

## REGIONAL TRANSPORTATION PLAN EXECUTIVE SUMMARY

### OVERVIEW

The Northern Middlesex Regional Transportation Plan (RTP) identifies and analyzes transportation infrastructure and service improvement needs for the region’s transportation system, and serves as the framework for future investment in highways, bridges, public transportation, bicycle and pedestrian paths and trails, and transportation-related air quality improvement projects. The RTP is the region’s long-range plan and includes recommendations to meet identified transportation needs through 2040. The plan includes nine communities located in the northern portion of Middlesex County in Massachusetts: the City of Lowell, and the Towns of Billerica, Chelmsford, Dracut, Dunstable, Pepperell, Tewksbury, Tyngsborough and Westford.



The Regional Transportation Plan is one of three federally required certification documents that the Northern Middlesex Metropolitan Planning Organization (NMMPO) must develop and maintain. The other key document used for programming project funding is the Transportation Improvement Program (TIP). The projects programmed for funding in the early years of the RTP are generally comprised of the projects listed in the TIP, as these are the projects that are most likely to move into the construction phase during that time period.

*The Endorsed RTP is available on the NMMCOG website at:*  
<http://www.nmcog.org/regional-transportation-plan>

### REGIONAL GOALS AND OBJECTIVES

Goals and objectives are extremely useful in the regional planning process as they provide the necessary direction and basic framework upon which future decisions can be made. The overarching vision of the RTP remains the same as in previous plans, with a focus on *“developing a balanced, multi-modal, cost-effective, energy efficient transportation system connecting points inside and outside the Northern Middlesex Region”* by:

- Determining the current and projected transportation needs of the region’s residents, businesses, and institutions over the next nearly 25 years;
- Assessing the ability of the existing transportation system to meet these needs; and
- Identifying a set of fiscally constrained strategies that best fill the gap between the capabilities of the existing transportation system and current and projected transportation needs.

The RTP was developed with input from residents, businesses, and community organizations. The first round of public involvement meetings were held between February and April 2019 to review and gather input on opportunities and issues facing the region, and to discuss potential transportation alternatives aimed at addressing transportation needs. A second round of public involvement meetings was held in July 2019 to solicit comments on the Draft RTP document.

The RTP goals, performance measures and recommendations are summarized in the sections below.

#### TRANSPORTATION PLANNING FRAMEWORK

The RTP goals and objectives have been developed in coordination with federal transportation planning factors set forth in the Fixing Americas Surface Transportation (FAST) Act. It also identifies performance measures, or the metrics used to monitor changes in the performance of the regional transportation system in order to gauge progress toward addressing identified needs. The performance measures address the following categories: safety, infrastructure condition, congestion reduction and system reliability, economic vitality, environmental sustainability and livability, and transportation equity and accessibility. Each performance measure category is presented in the following pages.

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#### GOAL 1: IMPROVE THE SAFETY OF THE TRANSPORTATION SYSTEM FOR ALL USERS

Traffic crashes result in economic loss from damaged vehicles and goods, personal pain and suffering due to injury, and occasionally the catastrophic loss of life. Facility improvements that benefit safety must be highly valued. The RTP strives to reduce and minimize the risk of crashes occurring on the roadway network, and encourages the integrated consideration of roadway, vehicle and driver elements in design of future improvements.

Objectives aimed at achieving goals include supporting projects, program and policies that:

- Advance safe travel;
- Reduce the number and severity of crashes for all modes of transportation; and
- Promote the use of technology for projects aimed at improving safety at high crash locations.

Table ES-1 outlines safety performance measures and targets used to quantify progress toward achieving goals. The NMMPO has adopted statewide performance measures and targets for 2019. | The

NMMPO has also adopted a long-term target of achieving a 20% reduction in injuries and fatalities by 2040. The fatality and incapacitating rates for the region are consistently below state averages.

**Table ES-1: Safety Performance Measures and Targets**

| Goal Area | Performance Measures   | Current Performance - Rolling Five-Year Average 2012-2016 | CY 2019 Performance Target - Rolling Five-Year Average 2015-2019* | Regional Rolling Five-Year Average 2012-2016 | 2040 Regional Target (20% reduction) |
|-----------|--|---|---|--|--------------------------------------|
| Safety    | Fatalities   | 364   | 353   | 61   | 49                                   |
|           | Rate of Fatalities per 100 million VMT                               | 0.61  | 0.58  | 0.44   | 0.35                                 |
|           | Incapacitating Injuries  | 3,146   | 2,801   | 632  | 506                                  |
|           | Rate of Incapacitating Injuries per 100 million VMT                  | 5.24  | 4.37  | 4.57   | 3.66                                 |
|           | Total Number of Non-Motorized Incapacitating Injuries and Fatalities | 541   | 541   | 90   | 72                                   |

\*Statewide Target adopted by NMMPO 2/27/19

**GOAL 2: EFFICIENTLY MANAGE EXISTING TRANSPORTATION ASSETS AND INFRASTRUCTURE**

The RTP places an emphasis on maximizing the efficiency of existing facilities, rather than constructing new ones. Maintenance is one of the most cost-effective strategies outlined in the Plan. A relatively small investment is needed to keep the system in good condition, compared to what is required to completely rebuild it. Deferred maintenance may save money in the short-run, but will be far more costly over the long-term, when compared with regular preventive maintenance. Regular maintenance provides better service, improves safety, extends equipment life and results in fewer breakdowns.

This plan addresses the issue of aging infrastructure and deferred maintenance and the associated impacts on safety, equipment life and the economic health of the region and its communities, by supporting the following projects, programs, and policies:

- Prioritize projects that maintain and modernize existing capital assets;
- Monitor the condition of existing infrastructure and identifying critical needs;
- Prioritize ongoing maintenance to avoid the added cost of deferred maintenance activities;
- Improve the condition of bridge structures;
- Improve the pavement conditions on the region’s multimodal travel network;

- Maintain and improve service reliability, through regular route and service evaluations, and proper preventative maintenance practices;
- Maintain and upgrade all transit facilities , including Gallagher Intermodal Center, commuter rail parking garages, Kennedy Bus Hub and operation and maintenance centers
- Ensure that the LRTA Bus and Paratransit fleets are safe, accessible and in a state of good repair;
- Continued participation in MassDOT programs, plans and policies including the Statewide Bridge Program, the Complete Streets funding program and Chapter 90; and
- Continuing to participate in the State ITS program.

Table ES-2 outlines the Roadway Infrastructure performance measures and targets aimed at achieving adopted goals. The NMMPO, at its October 24, 2018 meeting, voted to adopt statewide targets for pavement and bridge conditions and at its February 27, 2019, meeting adopted Lowell Regional Transit Authority (LRTA) assets (Table ES-3). This RTP shows a regional long-term target of achieving a 10% reduction in poor pavement and bridge conditions by 2040.

**Table ES-2: Pavement and Bridge Performance Measures and Targets**

| Performance Measures                     | Current Statewide Condition 2017 | 2020 Statewide Performance Target | 2022 Statewide Performance Target | 2040 Regional Target (10% reduction poor) |
|--|----------------------------------|-----------------------------------|-----------------------------------|---|
| <b>Interstate Pavement Condition</b>     |                                  |                                   |                                   |   |
| % of pavement in Good Condition          | 74.20%                           | 70%                               | 70%                               | NA  |
| % of pavement in Poor Condition          | 0.10%                            | 4%                                | 4%                                | 0.09%                                     |
| <b>Non-Interstate Pavement Condition</b> |                                  |                                   |                                   |   |
| % of pavement in Good Condition          | 32.90%                           | 30%                               | 30%                               | NA  |
| % of pavement in Poor Condition          | 31.40%                           | 30%                               | 30%                               | 28.3%                                     |
| <b>Bridges</b>                           |                                  |                                   |                                   |   |
| % of Bridges in Good Condition           | 15.22%                           | 15%                               | 16%                               | NA  |
| % of Bridges in Poor Condition           | 12.37%                           | 13%                               | 12%                               | 11.1%                                     |

The Federal Transit Administration’s (FTA) Final rule (49 CFR Part 625) outlined a requirement for transit providers to implement performance management through Transit Asset Management Plans. LRTA, as a

Tier II Provider<sup>1</sup>, adopted their respective TAM Plan on August 28, 2018. The NMMPO reviewed and adopted the performance measures outlined in the Plan on February 27, 2019. The TAM Plan covers a horizon period of Federal Fiscal Years 2018-2022. The purpose of the plan is to:

- Provide implementation actions that offer enabling support and direction for management of transit assets; and
- Provide direction and expectations for asset class owners and department managers regarding lifecycle management planning and processes.

The TAM Plan uses transit asset condition to guide the management of capital assets and prioritizations of funding to improve/maintain a State of Good Repair (SGR). SGR performance measures and targets were set for rolling stock, equipment and facilities. Table ES-3 outlines the NMMPO-adopted TAM performance measures and targets.

**Table ES-3: Transit Asset Management Performance Measures and Targets**

| Asset Category -Performance Measure  | Asset Class                           | 2019 Target | 2020 Target | 2021 Target | 2022 Target | 2023 Target |
|--|---------------------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>REVENUE VEHICLES</b>  |                                       |             |             |             |             |             |
| Age -% of revenue vehicles within a particular asset class that have met or exceeded their Useful Life Benchmark         | BU -Bus                               | 12%         | 20%         | 10%         | 5%          | 3%          |
|  | CU -Cutaway Bus                       | 11%         | 24%         | 35%         | 13%         | 4%          |
| <b>EQUIPMENT</b>   |                                       |             |             |             |             |             |
| Age -% of vehicles that have met or exceeded their Useful Life Benchmark   | Non-Revenue/Service Automobile        | 50%         | 0%          | 0%          | 0%          | 0%          |
|  | Trucks and other Rubber Tire Vehicles | 70%         | 70%         | 70%         | 70%         | 70%         |
|  | Maintenance Equipment*                | 30%         | 30%         | 22%         | 22%         | 10%         |
|  | Facilities Equipment*                 | 0%          | 0%          | 0%          | 0%          | 0%          |
| <b>FACILITIES</b>  |                                       |             |             |             |             |             |
| Condition -% of facilities with a condition rating below 3.0 on the FTA Transit Economic Requirements Model (TERM) Scale | Administration                        | 0%          | 0%          | 0%          | 0%          | 0%          |
|  | Maintenance                           | 0%          | 0%          | 0%          | 0%          | 0%          |
|  | Parking Structures                    | 0%          | 0%          | 0%          | 0%          | 0%          |
|  | Passenger Facilities                  | 50%         | 50%         | 0%          | 0%          | 0%          |

<sup>1</sup> Tier II Provider: 100 or fewer vehicles across all fixed routes.

### GOAL 3: IMPROVE TRAVEL TIME AND RELIABILITY FOR PEOPLE AND GOODS

Congestion results in increased travel time, poor air quality, increased greenhouse gas emissions, and frustration on the part of the traveling public. Improved methods of providing information about roadway conditions is essential in helping drivers plan trips and be aware of alternative routes and modes.

In order to achieve this goal, the NMMPO strives to support projects, programs, and policies that:

- Improve the performance of the existing transportation facilities to reduce congestion;
- Eliminate critical highway bottlenecks;
- Increase reliability and on-time performance of the transit system;
- Increase bicycle parking capacity, pedestrian facilities and access to transit stations in order to encourage mode shift; and
- Improve incident management.

As part of the FAST Act's performance-based planning process, FHWA passed a systems performance measure rule aimed at improving the efficiency of the system and freight movement, reducing traffic congestion, and reducing emissions. In October 2018 the NMMPO adopted MassDOT set targets for the following measures:

- **Level of Travel Time Reliability (LOTRR):** the consistency or dependability in travel times, as measured from day-to-day and/or across different times of the day.
- **Level of Truck Travel Time Reliability (TTTR):** the consistency or dependability in truck travel times, as measured from day-to-day and/or across different times of the day.

The Northern Middlesex MPO planning area includes communities in the Boston Urbanized Area (UZA). As a signatory to the 2018 Boston UZA Memorandum of Understanding (Boston UZA MOU), the NMMPO has adopted two-year (2020) and four-year (2022) Boston UZA-wide congestion performance measure targets. Targets were developed in coordination with state Departments of Transportation and neighboring MPOs with planning responsibility for portions of the Boston UZA.

- **Percentage of Non-Single Occupancy Vehicle (SOV) Travel:** The metric is based on the percentage of people commuting to work using a mode other than a single occupancy vehicle (e.g. carpool, van, public transit, walking, bicycling, or telecommuting).
- **Peak Hour Excessive Delay (PHED):** a measurement of annual hours of excessive delay per capita on the National Highway System (NHS) between 6 am and 10 am, and 3 pm and 7 pm, divided by the total UZA population.
- **Emissions Reductions:** The on-road mobile source emissions measure is calculated by summing two-and four-year totals of emissions reductions in kilograms per day.

In October 2018, the NMMPO voted to adopt two-year (2020) and four-year (2022) statewide reliability, congestion, and emissions performance measures and targets set by MassDOT. Table ES-4 summarizes each system performance measure and target adopted by the NMMPO. The 2040 regional targets represent a reduction of 20%, continuing the targets set in the 2016 Regional Transportation Plan.

**Table ES-4: System Performance Measures and Targets**

| Performance Measures  | 2017 Current Conditions (State)                              | 2017 Current Conditions (Region)           | 2020 Target                      | 2022 Target                          | 2040 Regional Target       |
|---|--|--|----------------------------------|--------------------------------------|----------------------------|
| <b>Percentage of Travel Time Reliability</b>                            | 68% Interstate   | 66.9% Interstate                           | 68% Interstate                   | 68% Interstate                       | 80%                        |
|   | 80% Non-Interstate   | 80.6% Non-Interstate                       | 80% Non-Interstate               | 80% Non-Interstate                   | 97%                        |
| <b>Level of Truck Travel Time Reliability</b>                           | 1.85   | 2.48                                       | 1.85                             | 1.85                                 | 1.98                       |
| <b>Peak Hour Excessive Delay (annual hours per capita – Boston UZA)</b> | 18.31  | 18.31                                      | 18.31                            | 18.31                                | 14.65                      |
| <b>Non-SOV Travel (Boston UZA)</b>                                      | 33.60% (2016)  | 33.60%                                     | 34.50%                           | 35.10%                               | 40.3%                      |
| <b>CO Benefit (kg/day)</b>  | 24.452 kg/day (State baseline condition)                     | 11.76 kg/day (FFY14-17 regional baseline); | 0.00 (FFY 18-19 regional target) | 0.00 (FFY 2018-2022 regional target) | FFY 2036-2040 Regional TIP |
|   |  |  | 1,596.514 (State target)         | 1,596.514 (State target)             |                            |
| <b>NOx Emissions Reduction (kg/day)</b>                                 | 0.742 (FFY 14-17 Obligated STIP Projects using CMAQ Funding) |  | 0.5                              | 1.6                                  |                            |
| <b>VOC Emissions Reduction (kg/day)</b>                                 | 1.667 (FFY 14-17 Obligated STIP Projects using CMAQ Funding) |  | 0.6                              | 0.9                                  |                            |
| <b>Ozone (kg/day)</b>   | FFY 14-17 baseline condition                                 |  | 497.9                            | 1.1                                  |                            |

#### GOAL 4: ENSURE THAT THE TRANSPORTATION NETWORK SUPPORTS ECONOMIC DEVELOPMENT NEEDS AND ACCOMMODATES FUTURE ECONOMIC GROWTH

An efficient, safe, and reliable transportation system is critical to the economic vitality of the region. Sufficient road, rail, and transit connections allow businesses to transport goods and services to markets and allow workers to get to job centers. The RTP strives to reduce the time and cost of commuting, goods movement, and other travel activities. Transportation supports economic development by improving access to priority development areas, and increasing transportation options in economically disadvantaged communities.

In order to achieve the economic vitality goal, the NMMPO support projects, programs, and policies that:

- Advance corridor and community development and redevelopment opportunities to improve the region's economy and enhance quality of life;
- Prioritize transportation investments that serve targeted development sites;
- Advance strategies to support connections between key employment origins and destinations;
- Expand transit service to regional employment markets that are either underserved or not currently served;
- Improve bicycle and pedestrian access to employment, educational, health, and recreational opportunities; and
- Connect multi-family and affordable housing with employment and educational opportunities.

This 2020 Regional Transportation Plan continues to support the goals outlined in the 2016 version, by monitoring the following performance measures:

- Number of new businesses formed;
- Number of Affordable Housing facilities served by transit;
- New jobs created;
- Number of new or expanded transit routes to serve employment centers, health care facilities, and educational facilities; and
- Percentage of population and places of employment within ¼ mile of a transit station or route.

Targets aimed at achieving this goal include the following:

- Increase percentage of population and places of employment within ¼ mile of transit station or route by 5% as compared to 2016; and
- Increase percentage of population and places of employment within ½ mile of bicycle facilities by 15% as compared to 2016.

## GOAL 5: MINIMIZE AND MITIGATE THE IMPACTS OF THE TRANSPORTATION SYSTEM ON THE ENVIRONMENT, INCLUDING AIR QUALITY, WATER QUALITY, WILDLIFE HABITAT, AND CLIMATE CHANGE

Transportation affects the environment by producing air pollution (including greenhouse gases), creating runoff that affects soils and drinking water, consuming land, and by generating noise and visual impacts. Air quality can be improved by encouraging the use of modes that reduce the amount of emissions per passenger per mile. Ridesharing, transit, bicycling and walking are beneficial in this regard, compared to using the single occupant automobile. Alternative fuels, electric vehicles and new engine technologies also offer hope for the future.

Design and construction of facilities should assure that materials used in operations and maintenance, such as road salt, will not have negative impacts on drinking water. In planning new facilities, sensitivity to design issues can also minimize adverse impacts on communities through appropriate treatments, such as landscaping and noise barriers. Future transportation improvements should be designed and constructed in a way that minimizes the disruption of existing neighborhoods, and preserves prime farmland, natural resources and open spaces.

Transportation system management measures enhance mobility and strengthen corridor efficiency by reducing overall travel time delay. Deploying and adapting Intelligent Transportation Systems (ITS), such as vehicle flow treatments, real-time system information programs, transit monitoring systems and real time automated incident detection technologies, can also improve the reliability and efficiency of the transportation system.

The most efficient modes of transportation save energy by using fewer vehicles to carry a given number of people. As vehicle occupancy rates increase, the amount of energy used per passenger mile decreases. The use of the most energy efficient modes, such as transit, ridesharing, bicycling and walking, should be encouraged wherever practical. Minimizing the use of energy resources will also help to lower greenhouse gas emissions. This plan supports MassDOT's Healthy Transportation Compact, which outlines the State's mode shift goal, and the Global Warming Solutions Act, which focuses on reduction of greenhouse gas emissions, by prioritizing projects aimed to achieve their goals. The Commission on the Future of Transportation, established under Executive Order 579, recommends electrification of the Commonwealth's transportation system. Electric vehicles produce far fewer emissions than conventional vehicles, and their use is supported by the NMMPO.

Transportation and land use policies have a symbiotic relationship –each is dependent upon the other. Transportation facilities should be constructed to serve areas with existing demand, and the land should be developed most intensively where there are adequate transportation facilities. Transportation planning decisions should incorporate sound local and regional land use planning objectives. Compact,

mixed-use development brings jobs, housing and shopping closer together, and, thereby, improves livability.

To achieve the environmental sustainability and livability goal, the NMMPO supports projects, programs, and policies that:

- Encourage mode shift and reduce VMT;
- Provide multimodal, active transportation options that improve public health and reduce air pollution;
- Maintain national ambient air quality standards;
- Create a connected network of bicycle and pedestrian facilities by expanding existing facilities and closing gaps;
- Promote the use of alternative fuel vehicles, such as compressed natural gas (CNG), electric and hybrid electric;
- Provide additional electric vehicle charging facilities;
- Protect critical transportation infrastructure from the effects of climate change;
- Promote sustainable design principles that minimize the region’s carbon footprint;
- Consider sensitive environmental resources, such as wetlands and wildlife habitat, in planning and designing transportation improvements; and
- Address stormwater runoff and flooding concerns.

**Table ES-5: Environmental Sustainability and Livability Performance Measures and Targets**

| <b>Goal 5: Environmental Sustainability and Livability</b>   |  |
|--|--|
| <b>Performance Measures</b>                                  | <b>Roadways</b>  |
|  | On-road mobile source emissions (carbon dioxide, nitrogen oxides, volatile organic compounds, greenhouse gases). |
|  | Number of projects implemented that benefit air quality  |
|  | Number of stormwater improvement projects implemented by local communities and MassDOT                           |
|  | <b>Transit</b>   |
|  | Transit fleet mix (alternative fueling technologies)   |
|  | Number of electric vehicle charging stations added   |
|  | <b>Active Transportation</b>   |
|  | Bicycle and Pedestrian mode share  |
| Miles of bike lanes, sidewalks and off road multi use trails |  |
| <b>Targets</b>   | <b>By 2040:</b>  |
|  | Reduce transportation-related carbon dioxide emissions below 1990 levels by 25% as compared to 2010              |
|  | Increase electric or compressed natural gas (CNG) transit fleet by 15% as compared to 2016                       |

**Table ES-5: Environmental Sustainability and Livability Performance Measures and Targets**

| Goal 5: Environmental Sustainability and Livability |  |
|---|--|
|   | Double bicycling and walking mode share as compared to 2016.                         |
|   | Increase miles of bike lanes and sharrows by 25% as compared to 2016.                |
|   | Increase miles of sidewalks and trails by 15% as compared to 2016.                   |
|   | Increase the number of electric vehicle charging stations by 20% as compared to 2016 |

In order to achieve these targets, the NMMPO will continue to work with local, regional, state and Federal partners to:

- Ensure that transportation construction projects respect the environment and are adequately mitigated;
- Promote alternative modes of transportation;
- Work with local communities to address pollution from stormwater runoff, limit deicing chemicals, and protect wildlife habitat; and
- Work to protect critical infrastructure from impacts of climate change.

**GOAL 6: PROVIDE FAIR AND EQUAL TRANSPORTATION ACCESS AND SERVICE QUALITY TO ALL COMMUNITIES AND NEIGHBORHOODS, REGARDLESS OF INCOME, RACE OR LEP STATUS.**

An equitable transportation system can produce many benefits including economic equity, social justice and equality. The RTP strives to provide mobility and accessibility to the transportation system for all people, particularly those who are transportation disadvantaged, and to minimize transportation barriers for mobility-limited people. Transit and paratransit services and systems must be accessible to persons with physical or other disabilities, in accordance with the Americans with Disabilities Act.

Transportation decision-making should be made through an open and accessible public participatory process that includes broad representation of interested individuals and groups, including minority and low-income populations. Environmental justice should be fostered through the maintenance of a planning process that does not unfairly affect any one segment of our community. Early and continuing opportunities for public engagement in transportation plans, projects and programs should be provided, particularly for those in the communities traditionally underserved by the transportation planning process.

To provide fair and equal transportation access and service quality to all communities and neighborhoods regardless of income, race or LEP status, the NMMPO supports projects, programs and policies that:

- Maximize benefits and minimize burdens of transportation investments for low-income and minority neighborhoods;
- Meet non-traditional transportation and transit-dependent needs of the region’s population, including those of the elderly and persons with disabilities; and
- Ensure that low-income, minority and Non-English speaking persons have ample opportunities to participate in the transportation planning process and share in the decision-making process.

**Table ES-6: Transportation Equity and Accessibility Performance Measures and Targets**

| <b>Goal 6: Transportation Equity and Accessibility</b> |   |
|--|---|
| <b>Performance Measures</b>                            | Monitor transportation projects and investments (number of projects and dollars of investment) that ensure that low-income and minority neighborhoods share equally in the benefits and burdens |
|  | Monitor transit improvement projects to ensure that low-income and minority neighborhoods receive equitable service levels and equipment  |
| <b>Targets</b>   | By 2040:  |
|  | Provide long-term documentation demonstrating that low income, minority and Non-English speaking persons share equally the benefits and burdens of transportation improvements and investments  |

To achieve the long-range target, the NMMPO will continue the following efforts:

- Actively engaging minority and low income neighborhoods;
- Review and expand the regional public participation process;
- Monitor changes in demographics; and
- Routinely evaluate transportation projects and programs to assess impacts on low-income and minority populations through the Transportation Improvement Program and the Unified Planning Work Program.

**PUBLIC OUTREACH**

Chapter 2 describes the public participation process used to develop the RTP. Public meetings, a survey, and social media were used to gather input from residents on the transportation needs and opportunities in the region. Chapter 3 highlights the role of the NMMPO in transportation policy, planning, and investment decision making, including the organizational structure and current members of the NMMPO.

**CURRENT TRANSPORTATION SYSTEM**

Chapter 4 discusses the existing and projected demographic and economic conditions along with land use and commuting patterns in the region. Chapters 5 through 8 provide an overview of the regional

transportation system by mode, including highways and bridges, public transportation, bicycling and walking. Intelligent Transportation Systems (ITS) initiatives across the region are also discussed.

Chapter 9 provides information on transportation safety and security considerations in the region. The congestion management process is presented in Chapter 10, as a means to provide practical tools to identify and implement strategies that improve the mobility of people and freight. This chapter emphasizes coordinated corridor-level and region-wide solutions that address existing and future sources of congestion that result in excess travel delays.

### OPPORTUNITIES AND ISSUES IN TRANSPORTATION PLANNING

Chapters 11 through 14 address a number of transportation planning topics that the MPO investigates and analyzes over the next 21 years. The issues are as follows:

- **Freight Movement:** Opportunities and challenges related to improving freight transportation by truck and rail are discussed.
- **Economic Development:** An overview of regionally significant development projects and related transportation infrastructure is presented.
- **Environmental Sustainability and Livability:** A preliminary analysis of the potential environmental impacts associated with the projects contained in the RTP is provided.
- **Transportation Equity and Accessibility:** An assessment of the region's environmental justice population and an analysis of the environmental justice impacts of the projects in the RTP are provided.

### PLAN RECOMMENDATIONS

Federal requirements mandate that the RTP include a financial plan that demonstrates how the recommendations can be implemented based on system-level estimates of costs and reasonably expected revenues. Chapter 15 presents plan recommendations to address existing and future needs, which can be implemented using the financial resources that are reasonably expected to be available through 2040. The recommendations will lead to the projects and programs that best address regional transportation needs, while focusing on the preservation and maintenance of the transportation system. The anticipated costs of implementing transportation projects and programs, and the federal revenues that can be reasonably expected to be available over the period covered by the RTP. The following tables summarize the recommendations of the RTP for both highway and transit projects. The projects recommended in the RTP must be within expected targets available to the Northern Middlesex MPO for programming.

**Table ES-7: FFY 2020-2024 Northern Middlesex RTP Recommendations - Highway**

| City/Town                                       | Project Name   | MassDOT ID | Construction Cost Estimate | RTP/TIP Program Year | NMMPO Investment Program Category     | Year of Expenditure Cost |
|---|--|------------|----------------------------|----------------------|---------------------------------------|--------------------------|
| Chelmsford                                      | Intersection improvements at Boston Road and Concord Road  | 608375     | \$2,440,923                | 2020                 | Intersection Improvements / Safety    | \$2,440,923              |
| Tewksbury                                       | Intersection Improvements at Andover Street (Route 133) and River Road   | 609038     | \$3,518,633                | 2020                 | Intersection Improvements / Safety    | \$3,518,633              |
| Tewksbury                                       | Resurfacing and Sidewalk Reconstruction on Route 38 Beginning at Colonial Drive North to the Intersection of Old Boston Road | 608297     | \$4,200,000                | 2021                 | Roadway/ Corridor Improvements        | \$4,368,000              |
| Dunstable                                       | Route 113 Improvements from Pleasant Street to 750 Ft. East of Westford Street   | 608603     | \$4,894,986                | 2021                 | Roadway/ Corridor Improvements        | \$5,090,785              |
| Billerica                                       | Rehabilitation on Boston Road (Route 3A) from Floyd St to Billerica Town Center  | 605178     | \$2,144,306                | 2022                 | Roadway/ Corridor Improvements        | \$2,319,281              |
| Westford  | Bridge Rehabilitation - Beaver Brook Road over Beaver Brook (W-26-014)   | 608830     | \$1,620,000                | 2022                 | Bridge Rehabilitation/ Reconstruction | \$1,752,192              |
| Dracut  | Improvements on Nashua Road  | 608350     | \$5,210,395                | 2022                 | Roadway/ Corridor Improvements        | \$5,635,563              |
| Billerica                                       | Rehabilitation on Boston Road (Route 3A) from Floyd St to Billerica Town Center  | 605178     | \$8,766,519                | 2023                 | Roadway/ Corridor Improvements        | \$9,861,142              |
| Chelmsford                                      | Traffic Signal Installation at Route 110 and I-495 (2 Locations)   | 607401     | \$1,172,500                | 2024                 | Intersection Improvements / Safety    | \$1,371,659              |
| Westford  | Westford - Rehabilitation of Boston Road   | 609035     | \$6,095,000                | 2024                 | Roadway/ Corridor Improvements        | \$7,130,288              |
| <b>Estimated Costs</b>                          |  |            |                            |                      |                                       | <b>\$43,488,467</b>      |
| <b>Regional Discretionary Funding Available</b> |  |            |                            |                      |                                       | <b>\$48,513,053</b>      |
| <b>Unprogrammed Funding</b>                     |  |            |                            |                      |                                       | <b>\$5,024,586</b>       |

Table ES-8 includes recommended RTP projects that are currently programmed to be funded through statewide programs outside of the MPO's regional allocation. These projects are currently listed in the FFY 2020-2024 Transportation Improvement Program (TIP) for the Northern Middlesex Region.

**Table ES-8: FFY 2020-2024 Northern Middlesex RTP Recommendations – Highway State Program Projects**

| City/Town              | Project Name  | MassDOT ID | Construction Cost Estimate | RTP/TIP Program Year | NMMPO Investment Program Category          | Year of Expenditure Cost |
|------------------------|---|------------|----------------------------|----------------------|--|--------------------------|
| Billerica              | Yankee Doodle Bike Path Construction (Phase 1)  | 608227     | \$9,673,932                | 2024                 | Bicycle and Pedestrian Improvement Program | \$11,317,132             |
| Lowell                 | Pedestrian Walkway & Bicycle Connection at Pawtucket Falls Overlook, from Vandenberg Esplanade to School Street | 607885     | \$2,232,100                | 2021                 | Bicycle and Pedestrian Improvement Program | \$2,321,384              |
| Lowell/<br>Tewksbury   | Route 38 Intersection Improvements  | 608774     | \$3,000,000                | 2023                 | Intersection Improvements/<br>Safety       | \$3,374,592              |
| Westford               | Bridge Replacement, W26-002, Stony Brook Road over Stony Brook  | 608861     | \$2,205,120                | 2022                 | Bridge Rehabilitation/<br>Reconstruction   | \$2,385,058              |
| <b>Estimated Costs</b> |   |            |                            |                      |  | <b>\$19,398,166</b>      |

Table ES-9 lists projects recommended in the FFY 2025-2029 time period. These projects have been approved by MassDOT and are eligible to be programmed in the Northern Middlesex TIP. These projects are currently in the preliminary design phase and are expected to be programmed for construction in the between 2025 and 2029.

**Table ES-9: FFY 2025-2029 Northern Middlesex RTP Recommendations - Highway**

| City/Town  | Investment Program/Project Name                                      | MassDOT ID | Construction Cost Estimate | RTP Program Year | NMMPO Program                        | Year of Expenditure Cost |
|------------|--|------------|----------------------------|------------------|--------------------------------------|--------------------------|
| Lowell     | Reconstruction and Related Work on VFW Highway                       | 605966     | \$6,215,865                | 2025             | Roadway/<br>Corridor Improvements    | \$7,562,550              |
| Billerica  | Intersection Improvements to Boston Rd/ Glad Valley Dr/ Lexington Rd | 609250     | \$3,003,500                | 2026             | Intersection Improvements/<br>Safety | \$3,800,386              |
| Lowell     | Connector Reconstruction from Thorndike Street to Gorham Street      | 604694     | \$3,409,870                | 2026             | Roadway/<br>Corridor Improvements    | \$4,314,573              |
| Chelmsford | Improvements on Chelmsford Street (Route 110)                        | 609317     | \$5,625,000                | 2027             | Intersection Improvements/<br>Safety | \$7,402,116              |

**Table ES-9: FFY 2025-2029 Northern Middlesex RTP Recommendations - Highway**

| City/Town                                       | Investment Program/Project Name               | MassDOT ID | Construction Cost Estimate | RTP Program Year | NMMPO Program                       | Year of Expenditure Cost |
|---|---|------------|----------------------------|------------------|-------------------------------------|--------------------------|
| Chelmsford                                      | Improvements on Chelmsford Street (Route 110) | 609317     | \$5,625,000                | 2028             | Intersection Improvements/Safety    | \$7,698,201              |
| Lowell  | Church Street 2 Way Conversion                | 609050     | \$3,050,000                | 2029             | Roadway/Corridor Improvements       | \$4,341,101              |
| Billerica                                       | Middlesex Canal Enhancement                   | 602945     | \$3,003,500                | 2029             | Bicycle and Pedestrian Improvements | \$4,274,917              |
| <b>Estimated Costs</b>                          |   |            |                            |                  |                                     | <b>\$39,393,844</b>      |
| <b>Regional Discretionary funding Available</b> |   |            |                            |                  |                                     | <b>\$55,620,728</b>      |
| <b>Unprogrammed Funding</b>                     |   |            |                            |                  |                                     | <b>\$16,226,884</b>      |

Table ES-10 lists funding allocation for the four highway investment programs presented by the NMMPO during RTP development. During development of this Plan, NMMPO staff compiled a universe of projects and based on that database, the percentage of investment program spending was determined. Each project in the universe has been categorized into one of these programs.

**Table ES-10: FFY 2030-2040 Investment Program Recommendations - Highway**

| City/Town                                       | Investment Program/Project Name                         | MassDOT ID | % Allocation | FFY 2030-2034       | FFY 2035-2039       | FFY 2040            |
|---|---|------------|--------------|---------------------|---------------------|---------------------|
| Region  | Intersection Improvements and Safety Investment Program | NA         | 33%          | \$22,537,366        | \$24,979,307        | \$5,313,050         |
| Region  | Roadway/Corridor Investment Program                     | NA         | 42%          | \$28,683,921        | \$31,791,846        | \$6,762,064         |
| Region  | Bicycle and Pedestrian Improvement Investment Program   | NA         | 22%          | \$15,024,911        | \$16,652,872        | \$3,542,033         |
| Region  | Bridge Rehabilitation/Reconstruction Investment Program | NA         | 3%           | \$2,048,851         | \$2,270,846         | \$483,005           |
| <b>Estimated Costs</b>                          |   |            |              | <b>\$68,295,049</b> | <b>\$75,694,871</b> | <b>\$16,100,152</b> |
| <b>Regional Discretionary Funding Available</b> |   |            |              | <b>\$68,295,049</b> | <b>\$75,694,871</b> | <b>\$16,100,152</b> |
| <b>Unprogrammed Funding</b>                     |   |            |              | <b>\$0</b>          | <b>\$0</b>          | <b>\$0</b>          |

Tables ES-11 and ES-12 present transit recommendations determined through collaboration with the Lowell Regional Transit Authority.

**Table ES-11: LRTA Capital Project Recommendations**

| Category  | 2020-2024           | 2025-2029           | 2030-2034           | 2035-2039           | 2040               | Total                |
|---|---------------------|---------------------|---------------------|---------------------|--------------------|----------------------|
| <i>Bus Replacement</i>  |                     |                     |                     |                     |                    |                      |
| Fixed Route Buses<br>over 35 ft.                                    | \$7,413,250         | \$9,191,400         | \$14,045,521        | \$11,510,142        | \$0                | \$42,160,313         |
| Fixed Route Buses<br>Under 35 ft.                                   | \$787,500           | \$1,003,811         | \$901,000           | \$400,000           | \$215,000          | \$3,307,311          |
| Paratransit   | \$0                 | \$0                 | \$0                 | \$0                 | \$0                | \$0                  |
| Support Vehicles  | \$0                 | \$80,000            | \$95,000            | \$100,000           | \$40,000           | \$315,000            |
| Preventive<br>Maintenance   | \$10,004,848        | \$10,955,309        | \$11,996,063        | \$13,135,689        | \$2,627,136        | \$48,719,045         |
| <i>Facility Updates and Improvements</i>                            |                     |                     |                     |                     |                    |                      |
| LRTA Admin Office   | \$100,000           | \$20,000            | \$20,000            | \$20,000            | \$20,000           | \$180,000            |
| Gallagher Intermodal<br>Transportation<br>Center                    | \$500,000           | \$100,000           | \$100,000           | \$100,000           | \$10,000           | \$810,000            |
| Gallagher Parking<br>Garage Facilities                              | \$320,000           | \$100,000           | \$100,000           | \$100,000           | \$20,000           | \$640,000            |
| 100 Hale Street Fixed<br>Route Operations &<br>Maintenance Facility | \$0                 | \$250,000           | \$250,000           | \$250,000           | \$50,000           | \$800,000            |
| Robert B. Kennedy<br>Bus Hub/ Transfer<br>Center                    | \$400,000           | \$100,000           | \$50,000            | \$100,000           | \$10,000           | \$660,000            |
| Roadrunner<br>Paratransit<br>Operations and<br>Maintenance          | \$0                 | \$100,000           | \$25,000            | \$50,000            | \$10,000           | \$185,000            |
| Spare Parts,<br>Equipment and<br>Miscellaneous                      | \$1,703,125         | \$600,000           | \$600,000           | \$600,000           | \$40,000           | \$3,543,125          |
| Fareboxes and<br>Communication                                      | \$0                 | \$2,000,000         | \$0                 | \$0                 | \$0                | \$2,000,000          |
| <b>Total Capital</b>  | <b>\$21,228,723</b> | <b>\$24,500,520</b> | <b>\$28,182,584</b> | <b>\$26,365,831</b> | <b>\$3,042,136</b> | <b>\$103,319,794</b> |

**Table ES-12: LRTA Operations Improvements Recommendations**

| Description  | 2020-2024                   | 2025-2029          | 2030-2034          | 2035-2039          | 2040               | Total     |
|--|-----------------------------|--------------------|--------------------|--------------------|--------------------|-----------|
| Realign Rte 01 - Christian Hill                                      | Implementation Cost Neutral | No Additional Cost | No Additional Cost | No Additional Cost | No Additional Cost | \$0       |
| Realign Routes through Downtown Lowell                               | Implementation Cost Neutral | No Additional Cost | No Additional Cost | No Additional Cost | No Additional Cost | \$0       |
| Realign Rte 16 (Chelmsford) and Rte 17 (North Chelmsford)            | Implementation Cost Neutral | No Additional Cost | No Additional Cost | No Additional Cost | No Additional Cost | \$0       |
| LRTA Route 12 Rerouting on Main Street in Tewksbury                  | No Additional Cost          | No Additional Cost | No Additional Cost | No Additional Cost | No Additional Cost | \$0       |
| Addition of Sunday Service (State Contract Assistance Pilot Program) | \$325,000                   | \$0                | \$0                | \$0                | \$0                | \$325,000 |