK END.

09. GRANULE TEXTURE FORMING AT EXTERIOR BEARING, BOTTOM WEB AND FLANGE ON NORTHEAST.

Approach and Roadway Notes:

APPROACH ASPHALT- NEW PAVEMENT.

APPROACH W-BEAM RAIL- MINOR SCRAPES, OFFSET BLOCK SPLIT ON SOUTHWEST AND ONE MISSING ON SOUTHEAST.

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/06/2023	NJL	☒	☒	☐	☐	7	7	7	N	☐	No Posting Req'd
06/22/2021	NJL	☒	☒	☐	☐	7	7	7	N	☐	No Posting Req'd
06/20/2019	NJL	☒	☒	☐	☐	7	8	7	N	☐	No Posting Req'd
06/29/2017	KLM	☒	☒	☐	☐	7	8	7	N	☐	No Posting Req'd
07/22/2015	KLM	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
07/02/2013	NJL	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
07/05/2011	KLM	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
06/24/2009	FNM	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
01/30/2007	FNM	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
02/18/2005	JEL	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
01/23/2003	FNM	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
01/23/2001	FNM	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
03/03/1999	JEL	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
02/01/1997		☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
01/01/1995		☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
01/01/1993		☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000700930015300

Amherst 093/153

Date of Inspection: 06/06/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

CAMP ROAD

over

BABOOSIC BROOK

Recommended Postings:Weight: **E-2**☒ Weight Sign OK

SIGNS IN PLACE. 6/6/23

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: N N/A (NBI)

Superstructure: N N/A (NBI)

Substructure: N N/A (NBI)

Culvert: 6 Satisfactory

Sufficiency Rating: 52.1 %

Bridge Rail: N/A or not required

Rail Transition: N/A or not required

Bridge Approach Rail: Meets Standards

Approach Rail Ends: Meets Standards

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Concrete/Culvert

NH Bridge Type: CRF (Concrete Rigid Frame)

Deck Type: N/A (NBI)

Wearing Surface: N/A (no deck (NBI))

Membrane: N/A (no deck (NBI))

Deck Protection: N/A (no deck (NBI))

Curb Reveal: Not Measured

Plan Location: 3-2-3-3

Total Bridge Length: 20.0 ft

Right Curb/Sidewalk Width: 0.0 ft

Total Bridge Width: 0.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1951

Bridge Dimensions:

Length Maximum Span: 18.0 ft

Left Curb/Sidewalk Width: 0.0 ft

Width Curb to Curb: 0.0 ft

Approach Roadway Width: 22.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000700930015300

Amherst 093/153

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 2,122

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 3,140

Year of Future AADT: 2041

Federal or State Definition Bridge: NH-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Urban, Collector

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible for

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: N Not applicable (NBI)

Underclearances: N Not applicable (NBI)

Approach Alignment: 7 Above Min Criteria

Structural Evaluation: 2 Intolerable - Replace

Channel/Channel Protection: 6 Bank Slumping

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Fair Condition

Debris Present: Debris Present

Channel Notes: TREE DEBRIS AT INLET.

Bridge Inspection Report

NBI Structure Number: 000700930015300

Amherst 093/153

Element Details

No.	Description	Material Notes and Condition Notes:
215	Reinforced Concrete Abutment	FINE CRACKS, LIGHT ABRASION ALONG BASE OF EACH.
241	Reinforced Concrete Culvert	UNDER 3.5' OF FILL. CONCRETE CULVERT: (CRF) HEADWALLS- LIGHT CRACK ALONG TOP ON WEST WITH MODERATE EFFLORESCENCE. UNDERSIDE OF CONCRETE RIGID FRAME- RUST STAINED WITH MINOR DELAMINATION UNDER WEST EDGE. ONE DELAMINATION AND TWO MINOR SPALLS UNDER EAST EDGE WITH RUST STAINS.
└ 1080	Delamination/Spall/Patched Area	RUST STAINED WITH MINOR DELAMINATION UNDER WEST EDGE. ONE DELAMINATION AND TWO MINOR SPALLS UNDER EAST EDGE WITH RUST STAINS.
└ 1130	Cracking (RC and Other)	LIGHT CRACK ALONG TOP OF WEST HEADWALL WITH MODERATE EFFLORESCENCE.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
215	Reinforced Concrete Abutment	52	ft	100%	0%	0%	0%
241	Reinforced Concrete Culvert	43	ft	49%	47%	5%	0%
└ 1080	Delamination/Spall/Patched Area	4	ft	0%	50%	50%	0%
└ 1130	Cracking (RC and Other)	18	ft	0%	100%	0%	0%

Bridge Notes:

Inspection Notes: 06/06/2023

BTB inspection comments -
ASPHALT- NO DAMAGE. RAIL- MINOR SCRAPES.

CONCRETE CULVERT: (CRF) HEADWALLS- LIGHT CRACK ALONG TOP ON WEST WITH MODERATE EFFLORESCENCE. UNDERSIDE OF CONCRETE RIGID FRAME- RUST STAINED WITH MINOR DELAMINATION UNDER WEST EDGE. ONE DELAMINATION AND TWO MINOR SPALLS UNDER EAST EDGE WITH RUST STAINS.

CONCRETE ABUTMENT: FINE CRACKS, LIGHT ABRASION ALONG BASE OF EACH.

PICTURES: D290-
51. SOUTH APPROACH.
52. WEST ELEVATION.

Previous Inspection Notes: 06/22/2021

NJL inspection comments -
ASPHALT- NO DAMAGE. RAIL- MINOR SCRAPES.

CONCRETE CULVERT: (CRF) HEADWALLS- LIGHT CRACK ALONG TOP ON WEST WITH MODERATE EFFLORESCENCE. UNDERSIDE OF CONCRETE RIGID FRAME- RUST STAINED WITH MINOR DELAMINATION UNDER WEST EDGE. ONE DELAMINATION AND TWO MINOR SPALLS UNDER EAST EDGE WITH RUST STAINS.

CONCRETE ABUTMENT: FINE CRACKS, LIGHT ABRASION ALONG BASE OF EACH.

PICTURES: D258-
10. LIGHT CRACK ALONG TOP OF WEST HEADWALL WITH MODERATE EFFLORESCENCE.
11. UNDERSIDE VIEW OF CONCRETE RIGID FRAME.
12. ONE DELAMINATION AND TWO MINOR SPALLS UNDER EAST EDGE WITH RUST STAINS.
13. TREE DEBRIS AT INLET.

Approach and Roadway Notes:

APPROACH ASPHALT- NO DAMAGE. APPROACH RAIL- MINOR SCRAPES.

Bridge Inspection Report

NBI Structure Number: 000700930015300

Amherst 093/153

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/06/2023	NJL	☒	☒	☐	☐	N	N	N	6	☐	E-2
06/22/2021	NJL	☒	☒	☐	☐	N	N	N	6	☐	E-2
06/20/2019	NJL	☒	☒	☐	☐	N	N	N	7	☐	E-2
06/29/2017	NJL	☒	☒	☐	☐	N	N	N	7	☐	E-2
07/22/2015	KLM	☒	☒	☐	☐	N	N	N	7	☐	E-2
07/01/2013	NJL	☒	☒	☐	☐	N	N	N	7	☐	E-2
07/05/2011	MHC	☒	☒	☐	☐	N	N	N	7	☐	E-2
06/24/2009	FNM	☒	☒	☐	☐	N	N	N	7	☐	E-2
01/30/2007	JEL	☒	☒	☐	☐	N	N	N	7	☐	E-2
02/18/2005	FNM	☒	☒	☐	☐	N	N	N	7	☐	E-2
01/24/2003	FNM	☒	☒	☐	☐	N	N	N	7	☐	E-2
01/23/2001	FNM	☒	☒	☐	☐	N	N	N	8	☐	E-2
03/04/1999	RLM	☒	☒	☐	☐	N	N	N	8	☐	E-2
02/01/1997		☒	☒	☐	☐	N	N	N	8	☐	E-2
01/01/1995		☒	☒	☐	☐	N	N	N	8	☐	E-2
01/01/1993		☒	☒	☐	☐	N	N	N	8	☐	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701090009000

Amherst 109/090

Date of Inspection: 06/05/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

NEW BOSTON ROAD

over

BEAVER BROOK

Recommended Postings:Weight: **No Posting Required**☒ Weight Sign OKWidth: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 7 Good

Superstructure: 7 Good

Substructure: 7 Good

Culvert: N N/A (NBI)

Sufficiency Rating: 88.8 %

Bridge Rail: Meets Standards

Rail Transition: Meets Standards

Bridge Approach Rail: Meets Standards

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Prestressed Concrete/Slab

NH Bridge Type: PVS (Prestressed Voided Slabs)

Deck Type: Concrete Precast Panel

Wearing Surface: Bituminous

Membrane: Preformed Fabric

Deck Protection: None

Curb Reveal: 3 in

Plan Location: TT 1-3-16

Total Bridge Length: 19.0 ft

Right Curb/Sidewalk Width: 0.0 ft

Total Bridge Width: 28.0 ft

Median: No median

Bridge Skew: 35.00°

Year Built/Rebuilt: 1966/1996

Bridge Dimensions:

Length Maximum Span: 15.0 ft

Left Curb/Sidewalk Width: 0.0 ft

Width Curb to Curb: 24.0 ft

Approach Roadway Width: 22.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701090009000

Amherst 109/090

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 674

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 997

Year of Future AADT: 2041

Federal or State Definition Bridge: NH-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Rural, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible for

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 4 Tolerable

Underclearances: N Not applicable (NBI)

Approach Alignment: 6 Equal Min Criteria

Structural Evaluation: 7 Above Min Criteria

Channel/Channel Protection: 6 Bank Slumping

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 4 Stable, needs action

Riprap Condition: Fair Condition

Debris Present: No Debris Present

Channel Notes: VOIDS REPAIRED ON NORTH ABUTMENT.

Bridge Inspection Report

NBI Structure Number: 000701090009000

Amherst 109/090

Element Details

No.	Description	Material Notes and Condition Notes:
39	Prestressed Concrete Slab	7 PSC SLABS, POST TENSIONED.
└ 510	Wearing Surfaces	CURBS- FINE CRACKS. UNDERSIDE OF SLAB- MINOR LEAKING WITH EFFLORESCENCE AT CONSTRUCTION JOINTS. ASPHALT- NO DAMAGE.
└ 1120	Efflorescence/Rust Staining	LEAKING WITH EFFLORESCENCE AT CONSTRUCTION JOINT #3 FULL LENGTH. JOINT #4 2' AT SOUTH. JOINT #5 3' AT SOUTH. JOINT #6 1' AT CENTER.
217	Masonry Abutment	STONE ABUTMENTS HAVE BEEN MORTARED. VOID ON NORTH HAS BEEN REPAIRED.
330	Metal Bridge Railing	** W-Beam ** GALVANIZED, DOUBLE NESTED ON POSTS WITH TIMBER OFFSET BLOCKS. MINOR SCRAPES.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
39	Prestressed Concrete Slab	532	(SF)	96%	4%	0%	0%
└ 510	Wearing Surfaces	---	---	100%	0%	0%	0%
└ 1120	Efflorescence/Rust Staining	21	(SF)	0%	100%	0%	0%
217	Masonry Abutment	163	ft	100%	0%	0%	0%
330	Metal Bridge Railing	89	ft	100%	0%	0%	0%

Bridge Notes:

ADDED TO MUNICIPAL REDLIST 6/22/09 DUE TO NORTH ABUTMENT VOIDS AND SCOUR.
 PER 11/4/2009 LETTER FROM TOWN, DEFICIENCIES (AS CITED IN 9/03/2009 BRIDGE DEFICIENCY LETTER FROM NHDOT) WERE REPAIRED.
 IT APPEARS THAT ONLY SMALL AREAS OF REPAVING WERE CONDUCTED. THE UNDERMINING AT THE ABUTMENT WAS NOT ADDRESSED. THE CONDITION HAS DETERIORATED SINCE THE PREVIOUS INSPECTION AND A NEW BRIDGE DEFICIENCY IS BEING ISSUED TO RE-EMPHASIZE THE NEED FOR UNDERMINING REMEDIATION.
 CWIP ON 11/24/2010. BRIDGE CLOSED AND BARRICADED.
 8/24/16- REMOVED FROM MUNICIPAL RED LIST. VOIDS ON NORTH ABUTMENT HAS BEEN REPAIRED.

Inspection Notes: 06/05/2023

BTB inspection comments-
 DECK / SUPERSTRUCTURE: ASPHALT- FEW CRACKS. CURBS- FINE CRACKS, DEBRIS COVERED IN AREAS. UNDERSIDE OF SLAB- MINOR LEAKING WITH EFFLORESCENCE AT CONSTRUCTION JOINT. RAIL- MINOR SCRAPES.

SUBSTRUCTURE: STONE ABUTMENTS HAVE BEEN MORTARED, NO DETERIORATION.

Previous Inspection Notes: 06/23/2021

BTB inspection comments-
 DECK / SUPERSTRUCTURE: ASPHALT- FEW CRACKS. CURBS- FINE CRACKS, DEBRIS COVERED IN AREAS. UNDERSIDE OF SLAB- MINOR LEAKING WITH EFFLORESCENCE AT CONSTRUCTION JOINT. RAIL- MINOR SCRAPES.

SUBSTRUCTURE: STONE ABUTMENTS HAVE BEEN MORTARED, NO DETERIORATION.

PICTURES: D258-
 14. SOUTH APPROACH.
 15. WEST ELEVATION.

Approach and Roadway Notes:

APPROACH ASPHALT- CRACKED AT CENTER OF ROADWAY ON NORTH. APPROACH RAIL- LIGHT DAMAGE ON NORTHWEST AND SOUTHEAST.

Bridge Inspection Report

NBI Structure Number: 000701090009000

Amherst 109/090

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/05/2023	NJL	☒	☒	☐	☐	7	7	7	N	☐	No Posting Req'd
06/23/2021	NJL	☒	☒	☐	☐	7	7	7	N	☐	No Posting Req'd
06/19/2019	NJL	☒	☒	☐	☐	7	7	7	N	☐	No Posting Req'd
06/20/2017	NJL	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
08/24/2016	KLM	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
10/16/2015	KLM	☒	☒	☐	☐	8	8	4	N	☒	No Posting Req'd
10/21/2014	KLM	☒	☒	☐	☐	8	8	4	N	☒	No Posting Req'd
10/04/2013	KLM	☒	☒	☐	☐	8	8	4	N	☒	No Posting Req'd
12/12/2012	NJL	☒	☒	☐	☐	8	8	4	N	☒	No Posting Req'd
09/15/2011	MHC	☒	☒	☐	☐	8	8	4	N	☒	No Posting Req'd
04/18/2011	KLM	☒	☒	☐	☐	8	8	4	N	☒	No Posting Req'd
11/24/2010	KLM	☒	☒	☐	☐	8	8	2	N	☒	Bridge Closed
09/28/2010	KLM	☒	☒	☐	☐	8	8	2	N	☒	No Posting Req'd
06/22/2009	FNM	☒	☒	☐	☐	8	8	2	N	☒	No Posting Req'd
01/29/2007	JEL	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
03/02/2005	JEL	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
01/24/2003	FNM	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
01/18/2001	FNM	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
03/02/1999	RLM	☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
02/01/1997		☒	☒	☐	☐	8	8	7	N	☐	No Posting Req'd
08/01/1996		☒	☒	☐	☐	9	9	8	N	☐	No Posting Req'd
01/01/1995		☒	☒	☐	☐	N	N	N	7	☒	10 Tons or 60%
01/01/1993		☒	☒	☐	☐	N	N	N	7	☒	10 Tons or 60%

Inspection Frequency (mo.)

NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701120007100

Amherst 112/071

Date of Inspection: 10/19/2023

Date Report Sent: 12/26/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

MONT VERNON ROAD

over

CEASARS BROOK

Recommended Postings:Weight: **No Posting Required**☒ Weight Sign OKWidth: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: N N/A (NBI)

Superstructure: N N/A (NBI)

Substructure: N N/A (NBI)

Culvert: 9 Excellent

Sufficiency Rating: 55 %

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Concrete/Culvert

Bridge Rail: Meets Standards
Rail Transition: Meets Standards
Bridge Approach Rail: Meets Standards
Approach Rail Ends: Meets StandardsNH Bridge Type: CRF-P (Conc Rigid Frame-Precast)
Deck Type: Concrete Precast Panel
Wearing Surface: Bituminous
Membrane: Preformed Fabric
Deck Protection: Epoxy Coated Reinforcing
Curb Reveal: 7 in

Plan Location:

Total Bridge Length: 26.0 ft

Right Curb/Sidewalk Width: 0.5 ft

Total Bridge Width: 27.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 2023

Bridge Dimensions:

Length Maximum Span: 24.0 ft

Left Curb/Sidewalk Width: 0.5 ft

Width Curb to Curb: 23.0 ft

Approach Roadway Width: 23.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701120007100

Amherst 112/071

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 178

Percent Trucks: 0%

Year of AADT: 2021

Future AADT: 263

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Rural, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: N Not applicable (NBI)

Underclearances: N Not applicable (NBI)

Approach Alignment: 7 Above Min Criteria

Structural Evaluation: 3 Intolerable - Correct

Channel/Channel Protection: 7 Minor Damage

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Not Applicable

Debris Present: No Debris Present

Channel Notes: GRAVEL AND SMALLER STONES PLACED ALONG ABUTMENTS. MINOR BANK
EROSION DOWNSTREAM FROM PREVIOUS METAL PIPE.

Bridge Inspection Report

NBI Structure Number: 000701120007100

Amherst 112/071

Element Details

No.	Description	Material Notes and Condition Notes:
215	Reinforced Concrete Abutment	PRECAST WINGS AND HEAD WALLS. MASONRY FORM LINERS USED TO GIVE MASONRY APPEARANCE. NEW.
241	Reinforced Concrete Culvert	NEW CONCRETE RIGID FRAME-PRECAST ON SPREAD FOOTINGS. #5 SECTIONS AT 5'-5" EACH IN WIDTH. TOP THICKNESS 15", SIDES 12" WITH 2' OF FILL ON NORTH AND 1' FILL ON SOUTH. NEW.
330	Metal Bridge Railing	GALVANIZED BRIDGE POST WITH GALVANIZED T-2 BOX BEAM RAIL. NEW.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
215	Reinforced Concrete Abutment	108	ft	100%	0%	0%	0%
241	Reinforced Concrete Culvert	27	ft	100%	0%	0%	0%
330	Metal Bridge Railing	89	ft	100%	0%	0%	0%

Bridge Notes:

7/21/15- ADDED TO MUNICIPAL RED LIST. SPIRAL MP. 2 2/3" x 1/2" x 8 GAUGE (MEASURED WITH POSITECTOR) WITH 4.5' OF COVER. APPROXIMATELY 9' FROM END OF PIPE TO EDGE OF PAVEMENT ON SOUTH, 8' ON NORTH.

10/19/23- REMOVE FROM MUNICIPAL RED LIST. *** NEW CONCRETE RIGID FRAME- PRECAST UNIT INSTALLED ***

Inspection Notes: 10/19/2023

NJL inspection comments-

ASPHALT- NO DAMAGE. RAIL- GALVANIZED BRIDGE POST WITH GALVANIZED T-2 BOX BEAM, NO DAMAGE.

CONCRETE CULVERT: CONCRETE RIGID FRAME- PRECAST STRUCTURE INSTALLED. APPROXIMATELY 2' OF FILL ON NORTH AND 1' ON SOUTH. CURBS- NO DETERIORATION. UNDERSIDE OF FRAME- NO SYMPTOMS OF DISTRESS.

SUBSTRUCTURE: PRECAST WINGS AND HEAD WALLS. MASONRY FORM LINERS USED TO GIVE MASONRY APPEARANCE.

PICTURES: D299-

34. WEST APPROACH.

35. SOUTH ELEVATION.

36. NORTH ELEVATION.

37. VIEW OF INTERIOR.

38. TOPSIDE VIEW OF NEW STRUCTURE.

Bridge Inspection Report

NBI Structure Number: 000701120007100

Amherst 112/071

Previous Inspection Notes: 06/09/2023

BTB inspection comments- *** ROAD TEMPORARILY CLOSED. METAL PIPES REMOVED, NEW STRUCTURE IN PROGRESS.

ASPHALT- NO DAMAGE. W-BEAM RAIL- NO DAMAGE

METAL CULVERT: MP'S- RUSTED, PITTED AND AREAS OF SECTION LOSS ON INVERTS IN EACH SPAN, ABLE TO PENETRATE INVERT WITH PICK HAMMER THROUGH OUT SPAN #2. POSSIBLE PIPING THROUGH. SCOUR- TWO FEET OF PENETRATION ON NORTHWEST CORNER, ONE FOOT OF PENETRATION UNDER BARRELS AND ABUTMENTS DOWNSTREAM.

OTHER ABUTMENT: UPSTREAM HEADWALL SETTLED DUE TO SCOUR. VOIDS AT BASE BETWEEN PIPES ON EACH END. LARGE VOID AT BASE OF SOUTHWEST WING.

PICTURES: D290-

76. C.W.I.P. BY DANIELS CONSTRUCTION.

77. VIEW OF CONSTRUCTION IN PROGRESS BY DANIELS CONSTRUCTION.

78. VIEW OF CONSTRUCTION IN PROGRESS BY DANIELS CONSTRUCTION.

Approach and Roadway Notes:

APPROACH ASPHALT- NO DAMAGE. APPROACH W-BEAM RAIL- GALVANIZED POST AND RAIL WITH SYNTHETIC OFFSET BLOCKS, NO DAMAGE.

Unusual or experimental features:

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
10/19/2023	NJL	☒	☒	☐	☐	N	N	N	9	☐	No Posting Req'd
06/09/2023	NJL	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
08/12/2022	NJL	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
06/21/2021	NJL	☒	☒	☐	☐	N	N	N	3	☒	No Posting Req'd
10/29/2020	NJL	☒	☒	☐	☐	N	N	N	4	☒	No Posting Req'd
06/19/2019	NJL	☒	☒	☐	☐	N	N	N	4	☒	No Posting Req'd
10/24/2018	NJL	☒	☒	☐	☐	N	N	N	4	☒	No Posting Req'd
06/22/2017	NJL	☒	☒	☐	☐	N	N	N	4	☒	No Posting Req'd
10/12/2016	NJL	☒	☒	☐	☐	N	N	N	4	☒	No Posting Req'd
07/21/2015	KLM	☒	☒	☐	☐	N	N	N	4	☒	No Posting Req'd
07/02/2013	NJL	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
07/06/2011	MHC	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
06/22/2009	KLM	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
01/29/2007	JEL	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
08/18/2005	FNM	☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd
01/24/2003	JEL	☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd
01/18/2001	FNM	☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd
03/02/1999	RLM	☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd
02/01/1997		☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd
01/01/1995		☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701160009100

Amherst 116/091

Date of Inspection: 06/05/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

NEW BOSTON ROAD

over

BEAVER BROOK

Recommended Postings:Weight: **No Posting Required**☒ Weight Sign OK

POSTED "E-2", CAN BE REMOVED IF DESIRABLE TO THE TOWN.

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: N N/A (NBI)

Superstructure: N N/A (NBI)

Substructure: N N/A (NBI)

Culvert: 5 Fair

Sufficiency Rating: 87.9 %

Bridge Rail: N/A or not required

Rail Transition: N/A or not required

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Aluminum or Iron/Culvert

NH Bridge Type: MP-B (Metal Plate Box Culvert)

Deck Type: N/A (NBI)

Wearing Surface: N/A (no deck (NBI))

Membrane: N/A (no deck (NBI))

Deck Protection: N/A (no deck (NBI))

Curb Reveal: Not Measured

Plan Location: M1-10-1-2

Total Bridge Length: 10.5 ft

Right Curb/Sidewalk Width: 0.0 ft

Total Bridge Width: 0.0 ft

Median: No median

Bridge Skew: 17.00°

Year Built/Rebuilt: 2006

Bridge Dimensions:

Length Maximum Span: 10.5 ft

Left Curb/Sidewalk Width: 0.0 ft

Width Curb to Curb: 0.0 ft

Approach Roadway Width: 21.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701160009100

Amherst 116/091

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 178

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 263

Year of Future AADT: 2041

Federal or State Definition Bridge: NH-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Rural, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: N Not applicable (NBI)

Underclearances: N Not applicable (NBI)

Approach Alignment: 7 Above Min Criteria

Structural Evaluation: 5 Above Min Tolerable

Channel/Channel Protection: 8 Protected

Waterway Adequacy: 7 Above Minimum

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: No Debris Present

Channel Notes: MINOR SCOUR UNDER DOWNSTREAM APRON.

Bridge Inspection Report

NBI Structure Number: 000701160009100

Amherst 116/091

Element Details

No.	Description	Material Notes and Condition Notes:
218	Other Abutments	ALUMINUM BOX CULVERT. NORTHEAST AND WEST WING TIPPED.
240	Steel Culvert	ALUMINUM BOX CULVERT. ALUM. TOE WALL U/S; CONCRETE CUTOFF WALL D/S. 2' MIN COVER. 2.67" x 9" CORRUG. x 0.125" PLATE. PIPE EXTENDS OUT FROM EDGE OF ROAD 8' ON EAST AND 10' ON WEST. SEVERAL MEDIUM SIZE HOLES FROM ATTACK OF CORE ALLOY AT MIDSPAN, ALSO IN OTHER AREAS. FEW GAPS AT CONSTRUCTION SEAMS. BOLT PULLED THROUGH ON SOUTHEAST AT TOP RADIUS. CONCRETE APRON EXTENDS 2' PAST OUTLET, SLIGHTLY UNDERMINED.
L 1000	Corrosion	SEVERAL MEDIUM SIZE HOLES FROM ATTACK OF CORE ALLOY AT MIDSPAN.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
218	Other Abutments	85	ft	100%	0%	0%	0%
240	Steel Culvert	46	ft	70%	0%	30%	0%
L 1000	Corrosion	14	ft	0%	0%	100%	0%

Bridge Notes:

ADDED TO THE INVENTORY 2006.

Inspection Notes: 06/05/2023

NJL inspection comments-

ASPHALT- MODERATE LONGITUDINAL CRACK AT CENTER OF ROAD, CRACK SEALED. RAIL- MINOR SCRAPES, FEW POST DECAYED.

CULVERT: (ALUMINUM MP-B)- SEVERAL MEDIUM SIZE HOLES FROM ATTACK OF CORE ALLOY AT MIDSPAN, ALSO IN OTHER AREAS. FEW GAPS AT CONSTRUCTION SEAMS. BOLT PULLED THROUGH ON SOUTHEAST AT TOP RADIUS. CONCRETE APRON EXTENDS 2' PAST OUTLET, SLIGHTLY UNDERMINED.

OTHER ABUTMENT: NORTHEAST AND WEST WING TIPPED.

PICTURE: D290-

35. SOUTH APPROACH.

36. WEST ELEVATION.

37. SEVERAL MEDIUM SIZE HOLES FROM ATTACK ON CORE ALLOY AT MIDSPAN, SIZE OF HOLES HAVE SLIGHTLY INCREASED.

Previous Inspection Notes: 06/23/2021

NJL inspection comments-

ASPHALT- MODERATE LONGITUDINAL CRACK AT CENTER OF ROAD CAUSING LEAKAGE. RAIL- MINOR SCRAPES, FEW POST DECAYED.

CULVERT: (ALUMINUM MP-B)- SEVERAL SMALL HOLES FROM ATTACK OF CORE ALLOY AT MIDSPAN, ALSO IN OTHER AREAS. FEW GAPS AT CONSTRUCTION SEAMS. BOLT PULLED THROUGH ON SOUTHEAST AT TOP RADIUS. CONCRETE APRON EXTENDS 2' PAST OUTLET, SLIGHTLY UNDERMINED.

OTHER ABUTMENT: NORTHEAST AND WEST WING TIPPED.

Approach and Roadway Notes:

APPROACH ASPHALT- NO DAMAGE. APPROACH W-BEAM RAIL- LIGHT DAMAGE ON NORTHWEST, POST DECAYED.

Bridge Inspection Report

NBI Structure Number: 000701160009100

Amherst 116/091

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/05/2023	NJL	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
06/23/2021	NJL	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
06/19/2019	NJL	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
06/20/2017	NJL	☒	☒	☐	☐	N	N	N	5	☐	No Posting Req'd
07/21/2015	KLM	☒	☒	☐	☐	N	N	N	6	☐	No Posting Req'd
07/11/2013	NJL	☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
07/05/2011	MHC	☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
06/22/2009	KLM	☒	☒	☐	☐	N	N	N	7	☐	No Posting Req'd
01/29/2007	FNM	☒	☒	☐	☐	N	N	N	8	☐	No Posting Req'd
02/07/2006	FNM	☒	☒	☐	☐	N	N	N	8	☐	No Posting Req'd

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701240008700

Amherst 124/087

Date of Inspection: 06/05/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

BOSTON POST ROAD

over

BEAVER BROOK

Recommended Postings:Weight: **E-2**☒ Weight Sign OK

SIGNS IN PLACE. 6/5/23

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: N N/A (NBI)

Superstructure: N N/A (NBI)

Substructure: N N/A (NBI)

Culvert: 5 Fair

Sufficiency Rating: 87.8 %

Bridge Rail: N/A or not required

Rail Transition: N/A or not required

Bridge Approach Rail: Meets Standards

Approach Rail Ends: Meets Standards

Structure Type and Materials:

Number of Main Spans: 2

Number of Approach Spans: 0

Main Span Material and Design Type

Steel/Culvert

NH Bridge Type: MP (Metal Pipe)

Deck Type: N/A (NBI)

Wearing Surface: N/A (no deck (NBI))

Membrane: N/A (no deck (NBI))

Deck Protection: N/A (no deck (NBI))

Curb Reveal: Not Measured

Plan Location: unknown

Total Bridge Length: 20.0 ft

Right Curb/Sidewalk Width: 0.0 ft

Total Bridge Width: 0.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1970

Bridge Dimensions:

Length Maximum Span: 8.0 ft

Left Curb/Sidewalk Width: 0.0 ft

Width Curb to Curb: 0.0 ft

Approach Roadway Width: 20.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701240008700

Amherst 124/087

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 2,352

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 3,480

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Rural, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible for

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: N Not applicable (NBI)

Underclearances: N Not applicable (NBI)

Approach Alignment: 8 Equal Desirable Crit

Structural Evaluation: 5 Above Min Tolerable

Channel/Channel Protection: 7 Minor Damage

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Fair Condition

Debris Present: Debris Present

Channel Notes: LARGE BEAVER DAM IN SPAN #1-2 AT INLET

Bridge Inspection Report

NBI Structure Number: 000701240008700

Amherst 124/087

Element Details

No.	Description	Material Notes and Condition Notes:
217	Masonry Abutment	FEW STONES MISALIGNED, SEVERAL JOINTS WITH NEW MORTAR.
240	Steel Culvert	SIZE- 7'-10" x 5'-8". 2 SPANS. 18" OF COVER. CORRUGATIONS- 6" x 2" x 5/32". PIPE EXTENDS OUT FROM EDGE OF ROAD 8' ON SOUTH AND 10' ON NORTH.
L 1000		TWO MP'S- LIGHT SCALE DEVELOPING AT WATERLINE. PLATE GAPS IN EACH UPSTREAM END SECTION. BEAVER DEBRIS IN EACH PIPE.
	Corrosion	CORROSION OF THE STEEL HAS INITIATED AT THE WATERLINE WITH LIGHT SCALE CREATING MINOR SECTION LOSS.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
217	Masonry Abutment	39	ft	100%	0%	0%	0%
240	Steel Culvert	82	ft	0%	50%	50%	0%
L 1000	Corrosion	82	ft	0%	50%	50%	0%

Bridge Notes:

UNABLE TO INSPECT INVERT DUE TO HIGH WATER; 20" OF FREEBOARD. 7/2/2013.

Inspection Notes: 06/05/2023

BTB inspection comments -

ASPHALT- NO DAMAGE. W-BEAM RAIL- NO DAMAGE.

METAL CULVERT: TWO MP'S- LIGHT SCALE DEVELOPING AT WATERLINE. PLATE GAPS IN EACH UPSTREAM END SECTION. BEAVER DEBRIS IN EACH PIPE.

OTHER ABUTMENT: FEW STONES MISALIGNED, SEVERAL JOINTS WITH NEW MORTAR.

PICTURES: D290-

38. WEST APPROACH.

39. SOUTH ELEVATION.

40. VIEW OF LARGE BEAVER DAM IN SPAN #1 AT INLET.

41. VIEW OF LARGE BEAVER DAM IN SPAN #2 AT INLET.

Previous Inspection Notes: 06/21/2021

NJL inspection comments -

ASPHALT-NO DAMAGE. W-BEAM RAIL- NO DAMAGE.

METAL CULVERT: TWO MP'S- LIGHT SCALE DEVELOPING AT WATERLINE. PLATE GAPS IN EACH UPSTREAM END SECTION. BEAVER DEBRIS IN EACH PIPE.

OTHER ABUTMENT: FEW STONES MISALIGNED, SEVERAL JOINTS WITH NEW MORTAR.

PICTURE: D257-

92. LARGE BEAVER DAM AT INLET IN SPAN #1.

93. LARGE BEAVER DAM AT INLET IN SPAN #2.

94. LIGHT SCALE DEVELOPING AT WATERLINE.

95. NEW RAIL SYSTEM SINCE LAST INSPECTION.

Approach and Roadway Notes:

APPROACH ASPHALT- NO DAMAGE. APPROACH W-BEAM RAIL- NO DAMAGE.

Bridge Inspection Report

NBI Structure Number: 000701240008700

Amherst 124/087

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/05/2023	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
06/21/2021	NJL	☒	☒	☐	☐	N	N	N	5	☐	E-2
06/19/2019	NJL	☒	☒	☐	☐	N	N	N	6	☐	E-2
06/22/2017	NJL	☒	☒	☐	☐	N	N	N	6	☐	E-2
07/21/2015	NJL	☒	☒	☐	☐	N	N	N	6	☐	E-2
07/02/2013	NJL	☒	☒	☐	☐	N	N	N	6	☐	E-2
07/06/2011	MHC	☒	☒	☐	☐	N	N	N	6	☐	E-2
06/22/2009	FNM	☒	☒	☐	☐	N	N	N	6	☐	E-2
01/29/2007	FNM	☒	☒	☐	☐	N	N	N	6	☐	E-2
08/18/2005	JEL	☒	☒	☐	☐	N	N	N	6	☐	E-2
07/16/2003	FNM	☒	☒	☐	☐	N	N	N	6	☐	E-2
01/23/2001	FNM	☒	☒	☐	☐	N	N	N	6	☐	E-2
03/02/1999	JEL	☒	☒	☐	☐	N	N	N	6	☐	E-2
02/01/1997		☒	☒	☐	☐	N	N	N	6	☐	E-2
01/01/1995		☒	☒	☐	☐	N	N	N	6	☐	E-2
01/01/1993		☒	☒	☐	☐	N	N	N	7	☐	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701320009300

Amherst 132/093

Date of Inspection: 06/05/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

BOSTON POST ROAD

over

BEAVER BROOK

Recommended Postings:Weight: **E-2**☒ Weight Sign OK

SIGNS IN PLACE. 6/5/23

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 6 Satisfactory

Superstructure: 6 Satisfactory

Substructure: 7 Good

Culvert: N N/A (NBI)

Sufficiency Rating: 82.6 %

Bridge Rail: Substandard

Rail Transition: Substandard

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Concrete/Frame

NH Bridge Type: CB (Concrete Box)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: None

Deck Protection: None

Curb Reveal: 6 in

Plan Location: 3-13-3-6

Total Bridge Length: 21.0 ft

Right Curb/Sidewalk Width: 5.0 ft

Total Bridge Width: 37.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1969

Bridge Dimensions:

Length Maximum Span: 18.0 ft

Left Curb/Sidewalk Width: 1.0 ft

Width Curb to Curb: 27.0 ft

Approach Roadway Width: 27.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701320009300

Amherst 132/093

Bridge Service:

Type of Service on Bridge: Highway and Pedestrian

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 2,352

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 3,480

Year of Future AADT: 2041

Federal or State Definition Bridge: NH-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Urban, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible for

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 3 Intolerable - Correct

Underclearances: N Not applicable (NBI)

Approach Alignment: 8 Equal Desirable Crit

Structural Evaluation: 6 Equal Min Criteria

Channel/Channel Protection: 7 Minor Damage

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: No Debris Present

Channel Notes:

Bridge Inspection Report

NBI Structure Number: 000701320009300

Amherst 132/093

Element Details

No.	Description	Material Notes and Condition Notes:
38	Reinforced Concrete Slab	NORTH CURB- LIGHT CRACKS. SOUTH SIDEWALK- MINOR SPALLS ALONG GRANITE. UNDERSIDE OF BOX- MINOR LEAKING, RUST STAINED WITH LIGHT DELAMINATIONS AT CENTERLINE CONSTRUCTION JOINT.
L 510	Wearing Surfaces	ASPHALT-NO DAMAGE.
L 1080	Delamination/Spall/Patched Area	MINOR DELAMINATIONS ALONG CONSTRUCTION JOINT AT CENTERLINE.
L 1120	Efflorescence/Rust Staining	SATURATED WITH RUST STAINS AT CENTERLINE CONSTRUCTION JOINT.
215	Reinforced Concrete Abutment	ABUTMENTS- FINE CRACKS, MINOR ABRASION DEVELOPING BELOW WATERLINE.
L 1190	Abrasion/Wear(PSC/RC)	ABRASION HAS EXPOSED COARSE AGGREGATE BUT REMAINS SECURE IN THE CONCRETE.
330	Metal Bridge Railing	RAIL- SEVERAL SCRAPES ON SOUTH RAIL, SPLICE PLATE MISSING AND FEW DAMAGED.
L 1020	Connection	ONE SPLICE BAR IS MISSING ON SOUTHWEST.
L 7000	Damage	FEW CRACKED SPLICE BARS ON SOUTH.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
38	Reinforced Concrete Slab	777	sq.ft	98%	2%	0%	0%
L 510	Wearing Surfaces	---	---	100%	0%	0%	0%
L 1080	Delamination/Spall/Patched Area	7	sq.ft	0%	100%	0%	0%
L 1120	Efflorescence/Rust Staining	8	sq.ft	0%	100%	0%	0%
215	Reinforced Concrete Abutment	148	ft	50%	50%	0%	0%
L 1190	Abrasion/Wear(PSC/RC)	74	ft	0%	100%	0%	0%
330	Metal Bridge Railing	174	ft	98%	2%	1%	0%
L 1020	Connection	1	ft	0%	0%	100%	0%
L 7000	Damage	3	ft	0%	100%	0%	0%

Bridge Notes:

Inspection Notes: 06/05/2023

NJL inspection comments -

DECK / SUPERSTRUCTURE: ASPHALT- NO DAMAGE. NORTH CURB- LIGHT CRACKS. SOUTH SIDEWALK- MINOR SPALLS ALONG GRANITE. UNDERSIDE OF BOX- MINOR LEAKING, RUST STAINED WITH LIGHT DELAMINATIONS AT CENTERLINE CONSTRUCTION JOINT. RAIL- SEVERAL SCRAPES ON SOUTH RAIL.

SUBSTRUCTURE: ABUTMENTS- FINE CRACKS, MINOR ABRASION DEVELOPING BELOW WATERLINE.

PICTURES: D290-

42. WEST APPROACH.

43. SOUTH ELEVATION.

44. MINOR ABRASION DEVELOPING BELOW WATERLINE ON ABUTMENTS.

Bridge Inspection Report

NBI Structure Number: 000701320009300

Amherst 132/093

Previous Inspection Notes: 06/21/2021

BTB inspection comments -

DECK / SUPERSTRUCTURE: ASPHALT- NO DAMAGE. NORTH CURB- LIGHT CRACKS. SOUTH SIDEWALK- MINOR SPALLS ALONG GRANITE. UNDERSIDE OF BOX- MINOR LEAKING, LIGHT CRACK WITH RUST STAIN AT CENTERLINE JOINT. RAIL- SEVERAL SCRAPES ON SOUTH RAIL; ONE SPLICE BAR IS BROKEN ON SOUTHWEST, FEW CRACKED.

SUBSTRUCTURE: ABUTMENTS- MINOR CRACKS.

PICTURE: D257-

96. SATURATED WITH RUST STAINS AND MINOR DELAMINATION AT JOINT CENTERLINE, DELAMINATIONS TYPICAL IN A FEW AREAS ALONG JOINT CENTERLINE.

Approach and Roadway Notes:

APPROACH ASPHALT- MINOR CRACKS. APPROACH RAIL- ALUMINUM POST AND RAIL- FEW SCRAPES, SPLICE BAR CRACKED ON SOUTHWEST. APPROACH ASPHALT SIDEWALK ON SOUTH ONLY- GOOD CONDITION.

Unusual or experimental features:

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/05/2023	NJL	☒	☒	☐	☐	6	6	7	N	☐	E-2
06/21/2021	NJL	☒	☒	☐	☐	6	6	8	N	☐	E-2
06/20/2019	NJL	☒	☒	☐	☐	7	7	8	N	☐	E-2
06/22/2017	NJL	☒	☒	☐	☐	7	7	8	N	☐	E-2
07/21/2015	NJL	☒	☒	☐	☐	7	7	8	N	☐	E-2
07/02/2013	NJL	☒	☒	☐	☐	7	7	8	N	☐	E-2
07/06/2011	KLM	☒	☒	☐	☐	7	7	8	N	☐	E-2
06/23/2009	KLM	☒	☒	☐	☐	7	7	8	N	☐	E-2
01/29/2007	JEL	☒	☒	☐	☐	7	7	8	N	☐	E-2
03/02/2005	FNM	☒	☒	☐	☐	7	7	8	N	☐	E-2
01/24/2003	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
01/18/2001	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
03/02/1999	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
02/01/1997		☒	☒	☐	☐	8	8	8	N	☐	E-2
01/01/1995		☒	☒	☐	☐	8	8	8	N	☐	E-2
01/01/1993		☒	☒	☐	☐	8	8	8	N	☐	E-2

Inspection Frequency (mo.)

NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701340010000

Amherst 134/100

Date of Inspection: 06/05/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

MANCHESTER ROAD

over

BEAVER BROOK

Recommended Postings:Weight: **No Posting Required**☒ Weight Sign OKWidth: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 8 Very Good

Superstructure: 8 Very Good

Substructure: 8 Very Good

Culvert: N N/A (NBI)

Sufficiency Rating: 84.3 %

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Prestressed Concrete/Slab

Bridge Rail: Meets Standards

Rail Transition: Meets Standards

Bridge Approach Rail: Meets Standards

Approach Rail Ends: Meets Standards

NH Bridge Type: PVS (Prestressed Voided Slabs)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: Preformed Fabric

Deck Protection: Epoxy Coated Reinforcing

Curb Reveal: 7 in

Plan Location: Electronic

Total Bridge Length: 44.6 ft

Right Curb/Sidewalk Width: 5.5 ft

Total Bridge Width: 38.3 ft

Median: No median

Bridge Skew: 3.00°

Year Built/Rebuilt: 2015

Bridge Dimensions:

Length Maximum Span: 44.0 ft

Left Curb/Sidewalk Width: 0.5 ft

Width Curb to Curb: 25.2 ft

Approach Roadway Width: 23.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701340010000

Amherst 134/100

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 930

Percent Trucks: 10 %

Year of AADT: 2021

Future AADT: 1,376

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Urban, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 4 Tolerable

Underclearances: N Not applicable (NBI)

Approach Alignment: 7 Above Min Criteria

Structural Evaluation: 8 Equal Desirable Crit

Channel/Channel Protection: 8 Protected

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: No Debris Present

Channel Notes:

Bridge Inspection Report

NBI Structure Number: 000701340010000

Amherst 134/100

Element Details

No.	Description	Material Notes and Condition Notes:
38	Reinforced Concrete Slab	10 prestressed butted deck beams (48 in. and 36 in. wide). 5 in. min. composite R/C overlay, heat welded membrane, 2.5 in. pave.
L 510	Wearing Surfaces	CURB ON EAST, SIDEWALK ON WEST, NO DAMAGE. UNDERSIDE OF SLAB- NO SYMPTOMS OF DISTRESS. ASPHALT- NO DAMAGE.
215	Reinforced Concrete Abutment	C.I.P. full height abutments and wingwalls on spread footings. Rock face block formliner finish with color treatment. CAST-IN-PLACE CONCRETE COLORED TO RESEMBLE GRANITE BLOCKS.
301	Pourable Joint Seal	6 in. wide asphaltic plug for crack control at each end. FULLY ADHERED.
310	Elastomeric Bearing	1.625 in.H, 8 in. diam. steel reinforced elastomeric bearings--no masonry or sole plates. 20@south, 22@north b/c of flair. NO DAMAGE.
330	Metal Bridge Railing	Galvanized T4 on each side. Powder coated brown after galvanizing. BRIDGE RAIL- T-4 BOX BEAM, PAINTED.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
38	Reinforced Concrete Slab	1,725	sq.ft	100%	0%	0%	0%
L 510	Wearing Surfaces	---	---	100%	0%	0%	0%
215	Reinforced Concrete Abutment	160	ft	100%	0%	0%	0%
301	Pourable Joint Seal	60	ft	100%	0%	0%	0%
310	Elastomeric Bearing	42	each	100%	0%	0%	0%
330	Metal Bridge Railing	127	ft	100%	0%	0%	0%

Bridge Notes:

Old structure replaced in 2015 through SAB Project 20242. Removed from MRL.

Inspection Notes: 06/05/2023

BTB inspection comments -

DECK / SUPERSTRUCTURE: ASPHALT- NO DAMAGE. PVS INSTALLED. CURB ON EAST, SIDEWALK ON WEST, NO DAMAGE. UNDERSIDE OF SLAB- NO SYMPTOMS OF DISTRESS. POURABLE JOINTS- ON EACH END, FULLY ADHERED. BRIDGE RAIL- T-4 BOX BEAM, PAINTED.

SUBSTRUCTURE: ABUTMENTS / WINGS- CAST IN PLACE CONCRETE.

Previous Inspection Notes: 06/23/2021

BTB inspection comments -

DECK / SUPERSTRUCTURE: ASPHALT- NO DAMAGE. PVS INSTALLED. CURB ON EAST, SIDEWALK ON WEST, NO DAMAGE. UNDERSIDE OF SLAB- NO SYMPTOMS OF DISTRESS. POURABLE JOINTS- ON EACH END, FULLY ADHERED. BRIDGE RAIL- T-4 BOX BEAM, PAINTED.

SUBSTRUCTURE: ABUTMENTS / WINGS- CAST IN PLACE CONCRETE.

PICTURES: D258-

16. SOUTH APPROACH.

17. WEST ELEVATION.

Approach and Roadway Notes:

APPROACH ASPHALT- NO DAMAGE.

APPROACH W-BEAM RAIL- METAL POST WITH SYNTHETIC OFFSET BLOCKS- NO DAMAGE.

Unusual or experimental features:

Bridge Inspection Report

NBI Structure Number: 000701340010000

Amherst 134/100

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/05/2023	NJL	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
06/23/2021	NJL	☒	☒	☐	☐	8	8	8	N	☐	No Posting Req'd
06/17/2019	NJL	☒	☒	☐	☐	9	9	9	N	☐	No Posting Req'd
06/20/2017	NJL	☒	☒	☐	☐	9	9	9	N	☐	No Posting Req'd
02/22/2016	KLM	☒	☒	☐	☐	9	9	9	N	☐	No Posting Req'd

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701600010500

Amherst 160/105

Date of Inspection: 06/02/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

BOSTON POST ROAD

over

BEAVER BROOK

Recommended Postings:Weight: **E-2**☒ Weight Sign OK

SIGNS IN PLACE, 6/2/23 E2 SIGN BENT ON EAST.

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 6 Satisfactory

Superstructure: 6 Satisfactory

Substructure: 7 Good

Culvert: N N/A (NBI)

Sufficiency Rating: 98.4 %

Bridge Rail: Substandard

Rail Transition: Meets Standards

Bridge Approach Rail: Meets Standards

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 2

Number of Approach Spans: 0

Main Span Material and Design Type

Concrete Continuous/Frame

NH Bridge Type: CB (Concrete Box)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: Preformed Fabric

Deck Protection: None

Curb Reveal: Not Measured

Plan Location: 4-14-4-5

Total Bridge Length: 36.0 ft

Right Curb/Sidewalk Width: 0.7 ft

Total Bridge Width: 44.0 ft

Median: No median

Bridge Skew: 12.00°

Year Built/Rebuilt: 1984

Bridge Dimensions:

Length Maximum Span: 15.0 ft

Left Curb/Sidewalk Width: 0.7 ft

Width Curb to Curb: 40.0 ft

Approach Roadway Width: 24.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701600010500

Amherst 160/105

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 2,841

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 4,204

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Urban, Collector

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 6 Equal Min Criteria

Underclearances: N Not applicable (NBI)

Approach Alignment: 6 Equal Min Criteria

Structural Evaluation: 6 Equal Min Criteria

Channel/Channel Protection: 7 Minor Damage

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: Debris Present

Channel Notes: SAND AND DEBRIS BUILDUP UP AND DOWNSTREAM; HEAVILY VEGETATED.

Bridge Inspection Report

NBI Structure Number: 000701600010500

Amherst 160/105

Element Details

No.	Description	Material Notes and Condition Notes:
38	Reinforced Concrete Slab	CURBS- FINE CRACKS. TWO FULL LENGTH LIGHT CRACKS, ALSO SHORT LONGITUDINAL LIGHT CRACKS IN EACH SPAN. LIGHT LEAKING AND EFFLORESCENCE.
L 510	Wearing Surfaces	ASPHALT- LIGHT CRACK ON EACH DECK END.
L 1130	Cracking (RC and Other)	TWO FULL LENGTH LIGHT CRACKS; ALSO SHORT LONGITUDINAL LIGHT CRACKS IN EACH SPAN. LIGHT LEAKING AND EFFLORESCENCE WITH RUST STAINS.
210	Reinforced Concrete Pier Wall	FINE VERTICAL CRACKS WITH EFFLORESCENCE.
L 1120	Efflorescence/Rust Staining	LIGHT EFFLORESCENCE ON EACH SIDE OF PIER.
215	Reinforced Concrete Abutment	FEW MINOR CRACKS AND EFFLORESCENCE.
L 1120	Efflorescence/Rust Staining	MINOR EFFLORESCENCE ON EACH ABUTMENT.
330	Metal Bridge Railing	** 2-Bar Aluminum **
L 7000	Damage	SCRAPES ON TOP RAIL WITH FEW GOUGED POSTS, NORTH.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
38	Reinforced Concrete Slab	1,584	sq.ft	95%	5%	0%	0%
L 510	Wearing Surfaces	---	---	0%	0%	100%	0%
L 1130	Cracking (RC and Other)	87	sq.ft	100%	0%	0%	0%
210	Reinforced Concrete Pier Wall	46	ft	89%	11%	0%	0%
L 1120	Efflorescence/Rust Staining	5	ft	0%	100%	0%	0%
215	Reinforced Concrete Abutment	138	ft	99%	1%	0%	0%
L 1120	Efflorescence/Rust Staining	2	ft	0%	100%	0%	0%
330	Metal Bridge Railing	167	ft	98%	2%	0%	0%
L 7000	Damage	3	ft	0%	100%	0%	0%

Bridge Notes:

Inspection Notes: 06/02/2023

NJL inspection comments -
DECK / SUPERSTRUCTURE: ASPHALT- LIGHT CRACK ON EACH DECK END. CURBS- FINE CRACKS. RAIL- SCRAPES ON TOP RAIL WITH FEW GOUGED POSTS, NORTH.

UNDERSIDE OF BOX- TWO FULL LENGTH LIGHT CRACKS, ALSO SHORT LONGITUDINAL LIGHT CRACKS IN EACH SPAN. LIGHT LEAKING AND EFFLORESCENCE WITH RUST STAINS.

SUBSTRUCTURE: FINE CRACKS WITH MINOR EFFLORESCENCE ON EACH ABUTMENT AND PIER.

PICTURES: D290-

21. WEST APPROACH.

22. SOUTH ELEVATION.

23. POST AND RAIL DAMAGED ON NORTHWEST DEPARTURE.

24. POST AND RAIL DAMAGED ON NORTHEAST APPROACH, E2 SIGN BENT.

25. FINE VERTICAL CRACK WITH EFFLORESCENCE ON WEST ABUTMENT.

26. FINE VERTICAL CRACK WITH EFFLORESCENCE ON EAST SIDE OF PIER, TYPICAL OF WEST SIDE.

Bridge Inspection Report

NBI Structure Number: 000701600010500

Amherst 160/105

Previous Inspection Notes: 06/24/2021

BTB inspection comments -

DECK / SUPERSTRUCTURE: ASPHALT- NO DAMAGE. CURBS- FINE CRACKS. RAIL- SCRAPES ON TOP RAIL WITH FEW GOUGED POSTS, NORTH.

UNDERSIDE OF BOX- TWO FULL LENGTH LIGHT CRACKS; ALSO SHORT LONGITUDINAL LIGHT CRACKS IN EACH SPAN. LIGHT LEAKING AND EFFLORESCENCE.

SUBSTRUCTURE: FINE CRACK WITH MINOR EFFLORESCENCE.

Approach and Roadway Notes:

APPROACH ASPHALT- MINOR CRACKS. APPROACH RAIL- POST AND RAIL DAMAGED ON NORTHWEST DEPARTURE AND NORTHEAST APPROACH. NORTHEAST GALVANIZED POST WITH COMPOSITE OFFSET BLOCKS. SOME DETERIORATED TIMBER POST ON SOUTHEAST.

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/02/2023	NJL	☒	☒	☐	☐	6	6	7	N	☐	E-2
06/24/2021	NJL	☒	☒	☐	☐	6	6	7	N	☐	E-2
06/18/2019	NJL	☒	☒	☐	☐	6	6	7	N	☐	E-2
06/21/2017	NJL	☒	☒	☐	☐	6	6	7	N	☐	E-2
06/12/2015	NJL	☒	☒	☐	☐	6	6	7	N	☐	E-2
06/24/2013	NJL	☒	☒	☐	☐	7	7	7	N	☐	E-2
06/30/2011	MHC	☒	☒	☐	☐	7	7	7	N	☐	E-2
06/23/2009	KLM	☒	☒	☐	☐	7	7	7	N	☐	E-2
01/31/2007	FNM	☒	☒	☐	☐	7	7	8	N	☐	E-2
03/02/2005	FNM	☒	☒	☐	☐	7	7	8	N	☐	E-2
01/23/2003	FNM	☒	☒	☐	☐	7	7	8	N	☐	E-2
01/17/2001	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
03/01/1999	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
02/01/1997		☒	☒	☐	☐	8	8	8	N	☐	E-2
01/01/1995		☒	☒	☐	☐	8	8	8	N	☐	E-2
01/01/1993		☒	☒	☐	☐	8	8	8	N	☐	E-2

Inspection Frequency (mo.)

NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701770010800

Amherst 177/108

Date of Inspection: 06/01/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

MERRIMACK ROAD

over

BEAVER BROOK

Recommended Postings:Weight: **E-2**☒ Weight Sign OK

SIGNS IN PLACE. 6/1/23

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 7 Good

Superstructure: 7 Good

Substructure: 8 Very Good

Culvert: N N/A (NBI)

Sufficiency Rating: 94.8 %

Bridge Rail: Meets Standards

Rail Transition: Meets Standards

Bridge Approach Rail: Meets Standards

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 2

Number of Approach Spans: 0

Main Span Material and Design Type

Concrete Continuous/Frame

NH Bridge Type: CB (Concrete Box)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: Preformed Fabric

Deck Protection: Epoxy Coated Reinforcing

Curb Reveal: Not Measured

Plan Location: 5-4-1-1

Total Bridge Length: 34.0 ft

Right Curb/Sidewalk Width: 0.5 ft

Total Bridge Width: 34.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1986

Bridge Dimensions:

Length Maximum Span: 15.0 ft

Left Curb/Sidewalk Width: 0.5 ft

Width Curb to Curb: 30.0 ft

Approach Roadway Width: 24.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701770010800

Amherst 177/108

Bridge Service:

Type of Service on Bridge: Highway

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 1,789

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 2,647

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Urban, Local

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Not eligible for NRHP

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 5 Above Tolerable

Underclearances: N Not applicable (NBI)

Approach Alignment: 8 Equal Desirable Crit

Structural Evaluation: 7 Above Min Criteria

Channel/Channel Protection: 7 Minor Damage

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: Debris Present

Channel Notes: SAND DEPOSITS UPSTREAM OF SPAN 1 AND 3' OF BUILDUP IN SPAN 1.
ADDITIONAL SAND DEPOSITS DOWNSTREAM OF SPAN 1.

Bridge Inspection Report

NBI Structure Number: 000701770010800

Amherst 177/108

Element Details

No.	Description	Material Notes and Condition Notes:
38	Reinforced Concrete Slab	CONCRETE TOP SLAB: 16" THICK. CURBS- FINE CRACKS. UNDERSIDE OF SLAB- DIAGONAL CRACK UNDER SLAB ON NORTHWEST WITH EFFLORESCENCE. FINE CRACK WITH EFFLORESCENCE ON SLAB FASCIA AT NORTH ADJACENT TO PIER, TYPICAL OF SOUTH.
└ 510	Wearing Surfaces	ASPHALT- NO DAMAGE ON DECK SURFACE, MODERATE CRACKS ON DECK ENDS; SEALED.
└ 1120	Efflorescence/Rust Staining	FINE CRACK WITH EFFLORESCENCE ON SLAB FASCIA AT NORTH ADJACENT TO PIER, TYPICAL OF SOUTH.
└ 1130	Cracking (RC and Other)	DIAGONAL CRACK UNDER SLAB ON NORTHWEST WITH EFFLORESCENCE.
210	Reinforced Concrete Pier Wall	NO DETERIORATION.
215	Reinforced Concrete Abutment	SEALANT PULLED AWAY AND OUT ON ALL CONSTRUCTION JOINTS.
330	Metal Bridge Railing	** 2-Bar Aluminum ** RAIL- MINOR SCRAPES.

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
38	Reinforced Concrete Slab	1,156	sq.ft	100%	0%	0%	0%
└ 510	Wearing Surfaces	---	---	100%	0%	0%	0%
└ 1120	Efflorescence/Rust Staining	2	sq.ft	0%	100%	0%	0%
└ 1130	Cracking (RC and Other)	3	sq.ft	0%	100%	0%	0%
210	Reinforced Concrete Pier Wall	33	ft	100%	0%	0%	0%
215	Reinforced Concrete Abutment	148	ft	100%	0%	0%	0%
330	Metal Bridge Railing	213	ft	100%	0%	0%	0%

Bridge Notes:

Inspection Notes: 06/01/2023

BTB inspection comments -

DECK / SUPERSTRUCTURE: ASPHALT- NO DAMAGE ON DECK SURFACE, MODERATE CRACKS ON DECK ENDS; SEALED. CURBS- FINE CRACKS. UNDERSIDE OF SLAB- DIAGONAL CRACK UNDER SLAB ON NORTHWEST WITH EFFLORESCENCE.

FINE CRACK WITH EFFLORESCENCE ON SLAB FASCIA AT NORTH ADJACENT TO PIER, TYPICAL OF SOUTH. RAIL- MINOR SCRAPES.

SUBSTRUCTURE: WINGS- SEALANT PULLED AWAY AND OUT ON ALL CONSTRUCTION JOINTS.

PICTURES: D290-

10. WEST APPROACH.

11. SOUTH ELEVATION.

Bridge Inspection Report

NBI Structure Number: 000701770010800

Amherst 177/108

Previous Inspection Notes: 06/25/2021

NJL inspection comments -

DECK / SUPERSTRUCTURE: ASPHALT- NO DAMAGE ON DECK SURFACE, MODERATE CRACKS ON DECK ENDS; SEALED. CURBS- FINE CRACKS. UNDERSIDE OF SLAB- DIAGONAL CRACK UNDER SLAB ON NORTHWEST WITH EFFLORESCENCE.

FINE CRACK WITH EFFLORESCENCE ON SLAB FASCIA AT NORTH ADJACENT TO PIER, TYPICAL OF SOUTH. RAIL- MINOR SCRAPES.

SUBSTRUCTURE: WINGS- SEALANT PULLED AWAY AND OUT ON ALL CONSTRUCTION JOINTS.

PICTURES: D258-

31. DIAGONAL CRACK UNDER SLAB ON NORTHWEST WITH EFFLORESCENCE.

32. FINE CRACK WITH EFFLORESCENCE ON SLAB FASCIA AT NORTH ADJACENT TO PIER, TYPICAL OF SOUTH.

33. SEALANT FAILING ON CONSTRUCTION JOINT AT NORTHEAST WING, TYPICAL OF ALL.

Approach and Roadway Notes:

APPROACH ASPHALT- MODERATE CRACKS ON DECK ENDS, SEALED. APPROACH W-BEAM RAIL- SEVERAL POSTS DECAYED ON WEST, LIGHT DAMAGE TO RAIL. GALVANIZED POST WITH COMPOSITE OFFSET BLOCKS ON EAST, NO DAMAGE. TOP OF ALUMINUM RAIL DAMAGED ON NORTHWEST DEPARTURE.

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/01/2023	NJL	☒	☒	☐	☐	7	7	8	N	☐	E-2
06/25/2021	NJL	☒	☒	☐	☐	7	7	8	N	☐	E-2
06/18/2019	NJL	☒	☒	☐	☐	8	8	8	N	☐	E-2
06/21/2017	NJL	☒	☒	☐	☐	8	8	8	N	☐	E-2
06/12/2015	NJL	☒	☒	☐	☐	8	8	8	N	☐	E-2
06/24/2013	KLM	☒	☒	☐	☐	8	8	8	N	☐	E-2
06/30/2011	MHC	☒	☒	☐	☐	8	8	8	N	☐	E-2
06/24/2009	FNM	☒	☒	☐	☐	8	8	8	N	☐	E-2
01/29/2007	FNM	☒	☒	☐	☐	8	8	8	N	☐	E-2
03/02/2005	FNM	☒	☒	☐	☐	8	8	8	N	☐	E-2
01/23/2003	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
01/17/2001	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
03/01/1999	JEL	☒	☒	☐	☐	8	8	8	N	☐	E-2
02/01/1997		☒	☒	☐	☐	8	8	8	N	☐	E-2
01/01/1995		☒	☒	☐	☐	8	8	8	N	☐	E-2
01/01/1993		☒	☒	☐	☐	8	8	8	N	☐	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A

Bridge Inspection Report

NBI Structure Number: 000701930013000

Amherst 193/130

Date of Inspection: 06/01/2023

Date Report Sent: 10/10/2023

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

BOSTON POST ROAD

over

SOUHEGAN RIVER

Recommended Postings:Weight: **E-2**☒ Weight Sign OK

6/1/23- SIGNS IN PLACE.

Width: **Not Required**☒ Width Sign OKPrimary Height Sign Recommendation: *None*Optional Centerline Height Sign Rec: *None*Clearances: Over: 99.99
(Feet) Under: 0.00
Route: 99.99☒ Height Sign OK**Condition:**

Red List Status: Not on the Redlist

Deck: 6 Satisfactory

Superstructure: 7 Good

Substructure: 6 Satisfactory

Culvert: N N/A (NBI)

Sufficiency Rating: 77.2 %

Bridge Rail: Meets Standards

Rail Transition: Substandard

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

Structure Type and Materials:

Number of Main Spans: 1

Number of Approach Spans: 0

Main Span Material and Design Type

Steel/Stringer/Girder

NH Bridge Type: IB-C (I Beams w/ Concrete Deck)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: Other

Deck Protection: None

Curb Reveal: Not Measured

Plan Location: unknown

Total Bridge Length: 88.0 ft

Right Curb/Sidewalk Width: 0.8 ft

Total Bridge Width: 31.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1977

Bridge Dimensions:

Length Maximum Span: 83.0 ft

Left Curb/Sidewalk Width: 4.0 ft

Width Curb to Curb: 24.0 ft

Approach Roadway Width: 21.0 ft
(W/Shoulders)

Bridge Inspection Report

NBI Structure Number: 000701930013000

Amherst 193/130

Bridge Service:

Type of Service on Bridge: Highway and Pedestrian

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 4,620

Percent Trucks: 4%

Year of AADT: 2021

Future AADT: 6,837

Year of Future AADT: 2041

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: Bridge does not carry NHS

Roadway Functional Class: Urban, Collector

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible for

Traffic Direction: 2-way traffic

National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 2 Intolerable - Replace

Underclearances: N Not applicable (NBI)

Approach Alignment: 7 Above Min Criteria

Structural Evaluation: 6 Equal Min Criteria

Channel/Channel Protection: 7 Minor Damage

Waterway Adequacy: 8 Equal Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: No Debris Present

Channel Notes: EMBANKMENT EROSION DOWNSTREAM.

Bridge Inspection Report

NBI Structure Number: 000701930013000

Amherst 193/130

Element Details

No.	Description	Material Notes and Condition Notes:
12	Reinforced Concrete Deck	CURBS-LIGHT CRACKS ON EAST. SIDEWALK ON WEST- SECTION OF STEEL ANGLE REMOVED ON NORTHWEST EDGE, MINOR CRACKS. UNDERSIDE OF DECK- FINE CRACKS WITH MINOR EFFLORESCENCE, MEDIUM DELAMINATIONS IN BAY #3.
L 510	Wearing Surfaces	ASPHALT- MODERATE CRACKS AT DECK ENDS, SOME SEALED; POTHOLED ON SOUTHWEST.
L 1080	Delamination/Spall/Patched Area	FOUR MEDIUM DELAMINATIONS IN BAY #3.
L 1120	Efflorescence/Rust Staining	FINE CRACKS WITH MINOR EFFLORESCENCE.
107	Steel Open Girder/Beam	5- WEATHERING STEEL I-BEAMS: 36" DEPTH. 12" FLANGE WIDTH. 1" FLANGE THICKNESS. 10" WIDE COVER PLATES, 3/4" THICK.
		LIGHT RUST, MINOR SCALE.
L 517	Weathering Steel Protective Coating	
L 1000	Corrosion	MINOR CORROSION ON BEAM ENDS AT SOUTHWEST.
205	Reinforced Concrete Column	TOTAL OF #8 COLUMNS. FOUR COLUMNS SUPPORT CONCRETE CAP, BRIDGE SEATS AND BACKWALL ON EACH END.
		COLUMNS- VERTICAL CRACK ON #2 AT SOUTH. VERTICAL CRACKS ON #1 THROUGH #3, ALL HOLLOW SOUNDING, NORTH.
L 1130	Cracking (RC and Other)	VERTICAL CRACKS ON #2 AT SOUTH, VERTICAL CRACKS #1 THROUGH #3 AT NORTH.
215	Reinforced Concrete Abutment	ABUTMENTS- CONCRETE BRIDGE SEATS AND BACKWALLS.
		BACKWALLS- MINOR CRACKS AND RUST STAINS.
217	Masonry Abutment	LIGHT SETTLEMENT ON SOUTHEAST, AREAS OF LOOSE MORTAR.
234	Reinforced Concrete Pier Cap	CONCRETE BRIDGE SEATS AND BACKWALLS SUPPORTED BY CONCRETE CAP.
		MINOR SPALL WITH REBAR EXPOSED AT TOP ON NORTHEAST. HORIZONTAL CRACKS ON SOUTHWEST FACE WITH RUST STAINS, TYPICAL OF NORTH.
L 1090	Exposed Rebar	TOP CORNER OF BRIDGE SEAT, ONE FOOT SPALL WITH REBAR EXPOSED.
L 1130	Cracking (RC and Other)	EIGHT HORIZONTAL FOOT CRACK ON SOUTHWEST, THREE FOOT HORIZONTAL CRACK ON NORTHEAST.
311	Movable Bearing	MINOR RUST.
L 515	Steel Protective Coating	
313	Fixed Bearing	MINOR RUST.
L 515	Steel Protective Coating	
330	Metal Bridge Railing	** W-Beam ** ON GALVANIZED POSTS; ANGLE TOP RAIL.
		RAIL- MINOR RUST IN AREAS.

Bridge Inspection Report

NBI Structure Number: 000701930013000

Amherst 193/130

Element States

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
12	Reinforced Concrete Deck	2,728	sq.ft	99%	0%	0%	0%
└ 510	Wearing Surfaces	---	---	100%	0%	0%	0%
└ 1080	Delamination/Spall/Patched Area	10	sq.ft	0%	0%	100%	0%
└ 1120	Efflorescence/Rust Staining	10	sq.ft	0%	100%	0%	0%
107	Steel Open Girder/Beam	400	ft	98%	3%	0%	0%
└ 517	Weathering Steel Protective Coating	---	---	100%	0%	0%	0%
└ 1000	Corrosion	10	ft	0%	100%	0%	0%
205	Reinforced Concrete Column	8	each	50%	50%	0%	0%
└ 1130	Cracking (RC and Other)	4	each	0%	100%	0%	0%
215	Reinforced Concrete Abutment	62	ft	100%	0%	0%	0%
217	Masonry Abutment	184	ft	100%	0%	0%	0%
234	Reinforced Concrete Pier Cap	62	ft	81%	19%	0%	0%
└ 1090	Exposed Rebar	1	ft	0%	100%	0%	0%
└ 1130	Cracking (RC and Other)	11	ft	0%	100%	0%	0%
311	Movable Bearing	5	each	100%	0%	0%	0%
└ 515	Steel Protective Coating	---	---	100%	0%	0%	0%
313	Fixed Bearing	5	each	100%	0%	0%	0%
└ 515	Steel Protective Coating	---	---	100%	0%	0%	0%
330	Metal Bridge Railing	298	ft	100%	0%	0%	0%

Bridge Notes:

Inspection Notes: 06/01/2023

NJL inspection comments-

DECK: ASPHALT- FEW CRACKS. CURBS-LIGHT CRACKS ON EAST. SIDEWALK ON WEST- SECTION OF STEEL ANGLE REMOVED ON NORTHWEST EDGE, MINOR CRACKS. UNDERSIDE OF DECK- FINE CRACKS WITH MINOR EFFLORESCENCE, MEDIUM DELAMINATIONS IN BAY #3. RAIL- MINOR RUST AT ENDS.

SUPERSTRUCTURE: LIGHT RUST, MINOR SCALE ON BOTTOM FLANGES.

SUBSTRUCTURE: CUT GRANITE STONE ABUTMENTS- MORTAR LOOSE AND MISSING IN AREAS. CONCRETE CAPS SUPPORTED BY COLUMNS ARE THE BRIDGE SEATS AND BACKWALLS. CONCRETE CAP- MINOR SPALL WITH REBAR EXPOSED AT TOP ON NORTHEAST. EIGHT FOOT HORIZONTAL CRACK ON SOUTHWEST, THREE FOOT HORIZONTAL CRACK ON NORTHEAST FACE. BACKWALLS- MINOR CRACKS AND RUST STAINS. CONCRETE COLUMNS- FEW VERTICAL CRACKS, HOLLOW SOUNDING IN AREAS. CUT GRANITE STONE WINGS- LIGHT SETTLEMENT ON SOUTHEAST, AREAS OF LOOSE MORTAR.

PICTURES: D290-

01. VIEW OF CUT GRANITE STONE ABUTMENT, COLUMNS AND CAP SUPPORTING BRIDGE SEATS AND BACKWALL ON SOUTH, TYPICAL OF NORTH.

02. MODERATE CRACKS ON SOUTH APPROACH, MOST SEALED WITH LARGE POTHOLE ON SOUTHWEST.

Bridge Inspection Report

NBI Structure Number: 000701930013000

Amherst 193/130

Previous Inspection Notes: 06/25/2021

BTB inspection comments-

DECK: ASPHALT- FEW CRACKS. CURBS-FINE CRACKS. SIDEWALK ON WEST, MINOR CRACKS. UNDERSIDE OF DECK- FINE CRACKS WITH MINOR EFFLORESCENCE. FEW SMALL DELAMINATIONS IN BAY #3. RAIL- MINOR RUST AT ENDS.

SUPERSTRUCTURE: LIGHT RUST, MINOR SCALE ON BOTTOM FLANGES.

SUBSTRUCTURE: ABUTMENTS- CAP- HORIZONTAL CRACKS AT OF SOUTHWEST TYPICAL OF NORTH. MINOR SPALL WITH REBAR EXPOSED TOP OF NORTHEAST. CONCRETE COLUMNS- FEW VERTICAL CRACKS HOLLOW SOUNDING. CONCRETE BACKWALLS- MINOR CRACKS AND RUST STAINS. STONE MASONRY ABUTMENTS / WINGS- LIGHT SETTLEMENT ON SOUTHEAST, AREAS OF LOOSE MORTAR.

PICTURES: D258-

27. SOUTHWEST BACKWALL LEAKING.

28. SOUTH DECK END CRACKED AND SETTLED FULL LENGTH WITH LARGE POTHOLE ON SOUTHWEST CAUSING LEAKAGE.

29. LARGE CRACKS WITH SETTLEMENT FULL LENGTH AT NORTH DECK END.

30. THREE FOOT HORIZONTAL CRACK AT TOP OF CAP UNDER BEAM #2 ON NORTHEAST.

Approach and Roadway Notes:

APPROACH ASPHALT- MODERATE CRACKS ON NORTH, MOST SEALED. MODERATE CRACKS ON SOUTH, MOST SEALED WITH LARGE POTHOLE ON SOUTHWEST.

APPROACH W-BEAM RAIL- LIGHT TO MODERATE DAMAGE, RAIL TIPPED ON NORTH. TREES SHOULD BE TRIMMED AROUND BRIDGE.

Inspection History

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
06/01/2023	NJL	☒	☒	☐	☐	6	7	6	N	☐	E-2
06/25/2021	NJL	☒	☒	☐	☐	6	7	6	N	☐	E-2
06/18/2019	NJL	☒	☒	☐	☐	6	7	6	N	☐	E-2
06/21/2017	NJL	☒	☒	☐	☐	7	7	6	N	☐	E-2
06/12/2015	NJL	☒	☒	☐	☐	7	8	6	N	☐	E-2
06/24/2013	NJL	☒	☒	☐	☐	7	8	6	N	☐	E-2
06/30/2011	KLM	☒	☒	☐	☐	7	8	6	N	☐	E-2
06/24/2009	KLM	☒	☒	☐	☐	7	8	6	N	☐	E-2
01/31/2007	JEL	☒	☒	☐	☐	7	8	6	N	☐	E-2
03/02/2005	JEL	☒	☒	☐	☐	7	8	6	N	☐	E-2
01/23/2003	FNM	☒	☒	☐	☐	7	8	6	N	☐	E-2
01/17/2001	FNM	☒	☒	☐	☐	7	8	6	N	☐	E-2
03/01/1999	JEL	☒	☒	☐	☐	7	8	6	N	☐	E-2
02/01/1997		☒	☒	☐	☐	7	8	7	N	☐	E-2
01/01/1995		☒	☒	☐	☐	7	8	7	N	☐	E-2
01/01/1993		☒	☒	☐	☐	7	8	7	N	☐	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	N/A