CHAPTER 5 REGIONAL ROADWAY INFRASTRUCTURE

Highway and roadway infrastructure is vital to our region’s economic growth and development. It is the fundamental system we rely on to transport people and goods, and our emergency management and public safety services depend on it. Crumbling, outdated and inefficient infrastructure can create serious barriers to economic growth and mobility. The Nation’s investment in highway infrastructure has not kept pace with growing demands, presenting a number of challenges, particularly as we plan for the region’s future. Extending the service life of existing highway infrastructure, and building, rebuilding and rehabilitating our roadway network, will be challenging without additional resources. Adapting to the impacts of climate change will also add to the cost of maintenance and repair, as we strive to protect our transportation assets and critical infrastructure from the likelihood of increased flooding, severe storms and rising temperatures.

The Northern Middlesex region is served by an extensive highway network with over 1,300 centerline miles of roadway, of which 95 miles are under state jurisdiction, and the remainder is under local jurisdiction. Interstates 93 and 495, as well as US Route 3, serve as the major limited access highways, providing connections between the region and New Hampshire, Maine, New York, Connecticut, Rhode Island and other locations throughout New England, Canada and the mid-Atlantic states. This section of the Regional Transportation Plan principally focuses on our roadway and bridge infrastructure by examining existing conditions, identifying deficiencies in the system, and outlining tools and programs that will play a role in addressing these issues in the future.

FUNCTIONAL CLASSIFICATION

The USDOT’s Federal Highway Administration (FHWA) classifies our nation’s urban and rural roadways by road function. Each functional class is based on the type of service the road provides to the motoring public, and the designation is used for data and planning purposes. Design standards are also tied to functional class, with each class having a range of allowable lane widths, shoulder widths, and curve radii. The amount of mobility and land access offered by these road types differs greatly.

In 1974, the Federal Highway Administration published the manual, *Highway Functional Classification - Concepts, Criteria and Procedures*, which was revised in...
The manual defines the different functional systems, discusses the general concepts and characteristics used to identify each, and explains the procedures to follow in designating a system.

Functional Classification is divided into rural and urban systems. The urban functional classification system covers all streets, roads, and highways located within urban boundaries as designated by the U.S. Census Bureau. The Census Bureau defines two types of urban areas based on population. Small urban areas are urban places with a population or 5,000 or more and not located within any urbanized area. An urbanized area is an area with a population of 50,000 or more. As might be expected, the rural functional classification system covers all other streets, roads, and highways that are not located within the boundaries of small urban and urbanized areas.

While urban and rural areas differ in terms of the density of land use and intensity of traffic and travel, the same general functional concepts apply to both systems. Streets and roads are ranked according to their purpose or function in meeting the demands for mobility and land access. The principal difference between the two systems is the length of trips, both in time and distance.

As traffic flows do not change their characteristics at municipal boundaries, road classification is organized on a regional and then state-by-state basis. Each street is classified according to its function utilizing the following classification system, from highest to lowest mobility:

- Interstates
- Other freeway and Expressways
- Other Principal Arterials
- Minor Arterials
- Collectors
- Local Roads

Map 5.1 on Page 5-4 depicts the Northern Middlesex regional roadway network according to functional classification. There are 2,798 lane miles and 1,399 centerline miles in the region. Figures 5.1 and 5.2 on the next page show the percentage of lane and centerline miles in the NMCOG region by functional classification. Figure 5.3 provides a summary of regional and local roadway centerline and lane miles by functional classification, using MassDOT’s Roadway Inventory File, which differs from the Federal Classification system in that it categorizes the network into six categories: Interstates, Principal Arterials, Other Principal Arterials, Minor Arterials, Collectors, and Local Roads.

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1 Data compiled from MassDOT Road Inventory Year End Report for 2017

Figure 5.1: Northern Middlesex Percentage of Lane Miles by Functional Classification

Figure 5.2: Northern Middlesex Percentage of Centerline Miles by Functional Classification
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Figure 5.3: Centerline and Lane Miles of Roadway by Community

Source: 2018 MassDOT Road Inventory Year End Report
ROADWAY JURISDICTION

Northern Middlesex roadways can be further categorized by jurisdiction. Jurisdiction refers to the agency that claims ownership or administrative authority over the roadway. Thirteen percent of the region’s roadways are under state ownership, while 78% are municipally-owned. The nine percent of streets that are unaccepted are either privately owned or currently have no identified ownership attributed to the roadway. Figure 5.4 below provides a summary of roadway jurisdiction in the region.

Figure 5.4: Percentage of Lane Miles by Jurisdiction in Northern Middlesex Region

![Pie chart showing percentage of lane miles by jurisdiction]

Source: MassDOT Roadway Inventory File

ROADWAY MAINTENANCE

All roads need a certain level of maintenance to be able to withstand the daily demands of modern traffic and to extend their life for as long as possible. Timely and appropriate maintenance is even more important today as construction costs rise and government agencies fiercely compete for funds. In addition, overused, poorly maintained, inadequately lit and badly signed and striped roads pose a safety hazard. Many crashes could be prevented if road safety features were installed and upgraded.

Poor maintenance has social and economic costs. Road maintenance ensures the longevity and long-term sustainability of road infrastructure. Such maintenance activities include:

CHAPTER 5 REGIONAL HIGHWAY NETWORK
• Winter maintenance
• Preservation (resurfacing, which can be carried out in the context of a preventive maintenance strategy, and crack filling)
• Pavement markings, signs, safety barriers, etc.
• Pavement rehabilitation (restructuring without upgrading nominal load capacity)
• Pavement upgrading (increasing load capacity, widening, environmental features, and applying low cost measures)
• Structural maintenance (bridges, tunnels, etc.)
• Peripheral maintenance (embankments, drainage, shoulders, etc.)

PAVEMENT MANAGEMENT AND PRESERVATION

Paved roadways represent one of the largest capital investments in any modern highway system. Maintaining the paved surface of a large highway system typically involves complex decision-making about how and when to apply surface treatments to keep the highway performing and operating with the funding available.

As Figure 5.5 depicts, pavement management is a key component to the development of a successful preservation, maintenance and rehabilitation program. A pavement management system consists of the collection and analysis of pavement condition data for use in identifying and implementing the most cost-effective treatments. The development of a pavement management system allows a jurisdiction to maximize the funding available for pavement maintenance and preservation. MassDOT uses such a system to manage roadways on the federal-aid system under their jurisdiction. Roadways under local jurisdiction are the responsibility of the municipalities. Locally controlled arterials and collectors are eligible for federal-aid funding providing that the communities fund design, permitting and acquisition of any rights-of-way necessary.

The cost of pavement repairs increases dramatically if not completed at the appropriate time. While it is less expensive to properly maintain a sound roadway system, municipalities have not had the resources to keep up with the normal deterioration of pavement. If that could be accomplished, fewer tax dollars
would be needed to maintain the road network over the long term. However, this has been fiscally and physically impossible under the current funding constraints.

_Pavement preservation_ is a program aimed at preserving investments in the highway system, enhancing pavement performance, extending pavement life, and meeting the motorists’ needs. Analysis from the pavement management systems is used to identify pavement preservation opportunities. Preservation is the sum of all activities undertaken to provide and maintain serviceable roadways; this includes corrective and preventive maintenance, as well as minor and major rehabilitation. It excludes capacity improvements and new or reconstructed pavement. An effective pavement preservation program encompasses a full range of maintenance strategies, as well as rehabilitation treatments, with the goal of enhancing pavement performance (ride quality, safety, service life, etc.) in a cost-effective and efficient manner.

### PERFORMANCE BASED APPROACH TO PAVEMENT MANAGEMENT

FHWA released Final rules establishing performance measures involving pavement condition of National Highway System (NHS) roadways with an effective date of May 20, 2017. This rule (23 CFR Part 490.307) established the following performance measures:

- Percentage of pavement of the Interstate in Good Condition;
- Percentage of pavement of the Interstate in Poor Condition;
- Percentage of pavement of the non-interstate system in Good Condition; and
- Percentage of pavement of the non-interstate system in Poor Condition.

Once FHWA established the final rulemaking, MassDOT adopted these performance measures and established statewide targets. The NMMPO then had 180 days to either adopt statewide performance measures and targets or develop their own regional set. Table 5.1 outlines the timeline for adoption of pavement performance measure and targets.

In setting these targets, MassDOT has followed FHWA guidelines by measuring pavement condition using the International Roughness Index (IRI); the presence of pavement rutting; and the presence of pavement cracking. Two-year and four-year targets were set for four individual performance measures: percent of Interstate pavement in good condition; percent of Interstate pavement in poor condition; percent of non-Interstate pavement in good condition; and percent of non-Interstate pavement in poor condition. All of the above performance measures are tracked in detail in MassDOT’s Transportation Asset Management Plan (TAMP), which will be finalized in July 2019.
### Table 5.1: Pavement Management Performance Measure Adoption Timeline

<table>
<thead>
<tr>
<th>National Performance Management Rule</th>
<th>National Performance Measures</th>
<th>FHWA Final Rule Effective Date</th>
<th>MassDOT Establishment of Pavement Performance Measures and Target Date</th>
<th>NMMPO Adoption of Pavement Performance Measure and Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage of pavements of the Interstate System in Poor Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage of pavements of the non-Interstate NHS in Good condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage of pavements of the non-Interstate NHS in Poor condition</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Performance targets for pavement-related performance measures were based on a single year of data collection, and thus were set to remain steady under the guidance of FHWA. These performance measures will be revisited at the two-year mark (2020), once three years of data are available allowing for more informed target setting.

MassDOT continues to measure pavement quality and to set statewide short-term and long-term targets in the MassDOT Performance Management Tracker using the Pavement Serviceability Index (PSI), which differs from IRI. These measures and targets are used in conjunction with federal measures to inform program sizing and project selection.

At its October 24, 2018 meeting, the NMMPO voted to adopt the pavement performance measures and targets set by the State, as allowed by federal regulation. Table 5.2 describes the pavement measures and targets adopted.
### Table 5.2: Pavement Condition Performance Measures and Targets Adopted by NMMPO

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>Current Condition 2017</th>
<th>2020 Performance Target</th>
<th>2022 Performance Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interstate Pavement Condition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of pavement in Good Condition²</td>
<td>74.2%</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>% of pavement in Poor Condition</td>
<td>0.1%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Non-Interstate Pavement Condition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of pavement in Good Condition</td>
<td>32.9%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>% of pavement in Poor Condition</td>
<td>31.4%</td>
<td>30%</td>
<td>30%</td>
</tr>
</tbody>
</table>

The communities in the Northern Middlesex region use a variety of methods to manage the pavement condition on the roadways under their jurisdictions. NMCOG performs its own pavement condition data collection and analysis of NHS roadways in six of the nine communities (Chelmsford, Dracut, Dunstable, Pepperell, Tewksbury, and Tyngsborough) utilizing the IWORQ pavement management software. The other communities (Billerica, Lowell, and Westford) employ a consultant to address their pavement management issues, as budgets allow. MassDOT monitors roadways as part of its Pavement Management Program. The program focuses on Interstates and principal arterials.

² Pavement condition on National Highway System Roads is based on International Roughness Index (IRI) value and one or more pavement distress metrics. FHWA sets thresholds to determine whether metric value is good or poor.
For each roadway segment evaluated by NMCOG staff, the severity and extent of pavement distress was rated for the following:

- Fatigue Cracking (Alligator Cracking)
- Longitudinal Cracking
- Transverse Cracking
- Edge Cracking
- Patching and Potholes
- Roughness

The above defects were assigned one of three levels for severity and extent — resulting in a rating of one to nine (with zero indicating no defects). A value for remaining service life (RSL) was determined based on the type and severity of defects observed for each roadway segment. The pavement remaining service life rating is a common method of gauging pavement condition in the transportation industry and is generally defined as the anticipated number of years that pavement will be functionally and structurally acceptable with only routine maintenance. This method assumes that a properly constructed paved road will have a service life of twenty years, without any preventative measures or maintenance, before the pavement reaches an unacceptable condition and requires construction intervention. Regular maintenance will significantly increase a pavement’s lifespan beyond twenty years, but the RSL rating, an integer number of years from zero to twenty, is estimated based on the current condition assuming no preventative measures. Table 5.3 outlines repair method and recommended treatments based on RSL ratings in IWorQ.

### Table 5.3: Repair Methods based on Remaining Service Life of Pavement

<table>
<thead>
<tr>
<th>Repair Method</th>
<th>Remaining Service Life (RSL) in years</th>
<th>Recommended Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Rehabilitation</td>
<td>0-4</td>
<td>Rebuild/Thick Overlay</td>
</tr>
<tr>
<td>Minor Rehabilitation</td>
<td>&gt;4-8</td>
<td>Overlay</td>
</tr>
<tr>
<td>Preventative Maintenance</td>
<td>&gt;8-10</td>
<td>Chip Seal/Crack Seal</td>
</tr>
<tr>
<td>Routine Maintenance</td>
<td>&gt;10-12</td>
<td>Crack Seal</td>
</tr>
<tr>
<td>No maintenance needed at this</td>
<td>&gt;12-20</td>
<td>None</td>
</tr>
</tbody>
</table>

Source: IWORQ Pavement Management Software

Three Hundred and nine (309) federal aid eligible centerline miles of roadway were monitored in the region, with NMCOG staff collecting data for 111.38 miles. Comparing RSL to the FHWA performance measure categories involves categorizing the RSL repair methods into “Good” or “Poor” condition.
purposes of reporting in this plan, RSLs lower than eight are considered “poor” condition and RSLs
greater than 8 are considered to be in “good” condition. As of 2018, 73.3 miles (66%) were found to be
in “good” condition, while 38.1 miles (34%) were determined to be in “poor” condition.

MASSDOT PAVEMENT MANAGEMENT PROGRAM

MassDOT collects pavement condition data on regional interstate and arterial roadways as part of its
pavement management program. As of 2017, a total of 197.7 miles of roadway were monitored by
MassDOT. Of the 197.7 miles of roadway monitored, 175.7 miles (89%) were considered to be in “good”
condition, with 22.1 miles (11%) categorized as “poor”.

NORTHERN MIDDLESEX REGIONAL PAVEMENT ASSESSMENT

Because pavement monitoring in the region is conducted by several agencies, reporting the overall
health of the infrastructure involves combining several approaches to pavement condition assessment.
Combining NMCOG and MassDOT efforts proves difficult because of differences in data collection
procedures. NMCOG uses a windshield survey method, while MassDOT employs an automated vehicle
known as ARAN that utilizes technology to collect pavement condition data on a continuous basis. The
overall number of miles considered to be in “good” condition adds up to over 80% of the roadways
monitored. The infrastructure conditions are constantly changing due to wear and tear and
construction, so this assessment represents a snapshot of conditions within the region. Figure 5.5
provides a summary of the regional pavement monitoring efforts by both NMCOG and MassDOT.
NMCOG staff calculated the total estimated cost of bringing “poor” condition roads to “good” levels at approximately $13.2 million. While it is unrealistic to expect such high levels of funding for the region’s pavement system, maintaining a pavement management system and utilizing pavement preservation techniques on roadways that are in acceptable condition will minimize the resources needed in the future to reconstruct and rebuild our highway network. As the region continues to expand its pavement management program, opportunities for lower cost preservation projects will be identified. Map 5.2 visually combines the NMCOG and MassDOT pavement conditions ratings throughout the region.

FUNDING SOURCES FOR ROADWAY MAINTENANCE

In order to efficiently utilize limited transportation resources, the existing transportation system must be maintained and preserved. Pavement preservation/rehabilitation type projects are initiated by the communities or MassDOT, in a similar fashion to all other federal aid projects. Roadway reconstruction and maintenance projects follow the same procedures for project initiation and approval as other projects programmed on the TIP. The funding programs that can be utilized for such projects are outlined in the following section and are intended to ensure sound maintenance and management of the existing transportation infrastructure and facilities.
CHAPTER 90 PROGRAM

The Chapter 90 Program is funded through the State Transportation Bond Bill and administered by MassDOT. The program supports local roadway and construction projects implemented by municipalities. The funds are apportioned by formula based on local roadway mileage, employment and population. The Chapter 90 FY 2019 allocations for the communities in the Northern Middlesex region are outlined in Table 5.4 below.

Table 5.4: FY 2019 Chapter 90 Apportionments by Community

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Billerica</td>
<td>4</td>
<td>189.09</td>
<td>24,850</td>
<td></td>
<td>$1,297,509</td>
</tr>
<tr>
<td>Chelmsford</td>
<td>4</td>
<td>172.01</td>
<td>23,395</td>
<td></td>
<td>$1,171,946</td>
</tr>
<tr>
<td>Dracut</td>
<td>4</td>
<td>136.43</td>
<td>5,893</td>
<td></td>
<td>$794,267</td>
</tr>
<tr>
<td>Dunstable</td>
<td>3</td>
<td>40.89</td>
<td>309</td>
<td></td>
<td>$184,599</td>
</tr>
<tr>
<td>Lowell</td>
<td>4</td>
<td>188.29</td>
<td>24,850</td>
<td></td>
<td>$1,860,170</td>
</tr>
<tr>
<td>Pepperell</td>
<td>3</td>
<td>83.27</td>
<td>1,564</td>
<td></td>
<td>$419,132</td>
</tr>
<tr>
<td>Tewksbury</td>
<td>4</td>
<td>138.71</td>
<td>4,730</td>
<td></td>
<td>$432,637</td>
</tr>
<tr>
<td>Tyngsborough</td>
<td>4</td>
<td>77.36</td>
<td>12,535</td>
<td></td>
<td>$887,154</td>
</tr>
<tr>
<td>Westford</td>
<td>3</td>
<td>151.92</td>
<td>21,951</td>
<td></td>
<td>$869,201</td>
</tr>
<tr>
<td>Regional Total</td>
<td></td>
<td>1,177.97</td>
<td>286,901</td>
<td>126,146</td>
<td>$7,969,201</td>
</tr>
</tbody>
</table>

Source: MassDOT

Chapter 90 funds must be allocated to roadway projects, such as resurfacing and related work, and other incidental work, such as preliminary engineering, State Aid/Consultant Design Agreements, right-of-way acquisition, shoulders, side road approaches, landscaping and tree planting, roadside drainage, structures (including bridges), sidewalks, traffic control, service facilities, and street lighting (excluding operating costs).
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Map 5.2: Pavement Conditions in the Northern Middlesex Region

Pavement Condition
- Good
- Poor
- Limited

Town Boundary
- MassDOT Urbanized Area (2010)

Data provided on this map is not sufficient for either boundary determination or regulatory interpretation.

Produced 5/25/2019 by MassDOT.
INTERSTATE MAINTENANCE

MassDOT oversees the federal Interstate Maintenance program, which is aimed at ensuring that the interstate system is adequately maintained and managed. Work typically performed with these funds includes reconstruction, resurfacing, sign replacement and construction, striping and other necessary maintenance items. Interstate maintenance funds can only be expended on the interstate highway system and are intended for the rehabilitation (including approved preventive maintenance measures) of existing main lines, structures and interstate frontage roads. Interstate maintenance funds can also be used to build high occupancy vehicle (HOV) lanes or auxiliary lanes on interstate highways. However, funds cannot be used to add lanes for single occupancy vehicles.

SURFACE TRANSPORTATION BLOCK GRANT (STBG) PROGRAM

Federal Surface Transportation Block Grant Program (STBG) funding may be used by States and localities for projects that preserve or improve conditions and performance on any Federal-aid highway or bridge, or for bike and pedestrian facilities, transit capital projects and public bus terminals and facilities. In general, STBG funding may be used for transportation projects on any roadways classified as minor collectors or higher.

FAST established the STBG program [FAST Act Section 1109(a)] (23 USC 133), replacing the long standing Surface Transportation Program (STP), acknowledging that this program has the most flexible eligibilities among all Federal-Aid highway programs and aligning the program’s name with how FHWA has historically administered it. The STBG program promotes flexibility in State and local transportation decision making and provides flexible funding to best address State and local transportation needs. STBG funds are 80% federal monies requiring a 20% state match.

NORTHERN MIDDLESEX INFRASTRUCTURE - BRIDGES

There are 201 bridges in the Northern Middlesex Region. These bridges include many different types of crossings including interstates, major river crossings over the Merrimack River, Shawsheen River, Nashua River or Concord River, minor stream crossings like Beaver Brook, and over the many canals in the City of Lowell. These bridges are key to moving both people and goods throughout the region and it is imperative that these structures remain sound.
PERFORMANCE BASED APPROACH TO BRIDGE CONDITIONS

The final rule on bridge condition performance measures (PM2) was made effective on May 20, 2017 (23 CFR Part 490 Subparts A, C and D), with Massachusetts setting targets in May of 2018. In setting these targets, MassDOT followed FHWA guidelines by measuring bridges using the 9-point National Bridge Inventory Standards (NBIS). Two-year and four-year targets were set for two individual performance measures: percent of bridges in good condition and percent of bridges in poor condition. These performance measures are tracked in detail in MassDOT’s Transportation Asset Management Plan (TAMP), which will be finalized in July 2019.

Targets for bridge-related performance measures were determined by identifying which bridge projects are programmed and projecting at what rate bridge conditions may deteriorate. The bridge-related performance measures analyze the percentage of deck area in poor condition, rather than the total number of bridges that are considered structurally deficient across the State.

The NMMPO considered and adopted statewide performance measures and targets at the October 24, 2018 meeting, agreeing to program projects aimed at achieving the State’s goals. Table 5.5 describes the bridge condition measures and targets adopted.

Table 5.5: Bridge Condition Performance Measures and Targets

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>Current Condition 2017</th>
<th>2020 Performance Target</th>
<th>2022 Performance Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Bridges in Good Condition</td>
<td>15.22%</td>
<td>15%</td>
<td>16%</td>
</tr>
<tr>
<td>% of Bridges in Poor Condition</td>
<td>12.37%</td>
<td>13%</td>
<td>12%</td>
</tr>
</tbody>
</table>

BRIDGE CONDITION RATINGS

MassDOT utilizes inspection and rating standards developed by the American Association of State Highway and Transportation Officials (AASHTO) to evaluate all bridges in Massachusetts based on their condition. Two hundred and one (201) bridges in the Northern Middlesex region have been evaluated by

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3 Bridge Condition on National Highway System roads is based on condition ratings of deck, superstructure and substructure. National Bridge Inventory data is used to rate these components. The worst component rating is the overall rating of the bridge.

CHAPTER 5 REGIONAL HIGHWAY NETWORK
MassDOT and rated on a scale of 0 to 100, with 100 being the best condition possible. Bridges that score low on the scale are classified as structurally deficient. Map 5.3 provides a summary of bridge conditions throughout the region. Map 5.4 provides bridge condition information for the City of Lowell.

A structurally deficient classification indicates a deterioration of significant bridge elements, which may require a restriction in the load capacity of the bridge. It does not necessarily mean the bridge is unsafe, but indicates that repairs should be made before the condition deteriorates further. Table 5.6 identifies the region’s fourteen structurally deficient bridges, based on MassDOT’s most recent inspection and the corresponding ratings. This table shows that 7% of the region’s bridges are considered structurally deficient. Four structurally deficient bridges are currently under construction and two more were advertised in FFY 2019. Two bridges in Westford are scheduled for reconstruction starting in Federal Fiscal Year 2020 and are currently programmed in the TIP. Both the Beaver Brook Road Bridge over Beaver Brook, which is structurally deficient, and the Stony Brook Road Bridge over the Stony Brook, which is not classified as structurally deficient, are programmed for construction in 2022.

Table 5.6: Structurally Deficient Bridges in Northern Middlesex Region, 2018

<table>
<thead>
<tr>
<th>Community</th>
<th>Facility</th>
<th>Owner</th>
<th>Functional Class</th>
<th>Year Built</th>
<th>AASHTO Rating</th>
<th>Design/Construction Underway?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chelmsford</td>
<td>Route 3A (Gorham Street) over I-495</td>
<td>MassDOT</td>
<td>Urban Arterial</td>
<td>1962</td>
<td>54.8</td>
<td>No</td>
</tr>
<tr>
<td>Chelmsford</td>
<td>Lowell Connector over I-495</td>
<td>MassDOT</td>
<td>Freeway/Expressway</td>
<td>1959</td>
<td>78.7</td>
<td>No</td>
</tr>
<tr>
<td>Chelmsford</td>
<td>Westford Street over I-495</td>
<td>MassDOT</td>
<td>Urban Minor Arterial</td>
<td>1961</td>
<td>62.4</td>
<td>No</td>
</tr>
<tr>
<td>Chelmsford</td>
<td>Route 4 (North Street) over I-495</td>
<td>MassDOT</td>
<td>Urban Arterial</td>
<td>1959</td>
<td>74.7</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Lowell</td>
<td>Bridge Street over the Eastern Canal</td>
<td>MassDOT</td>
<td>Urban Arterial</td>
<td>1937</td>
<td>48.9</td>
<td>No</td>
</tr>
<tr>
<td>Lowell</td>
<td>Beaver Street over Beaver Brook</td>
<td>City</td>
<td>Urban Collector</td>
<td>1971</td>
<td>26.9</td>
<td>No</td>
</tr>
<tr>
<td>Lowell</td>
<td>Market Street over the Western Canal</td>
<td>City</td>
<td>Urban Minor Arterial</td>
<td>1920</td>
<td>27.5</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Lowell</td>
<td>Lawrence Street over the Concord River</td>
<td>City</td>
<td>Urban Minor Arterial</td>
<td>1850/1951</td>
<td>59.6</td>
<td>Under Construction</td>
</tr>
</tbody>
</table>
Table 5.6: Structurally Deficient Bridges in Northern Middlesex Region, 2018

<table>
<thead>
<tr>
<th>Community</th>
<th>Facility</th>
<th>Owner</th>
<th>Functional Class</th>
<th>Year Built</th>
<th>AASHTO Rating</th>
<th>Design/Construction Underway?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowell</td>
<td>Lowell Connector over Industrial Avenue</td>
<td>MassDOT</td>
<td>Freeway/Expressway</td>
<td>1960</td>
<td>69.2</td>
<td>Advertised for Construction 2019</td>
</tr>
<tr>
<td>Lowell</td>
<td>VFW Highway over Beaver Brook</td>
<td>MassDOT</td>
<td>Urban Arterial</td>
<td>1949</td>
<td>19</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Tewksbury</td>
<td>Mill Street over Shawsheen River</td>
<td>Town</td>
<td>Urban Local</td>
<td>1998</td>
<td>59.9</td>
<td>Advertised for Construction 2019</td>
</tr>
<tr>
<td>Tewksbury</td>
<td>I-495 NB over Andover Street</td>
<td>MassDOT</td>
<td>Urban Interstate</td>
<td>1961</td>
<td>49.1</td>
<td>No</td>
</tr>
<tr>
<td>Tewksbury</td>
<td>I-495 SB over Andover Street</td>
<td>MassDOT</td>
<td>Urban Interstate</td>
<td>1961</td>
<td>52.1</td>
<td>No</td>
</tr>
<tr>
<td>Westford</td>
<td>Beaver Brook Road over Beaver Brook</td>
<td>Town</td>
<td>Urban Collector</td>
<td>1957</td>
<td>51</td>
<td>Design (Programmed in 2022 TIP)</td>
</tr>
</tbody>
</table>

Source: MassDOT
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**PROGRESS IN ADDRESSING BRIDGE DEFICIENCIES**

The three structurally deficient bridges that were listed in the 2016 Regional Transportation Plan have been improved or reconstructed over the past four years, as shown in Table 5.7 below.

**Table 5.7: Improvement Projects completed since 2016 RTP to Address Structurally Deficient Bridges**

<table>
<thead>
<tr>
<th>Community</th>
<th>Facility</th>
<th>Owner</th>
<th>Functional Class</th>
<th>Year Built</th>
<th>AASHTO Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chelmsford</td>
<td>Hunt Road over I-495</td>
<td>MassDOT</td>
<td>Urban Local</td>
<td>1961</td>
<td>79.1</td>
</tr>
<tr>
<td>Chelmsford</td>
<td>Route 3A/Gorham Street over I-495</td>
<td>MassDOT</td>
<td>Urban Arterial</td>
<td>1962</td>
<td>61.5</td>
</tr>
<tr>
<td>Lowell</td>
<td>I-495 over the B&amp;M Railroad</td>
<td>MassDOT</td>
<td>Urban Interstate</td>
<td>1961</td>
<td>87.3</td>
</tr>
</tbody>
</table>

Source: MassDOT

As shown in Figure 5.6 below, since 2000 the number of structurally deficient bridges in the region has remained fairly constant, ranging between 6% and 13%.

**Figure 5.6: Percent Structurally Deficient (SD) Bridges in the Northern Middlesex Region**
LOWELL’S CANAL BRIDGES

The City of Lowell is unique in that there are eight bridges crossing the canal system that were previously owned and/or controlled by Enel Green Power, a multi-national power company, until the City took ownership in July 2017. Prior to the City assuming ownership, Enel repaired two of the bridges – Broadway Street over the Pawtucket Canal and Kearney Square over the Eastern Canal. The remaining six bridges were in various states of disrepair or deterioration, resulting in closures or weight restrictions. This adversely affected public safety, commerce, economic development, traffic congestion, and transportation efficiency. Buses, fire apparatus, and larger commercial vehicles were prohibited from crossing these spans and had to detour around them. In 2015, the City of Lowell was awarded a TIGER Grant for $13,389,750 to address the repair of the six bridges. This work has been overseen by MassDOT in conjunction with the City of Lowell. The design and engineering was completed in 18 months. Due to funding constraints, the superstructure replacement at the Suffolk Street over the Northern Canal was removed from the original project scope and the City will seek additional funds to complete that project. Project bids for the five remaining bridges were opened on February 21, 2018 and awarded to the low bidder in March 2018. Construction began on July 1, 2018 with final construction anticipated on April 1, 2022. The status of the five bridges as of April 2019 was as follows:

1) **Pawtucket Street over the Pawtucket Canal** – Utility relocation underway. Closed for one lane of traffic inbound to Lowell beginning in mid-May 2019. Bridge completion is anticipated by April 2022.
2) **Pawtucket Street over the Northern Canal** – Construction underway and closed to vehicular traffic (open to pedestrian traffic). Bridge completion is expected by November 2020.
3) **Central Street over the Lower Pawtucket Canal** – Construction work began in early April 2019. Bridge completion is anticipated by September 2021.
4) **Merrimack Street over the Western Canal** – Under construction. Bridge completion is anticipated by October 2019.
5) **Merrimack Street over the Merrimack Canal** – Project complete.

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**Canal Bridges in Lowell**
- Pawtucket Street over the Pawtucket Canal
- Pawtucket Street over the Northern Canal
- Broadway Street over the Pawtucket Canal
- Central Street over the Lower Pawtucket Canal
- Suffolk Street over the Northern Canal
- Merrimack Street over the Western Canal
- Merrimack Street over the Merrimack Canal
- Kearney Square over the Eastern Canal
MERRIMACK RIVER CROSSING ISSUES - LOWELL

Much of the City of Lowell’s traffic congestion results from bottlenecks that occur at the six bridge crossings over the Merrimack River. Such deficiencies have been identified and noted in the region’s Congestion Management Process.

In the morning peak travel period, nearly half of the traffic originating north of the river is bound for Chelmsford and other points south of Lowell, while more than half of the northbound traffic in the evening peak period is destined for areas beyond Lowell. Since these vehicles largely represent commuters, the through movement consists mainly of people who live north of Lowell travelling to and from their jobs south of Lowell. The Lowell Connector and U.S. Route 3 serve as the primary collectors-distributors south of Lowell, and Mammoth Road performs this function north of the river.

These regional traffic patterns, with heavy southbound flow in the mornings and northbound flow in the evenings, coupled with internal traffic movements in Lowell, a limited number of river crossings, and Lowell’s 19th century street network, have resulted in severe peak hour congestion at the Lowell bridge approaches.

Public outreach during the development of this plan showed that residents have an interest in studying the possibility of constructing another bridge over the Merrimack River between Hunts Falls Bridge in Lowell and I-93 in Methuen, a distance of approximately six miles. Residents are also interested in a permanent bridge where the temporary Rourke Bridge now stands.

In 1976 a Draft Environmental Impact Study (DEIS) considered a number of alternatives for a new river crossing in Lowell, all within a 1.5-mile corridor extending from the Drum Hill Rotary in Chelmsford, through western Lowell and over the Merrimack River and then through southern Dracut to Route 113. The highway was assumed to be a six-lane, limited access roadway with an eight-lane river crossing. The

![Image 5.2: The Merrimack River in Lowell with Bridge Crossings at Aiken, University and School Street](image-url)
preferred alignment met with considerable opposition because of the land takings required and the barrier effect it would create.

In response to the disagreements generated by the DEIS, in 1978, the Federal Highway Administration, through MassDOT (then known as the Massachusetts Highway Department), funded a Corridor Planning Study (CPS) undertaken by the Northern Middlesex Council of Governments. The purpose of the study was to analyze the feasibility of a smaller scale project than that considered in the DEIS, and to examine additional alternatives to effectively address existing traffic problems.

The Corridor Planning Study drew numerous conclusions based on traffic characteristics and projections, and determined that a limited access highway was not justified. Three alternatives for a new river crossing were identified as being equally appropriate for alleviating congestion on the existing bridges. All of these connected Route 3 east of Drum Hill Rotary in Chelmsford with Mammoth Road in Dracut, providing a new bridge in western Lowell.

Upon completion of the CPS, MassDOT contracted with Parsons Brinckerhoff Quade & Douglas to undertake an environmental analysis, based on the conclusions and recommendations of the CPS. The DEIS was completed in 1985. However, it was never accepted by FHWA as it was based on 1982 data, which was considered outdated. The project has not moved forward since.

In developing the 2007 Regional Transportation Plan, a survey was distributed to each community asking officials to identify and rank the transportation priorities within their respective communities. City of Lowell officials identified the river crossing deficiencies as being of high priority. The City requested that a new, updated feasibility study be undertaken examining the potential for replacing the temporary Rourke Bridge with a larger, permanent structure. Former Congressman Marty Meehan earmarked $562,439 in High Priority Project funds through SAFETEA-LU for a new feasibility study, and in the fall of 2011, NMCOG issued an RFP for a consultant.

Vanasse Hangen Brustlin Inc. (VHB) was retained and charged with analyzing options for replacing the temporary Rourke Bridge and for addressing traffic and safety issues in the vicinity of the bridge, and along Wood Street/Westford Street and Drum Hill Road in Chelmsford.

The intent of the feasibility study was two-fold: (1) to develop short-term recommendations for addressing the severe congestion and safety issues that exist along the corridor between Drum Hill Square and Pawtucket.
Boulevard; and (2) to reassess the feasibility of constructing a permanent replacement for the temporary Rourke Bridge, which in 2012 carried 28,000 vehicles per day\(^4\). Immediate-term, short-term, and long-term recommendations were developed using both quantitative information from analyses and also qualitative feedback provided by working committees and the public. In some cases, municipalities involved in the overall study process have been pro-active in starting to address identified traffic issues and have implemented some of the study recommendations.

Several alternatives for a new bridge were identified, with three following alternatives ultimately selected for further analysis through the environmental process:

- Alternative 2: Maintain the existing alignment and construct a 4-lane bridge
- Alternative 4: A 4-lane Western Bypass Alignment
- Alternative 6: A 4-lane Skewed Bypass Alignment

A project was initiated in 2018 by MassDOT to replace the Rourke Bridge. Funding for preliminary design and environmental permitting of the project has been identified. A consultant has been brought on board to bring the design plans up to 25% completion. Funding for complete design and construction is currently being considered.

**MERRIMACK RIVER CROSSING ISSUES - TYNGSBOROUGH**

The Tyngsborough Bridge, originally constructed in 1932 and reconstructed in 2013, provides the only crossing of the Merrimack River for the residents of Tyngsborough and neighboring communities of Chelmsford, Dracut, Dunstable and Westford. The next river crossing is located approximately five miles to the north and six miles to the south. Increased traffic congestion on and around the bridge, from local and regional growth, has resulted in

\(^4\) ATR count as part of Corridor Study and Feasibility Analysis for Rourke Bridge, Wood Street, Westford Street, and Drum Hill Road, August 2013.
significant congestion and delays. The bridge carries approximately 23,000 vehicles per day. The high volume of traffic not only creates delays for commuters and residents, but also presents safety concerns for emergency and public safety personnel. As development continues in the area, vehicular demand will increase and additional river crossing capacity will be needed.

In February 2002, the New Tyngsborough Bridge Transportation Study, Feasibility Study, and Conceptual Design for a Second Bridge Crossing of the Merrimack River was published by MassDOT. The purpose of the study was to assess the need for and feasibility of a second bridge across the Merrimack River. The first part of the study evaluated 14 different alternative crossing locations. The feasibility study indicated that alternatives 5/6 and 14 best met the goals of the study with the least environmental impact.

Alternative 5/6 uses the regional access and natural terrain advantages of Westford Road. It connects Westford Road, on the west side of the River, with a relocated Pawtucket Boulevard on the east side of the river via a four-lane bridge and access road. Traffic projections have shown that this alternative will attract approximately 23,500 vehicles on a daily basis in the year 2020 and is one of the most effective alternatives in drawing traffic away from the existing bridge. Alternative 14 capitalizes on the regional connection to Route 3 via Exit 36. This alternative connects Middlesex Road at the Exit 36 Access Ramp on the east side of the river to Frost Road on the west side of the river, via a four-lane bridge and access road.

An Environmental Notification Form was filed with MEPA on September 25, 2002. The Massachusetts Secretary of Energy and Environmental Affairs issued a Certificate on November 22, 2002 requiring that an Environmental Impact Report (EIR) be prepared for the proposed project. The EIR would assess the environmental impacts of each of the preferred alternatives. The selection, design, permitting and construction of the additional river crossing would take several years to complete.

ROUTE 3 EXIT 36 SOUTHBOUND RAMP STUDY

In 2014, the Northern Middlesex Council of Governments, Nashua Regional Planning Commission (NRPC), the Town of Tyngsborough, Massachusetts and the City of Nashua, New Hampshire completed a feasibility and planning study to assess the impacts and benefits of adding a southbound off ramp at Exit 36 on Route 3. The project area straddles the Massachusetts/New Hampshire border and directly impacts the City of Nashua and the Town of Tyngsborough. The area is an economic center for both the NMCOG and NRPC regions due to the significant amount of commercial, retail and high-
density residential development. In addition, the expansion of Route 3 in Massachusetts has provided additional untapped economic development opportunities for this area.

The goals of the study included the following:

- Improve the operation of the major roads in the vicinity of the proposed Exit 36 Southbound;
- Create safer roads for all modes of transportation;
- Provide efficient access to services and local and regional job centers;
- Generate opportunities for sustainable growth and economic development;
- Support existing and initiate new opportunities for innovative financing and public/private partnerships; and
- Develop a plan for mitigating traffic congestion and greenhouse gas emissions associated with the transportation sector.

In addition to analyzing the impacts of constructing a new southbound off ramp, the Exit 36 study evaluated the following:

- Opportunities for transit-oriented development, including design recommendations that would accommodate a regional transit center serving rail and intercity bus;
- Improvements to pedestrian and bicycle connectivity and safety;
- Recommendations for improving local and regional transit service: Construction of Exit 36S will facilitate improved transit service to south Nashua and Tyngsborough, and express service from Downtown Nashua to the Pheasant Lane Mall and other retail destinations may also be possible, as well as connecting transit services between Nashua and Lowell.

Traffic congestion and the lack of a well-coordinated development strategy across municipal and state boundaries have impeded economic growth and development in some portions of the project area. Currently, southbound Route 3 motorists, who want to access the businesses on Middlesex Road in Tyngsborough and along the southern section of the Daniel Webster Highway in Nashua, must either exit Route 3 at Exits 1 or 2 in Nashua or at Exit 35 in Tyngsborough. NRPC has estimated that 13,300 vehicles per weekday divert to Exit 1 in New Hampshire, leading to considerable congestion on both sides of the interchange.

There has been discussion for a number of years regarding the potential extension of MBTA commuter rail service from Lowell to New Hampshire. A multi-modal transportation facility is being considered as part of that project at a location along the Daniel Webster Highway in South Nashua. Potentially,
commuter rail riders could access the new station via Exit 36. The study found that the construction of a southbound ramp at Exit 36 would improve overall operating conditions in the study area, by relieving traffic congestion and delay, reducing greenhouse gas emissions, improving travel time, and decreasing lost productivity. The project would also enhance the efficiency of public transportation and support future passenger rail service. The benefits to economic development are significant, as the project would also generate opportunities for business investment and serve as catalyst for future sustainable development.

The Exit 36 Southbound project has been included in the NRPC Long Range Transportation Plan (LRTP) for many years and is widely accepted as having significant benefit for a relatively small investment. The project was also recommended as part of the Daniel Webster Highway and Spit Brook Road Corridor Study completed in 2002. Most recently, the City of Nashua Transportation Task Force included Exit 36 Southbound (Exit 36S) in its report to the Mayor as a high priority project for the City – citing congestion relief and economic development opportunities to the City. In 2015, the Tyngsborough Board of Selectmen voted unanimously to support the project given the economic development benefits along the northern section of Middlesex Road. The bi-state nature of the project provides exceptional opportunities for innovative financing, interstate cooperation and public/private partnerships.

I-495 CORRIDOR TRANSPORTATION STUDY

Completed in 2008, the I-495 Corridor Transportation Study was initiated by MassDOT to identify existing and future transportation problems and to develop reasonable solutions. The project study area extended forty miles from Westford north to Salisbury, and included twenty-five (25) interchanges, thirteen (13) communities, and two (2) regional planning districts. Within the Northern Middlesex region, the study included interchanges in Westford, Chelmsford, Lowell, and Tewksbury.

The study evaluated a full range of transportation improvement alternatives, including interchange, highway, and non-highway improvements, as well as multi-modal options. Overall, the corridor study found that travel on the mainline is congested at times, and that the majority of congestion is directly related to traffic operations at the interchanges. Interchange operations, both at the junction of interchange ramps with the mainline and with local intersecting streets, are critical to the overall functioning of the network. Potential improvements were outlined to alleviate existing and future traffic operational deficiencies along the corridor. These strategies were
categorized into near-term (0-2 years), mid-term (3-8 years), and long-term (>8 years) improvements. Near-term improvements are described as relatively simple, inexpensive, and quickly implemented. Examples include traffic signal retiming or pavement re-striping. Near-term improvement projects recommended along I-495 in the Northern Middlesex region include adjusting traffic signal timing at Exit 38 NB at Route 38 in Tewksbury and adjusting traffic signal timing at Exit 39 SB at Route 133 in Tewksbury.

Mid-term improvement projects are more complicated and expensive to plan, design, and put into service. Some examples of mid-term improvements include installation of a new traffic signal, lengthening acceleration/deceleration lanes at interchanges, and intersection reconfiguration. Table 5.8 provides a list of mid-term improvements recommended within the Northern Middlesex region, and quantifies their corresponding benefits to traffic operations along the corridor.

<table>
<thead>
<tr>
<th>Interchange</th>
<th>AM/PM Travel Period</th>
<th>Movement</th>
<th>Current LOS</th>
<th>Study Recommendation</th>
<th>Time Period</th>
<th>Improved LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>Both</td>
<td>I-495 NB Left Turns</td>
<td>F</td>
<td>Signal Installation</td>
<td>Mid-Term</td>
<td>B, A</td>
</tr>
<tr>
<td>34</td>
<td>PM</td>
<td>I-495 NB Left Turns</td>
<td>F</td>
<td>Traffic Signal Installation and add Left Turn Lane on Rte 110</td>
<td>Mid-Term</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>I-495 SB Left Turns</td>
<td>F</td>
<td>Traffic Signal Installation and add Left Turn Lane on Rte 110</td>
<td>Mid-Term</td>
<td>A</td>
</tr>
<tr>
<td>37</td>
<td>Both</td>
<td>I-495 NB Left/Through</td>
<td>F</td>
<td>Signal Installation and add Left Turn Lane from Woburn St SB to Christman Ave</td>
<td>Mid-Term</td>
<td>B, C</td>
</tr>
<tr>
<td></td>
<td>Both</td>
<td>I-495 SB Left Turns</td>
<td>F</td>
<td>Signal Installation and add Left Turn Lane from Woburn St NB to I-495 SB Ramp</td>
<td>Mid-Term</td>
<td>B, B</td>
</tr>
<tr>
<td>38</td>
<td>PM</td>
<td>I-495 NB Left Turns</td>
<td>E</td>
<td>Retime Existing Traffic Signal</td>
<td>Near-Term</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>Rte 133 WB L</td>
<td>E</td>
<td>Retime Existing Traffic Signal</td>
<td>Near-Term</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>I-495 SB Through</td>
<td>E</td>
<td>Retime Existing Traffic Signal</td>
<td>Near-Term</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>I-495 SB Left Turns</td>
<td>F</td>
<td>Retime Existing Traffic Signal</td>
<td>Near-Term</td>
<td>C</td>
</tr>
</tbody>
</table>
A new traffic signal is being installed at the exit 33 ramp to North Road in Chelmsford. A second traffic signal installation project at Exit 34 (Route 110) is programmed in the TIP in 2024. The Exit 37 signal installation is listed in the universe of projects in Appendix F of this document. Exit 38 signal retiming will be included in project 608774, intersection improvement along Route 38 in Tewksbury, currently programmed in FFY 2023.

Long-term improvements are usually in response to expected future problems that do not currently exist. In the I-495 corridor study, these improvements would be implemented more than ten years in the future and include widening the mainline I-495, redesigning some interchanges, installing traffic signals, and ramp reconstruction.

An additional travel lane in each direction is recommended from Exit 32 to 40, exclusive of the section between Exits 35 and 36, for a total distance of 15 miles. All widening would occur within the highway’s median. While the study did not discuss the impacts the widening would have on bridges in the corridor, presumably the bridges and interchanges ramps would be impacted. The widening is anticipated to improve the level of service on all links both east and west bound, although it was noted that two weave movements within the widened section would continue to experience operational problems during peak periods. The study suggested that only the relocation or a major redesign of the effected interchanges would improve the level of service. The study added that similar conditions would presumably continue on the I-495 corridor to the west of the study area, and suggested that consideration be given to widening the corridor west toward the Route 2 interchange.

The study also made long-term recommendations at interchanges in the Northern Middlesex region, including expanding the off ramps to two lanes at Exit 32 (Boston Road) in Westford, allowing a yield right turn movement at the end of the ramp and changing the overall configuration from a free flow movement to a signalized movement. This recommendation was implemented as part of the mitigation for the Cornerstone Square development project completed in 2015.

IMPLEMENTING RECOMMENDATIONS FOR IMPROVING ROADWAY AND BRIDGE INFRASTRUCTURE

Currently, the NMMPO pavement management program covers approximately 24% of federal-aid eligible roadways in the region. The NMMPO staff will continue to expand the pavement condition data collection to include all federal-aid eligible roadways. Some communities in the region have their own pavement management program in place. Including this data with the regional program would allow the NMMPO to develop more accurate cost estimates for maintaining the region’s roadway network.
The state’s regional planning agencies are working collaboratively on establishing a process for utilizing MassDOT’s pavement condition data. To improve overall data quality and compatibility, the RPAs and MassDOT should work together to develop a universal reporting methodology or to develop a bridging software that would improve compatibility. Reactivating the now dormant Pavement Management Users Group would be useful in moving forward with this process.

The MassDOT Accelerated Bridge Program expired in 2016, but the State is repaying the bonds for this program until 2028. A continuation of the program, or the establishment of a new funding source to address the State’s bridge infrastructure, will be needed to keep pace with needed repairs and make continued progress in reducing the number of structurally deficient bridges in the region and across the Commonwealth.

As outlined in this section of the Plan, there are a number of major infrastructure projects needed in the region, including the replacement of the temporary Rourke Bridge over the Merrimack River, improvements on I-495, and the Exit 36 southbound ramp on Route 3. These projects will be expensive to undertake and the NMMPO does not have a federal funding target that is adequate to fund these initiatives. Alternative funding sources, such as the BUILD grant program or other federal discretionary programs, state resources provided through the legislature, or creative financing tools, such as design-build, will need to be utilized to bring these projects to fruition. It should be noted that funding of the Exit 36 southbound ramp project is to be borne by New Hampshire, although most of the construction would take place in Massachusetts.