2020 Merrimack Valley Regional Transportation Plan

Merrimack Valley Metropolitan Planning Organization

July 24, 2019

Prepared for the

Merrimack Valley Metropolitan Planning Organization

By the

Merrimack Valley Planning Commission

The preparation of this report has been financed under contracts #95416 and MA-80-x012 and x013 between the Merrimack Valley Planning Commission and the Massachusetts Department of Transportation and with the cooperation of the Federal Highway Administration, Federal Transit Administration and the Merrimack Valley Regional Transit Authority.

Cover Photo: Bradford Rail Trail, D. Ovalle.

Photo this page: Placemaking – reimagining roadways at Salisbury Beach, MVPC.

Title VI Notice of Public Protection

The Merrimack Valley Planning Commission (MVPC) operates its programs, services and activities in compliance with federal nondiscrimination laws including Title VI of the Civil Rights Act of 1964 (Title VI), the Civil Rights Restoration Act of 1987, and related statutes and regulations. Title VI prohibits discrimination in federally assisted programs and requires that no person in the United States of America shall, on the grounds of race, color or national origin (including limited English proficiency) be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal assistance. Related federal nondiscrimination laws administered by the Federal Highway Administration, the Federal Transit Administration, or both prohibit discrimination on the basis of age, sex and disability. These protected categories are contemplated within MVPC's Title VI Program consistent with federal interpretation and administration. Additionally, MVPC provides meaningful access to its programs, services, and activities to individuals with limited English proficiency, in compliance with U.S. Department of Transportation policy and guidance on federal Executive Order 13166.

MVPC also complies with the Massachusetts Public Accommodation Law, M.G.L. Chapter 272, Sections 92a, 98, and 98a prohibiting making any distinction, discrimination, or restriction in admission to or treatment in a place of public accommodation based upon race, color, religious creed, national origin, sex, sexual orientation, disability, or ancestry. Likewise, MVPC complies with the Governor's Executive Order 526, Section 4 requiring that all its programs, activities, and services provided, performed, licensed, chartered, funded, regulated, or contracted for shall be conducted without unlawful discrimination based upon race, color, age, gender, ethnicity, sexual orientation, gender identity or expression, religion, creed, ancestry, national origin, disability, veteran's status (including Vietnam-era veterans), or background.

Additional Information

To request additional information regarding Title VI and related federal and state nondiscrimination obligations, please contact:

Title VI Program Coordinator
Merrimack Valley Metropolitan Planning Organization
c/o Merrimack Valley Planning Commission
160 Main Street
Haverhill, MA 01830-5061
(978) 374-0519, extension 15
AKomornick@mvpc.org

Complaint Filing

To file a complaint alleging a violation of Title VI or related federal nondiscrimination law, contact the Title VI Program Coordinator (above) within one hundred and eighty (180) days of the alleged discriminatory conduct.

To file a complaint alleging a violation of the Commonwealth's Public Accommodation Law, contact the Massachusetts Commission Against Discrimination within three hundred (300) days of the alleged discriminatory conduct at:

Massachusetts Commission Against Discrimination (MCAD)
One Ashburton Place, 6th Floor
Boston, MA 02109
(617) 994-6000
TTY: (617) 994-6196

Translation

English
If this information is needed in another language, please contact the MVMPO Title VI/Nondiscrimination Coordinator at 978-374-0519 ext. 15.

Spanish
Si necesita esta información en otro idioma, por favor contacte al coordinador de MVMPO del Título VI/Contra la Discriminación al 978-374-0519 ext. 15.

Portuguese
Caso estas informações sejam necessárias em outro idioma, por favor, contate o Coordenador de Título VI e de Não Discriminação da MVMPO pelo telefone 978-374-0519, Ramal 15.

Chinese Simplified
如果需要使用其它语言了解信息，请联系Merrimack Valley**大都会**规划组织（MVMPO）《**民**权法案》第六章协调员，电话978-374-0519，转15。

Chinese Traditional
如果需要使用其他語言瞭解資訊，請聯繫 Merrimack Valley**大都會規劃組織**（MVMPO）《**民權法案》第六章協調員，電話**978-374-0519，**轉**15

Vietnamese
Nếu quý vị cần thông tin này bằng tiếng khác, vui lòng liên hệ Điều phối viên Luật VI/Chống phân biệt đối xử của MVMPO theo số điện thoại 978-374-0519, số máy nhánh 15.

French Creole
Si yon moun vle genyen enfòmasyon sa yo nan yon lòt lang, tanpri kontakte Kowòdinatè kont Diskriminasyon/MVMPO Title VI la nan nimewo 978-374-0519, ekstansyon 15.

Russian
ЕслиВамнеобходимаданнаяинформацияналюбомдругомязыке, пожалуйста, свяжитесьсКоординатором

Титула VI/Защита от дескриминациив MVMPOпотел: 978-374-0519, добавочный 15.

French

Si vous avez besoin d'obtenir une copie de la présente dans une autre langue, veuillez contacter le coordinateur du Titre VI/anti-discrimination de MVMPOen composant le 978-374-0519, poste 15.

Italian

Se ha bisogno di ricevere queste informazioni in un'altra lingua si prega di contattare il coordinatore del MVMPO del Titolo VI e dell'ufficio contro la discriminazione al 978-374-0519 interno 15.

Mon-Khmer, Cambodian

ប្រសិនបើណោក-អ្នកត្រូវការបកប្រែព័ត៌មាននេះសូមទាក់ទងអ្នកសម្របសម្រួលជំពូកទី**6/**គ្មានការធីសអើងរបស់

MVMPOតាមរយៈលេខទូរស័ព្ទ**978-374-0519** រួចភ្ជាប់ទៅលេខ**15**។

Arabic

إذا كنت بحاجة إلى هذه المعلومات بلغة أخرى، يُرجى الاتصال بمنسق الفقرة السادسة لمنع التمييز التابعلمنظمة التخطيط الحضري في ميريماك فالي على الهاتف: 978-374-0519 وثم اضغط الأرقام 15

Endorsement Page

Merrimack Valley Metropolitan Planning Organization Endorsement of the 2020 Merrimack Valley Regional Transportation Plan

This document certifies that the Merrimack Valley Metropolitan Planning Organization, at its meeting on July 24, 2019, hereby approves the endorsement of the 2020 Regional Transportation Plan and Air Quality Determination for the Merrimack Valley Region. The RTP is being endorsed in accordance with the 3C Transportation Planning Process and complies with the requirements set forth in Moving Ahead for Progress in the 21st Century Act (MAP 21).

Signatory Certification: **Date: July 24, 2019**

Stephanie Pollack Secretary/CEO MassDOT	Joseph Costanzo Administrator/CEO MVRTA	James Fiorentini Mayor, City of Haverhill
Jonathan L. Gulliver MassDOT Highway Division Administrator	Paul Materazzo Town of Andover	Daniel Rivera Mayor, City of Lawrence

John Cashell Town of Georgetown	Neil Harrington Town of Salisbury	Robert Snow Town of Rowley	Karen Conard MVPC Executive Director

Self-Certification Compliance
Statement - Signatures
Merrimack Valley Metropolitan Planning Organization

Concurrent with the submittal of the proposed RTP to the FHWA and the FTA, the MPO Policy Board shall certify that the metropolitan transportation planning process is being carried out in accordance with all applicable requirements including:

1. 23 U.S.C. 134, 49 U.S.C. 5303, and this subpart;
2. In nonattainment and maintenance areas, sections 174 and 176 (c) and (d) of the Clean Air Act, as amended (42 U.S.C. 7504, 7506 (c) and (d)) and 40 CFR part 93;
3. Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d-1) and 49 CFR part 21;
4. 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex, or age in employment or business opportunity;
5. Section 1101 (b) of the FAST Act (Pub. L. 114-357) and 49 CFR part 26 regarding the involvement of disadvantaged business enterprises in USDOT funded projects;
6. 23 CFR 230, regarding the implementation of an Equal Employment Opportunity Program on Federal and Federal-aid Highway construction contracts;
7. The provisions of the American with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) and 49 CFR parts 27, 37, and 38;
8. The Older Americans Act, as amended (42 U.S.C. 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;
9. Section 324 of title 23 U.S.C. regarding the prohibition of discrimination based on gender;
10. Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities; and
11. Anti-lobbying restrictions found in 49 USC Part 20. No appropriated funds may be expended by a recipient to influence or attempt to influence an officer or employee of any agency, a Member of Congress, in connection with the awarding of any Federal contract.

Signatory Certification: **Date: July 24, 2019**

_____	_____	_____
Stephanie Pollack Secretary/ CEO Mass DOT	Joseph Costanzo Administrator/CEO MVRTA	James Fiorentini Mayor, City of Haverhill
_____	_____	_____
Jonathan L. Gulliver MassDOT Highway Division Administrator	Paul Materazzo Town of Andover	Daniel Rivera Mayor, City of Lawrence
_____	_____	_____
John Cashell Town of Georgetown	Neil Harrington Town of Salisbury	Robert Snow Town of Rowley
_____		
Karen Conard MVPC Executive Director		

310 CMR 60.05: Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation (MassDOT)

Certification Compliance Statement for the Merrimack Valley MPO.

This will certify that the 2020 Regional Transportation Plan (RTP) and the Air Quality Conformity Determination for the Merrimack Valley Metropolitan Planning Organization (MVMPO) is in compliance with all applicable requirements in the State Regulation 310 CMR 60.05: Global Warming Solutions Act Requirements for the Transportation Sector and the MassDOT. The regulation requires the MVMVPO to:

- 310 CMR 60.05, 5(a)(1): Evaluate and report the aggregate transportation GHG emissions and impacts of RTPs and TIPs;
- 310 CMR 60.05, 5(a)(2): In consultation with MassDOT, develop and utilize procedures to prioritize and select projects in RTPs and TIPs based on factors that include aggregate transportation GHG emissions impacts;
- 310 CMR 60.05, 5(a)(3): Quantify net transportation GHG emissions impacts resulting from the projects in RTPs and TIPs and certify in a statement included with RTPs and TIPs pursuant to 23 CFR Part 450 that the MPO has made efforts to minimize aggregate transportation GHG emissions impacts;
- 310 CMR 60.05, 5(a)(4): Determine in consultation with the RPA that the appropriate planning assumptions used for transportation GHG emissions modeling are consistent with local land use policies, or that local authorities have made documented and credible commitments to establishing such consistency;
- 310 CMR 60.05, 8(a)(2)(a): Develop RTPs and TIPs;
- 310 CMR 60.05, 8(a)(2)(b): Ensure that RPAs are using appropriate planning assumptions;
- 310 CMR 60.05, 8(a)(2)(c): Perform regional aggregate transportation GHG emissions analysis of RTPs and TIPs;
- 310 CMR 60.05, 8(a)(2)(d): Calculate aggregate transportation GHG emissions for RTPs and TIPs;
- 310 CMR 60.05, 8(a)(2)(e): Develop public consultation procedures for aggregate transportation GHG reporting and related GWSA requirements consistent with current and approved regional public participation plans;
- 310 CMR 60.05, 8(c): Prior to making final endorsements on the RTPs, TIPs, STIPs, and projects included in these plans, MassDOT and the MPOs shall include the aggregate transportation GHG emission impact assessment in RTPs, TIPs, and STIPs and provide an opportunity for public review and comment on the RTPs, TIPs, and STIPs.
- 310 CMR 60.05, 8(a)(1)(c): After a final GHG assessment has been made by MassDOT and the MPOs, MassDOT and the MPOs shall submit MPO-endorsed RTPs, TIPs or projects within 30 days of endorsement to the Department for review of the GHG assessment.

Signatory Certification: **Date: July 24, 2019**

_____	_____	_____
Stephanie Pollack Secretary/ CEO Mass DOT	Joseph Costanzo Administrator/CEO MVRTA	James Fiorentini Mayor, City of Haverhill
_____	_____	_____
Jonathan L. Gulliver MassDOT Highway Division Administrator	Paul Materazzo Town of Andover	Daniel Rivera Mayor, City of Lawrence
_____	_____	_____
John Cashell Town of Georgetown	Neil Harrington Town of Salisbury	Robert Snow Town of Rowley
_____		
Karen Conard MVPC Executive Director		

List of Acronyms

Organization/Term	Acronym
Active Transportation Network	ATN
Advance Construction	AC
Americans with Disabilities Act	ADA
Capital Investment Plan	CIP
Clean Air Act	CAA
Clean Air Act Amendments	CAAA
Congestion Management Process	CMP
Eight Towns and the Great Marsh	ETGM
Environmental Justice	EJ
Environmental Protection Agency	EPA
Equivalent Property Damage Only	EPDO
Essex County Community Foundation	ECCF
Federal Highway Administration	FHWA
Federal Transit Administration	FTA
Fixing America's Surface Transportation Act	FAST Act
Functionally Obsolete (refers to bridge status)	FO
Green House Gas	GHG
Highway Performance Monitoring System	HPMS
Long-Range Regional Transportation Plans	LRTP
Low Impact Development	LID
Massachusetts Bay Transportation Authority	MBTA
Massachusetts Department of Environmental Protection	MassDEP
Massachusetts Department of Transportation	MassDOT
Merrimack Valley Metropolitan Planning Organization	MVMPO
Merrimack Valley Planning Commission	MVPC
Merrimack Valley Regional Transit Authority	MVRTA
Metropolitan Area Planning Council	MAPC
Metropolitan Planning Organization	MPO

National Ambient Air Quality Standards	NAAQS
National Highway Freight Network	NHFN
National Highway System	NHS
Nitrogen Oxides	NOx
Priority Development Area	PDA
Public Participation Plan	PPP
Regional Transportation Plan	RTP
Road Safety Audit	RSA
State Implementation Plan	SIP
Structurally Deficient (refers to bridge status)	SD
State Transportation Improvement Program	STIP
Surface Transportation Program	STP
Transportation Control Measures	TCM
Transportation Evaluation Criteria	TEC
Transportation Improvement Program	TIP
Unified Planning Work Program	UPWP
Vehicle Miles Traveled	VMT
Volatile Organic Compounds	VOC

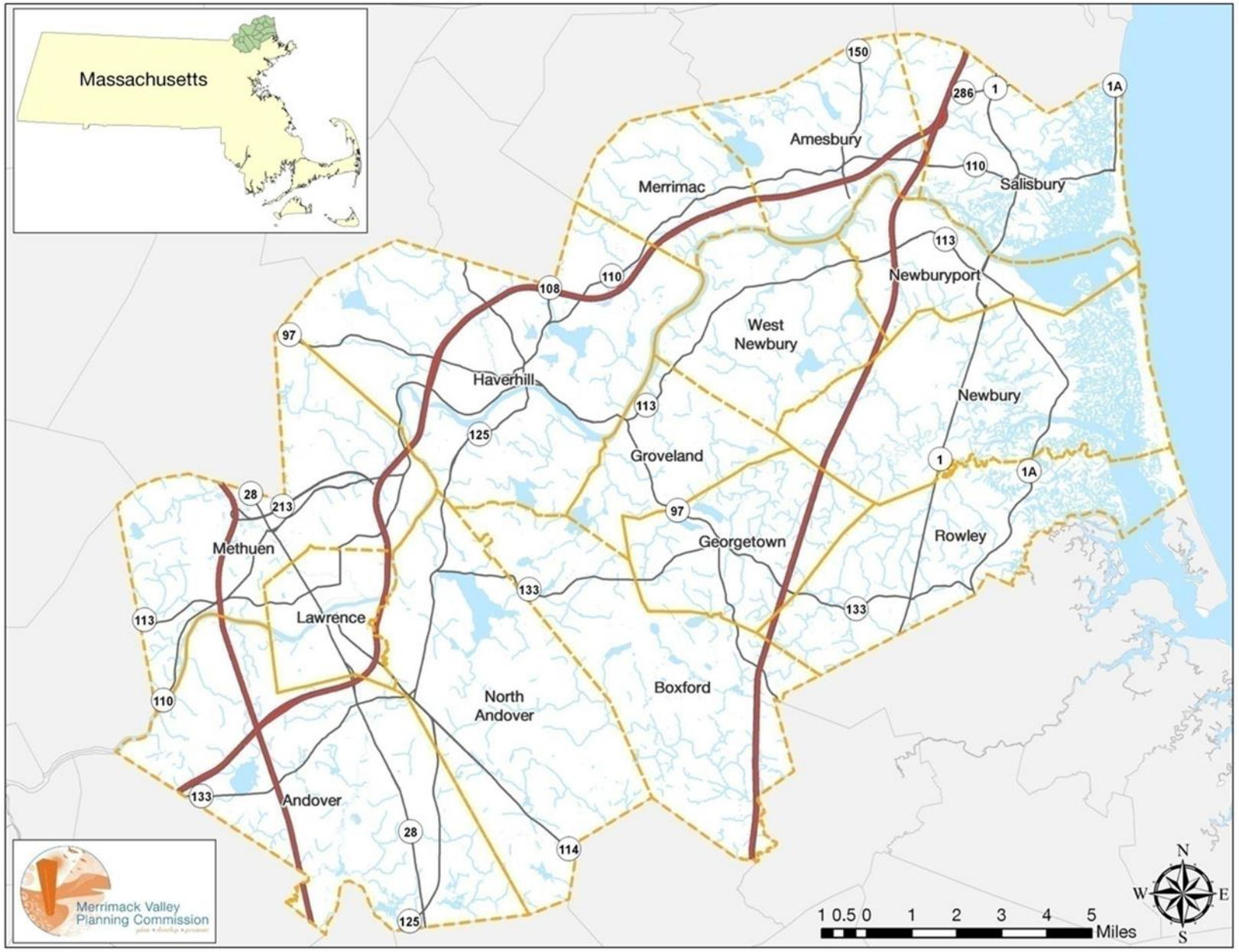


Figure 1: Map of Merrimack Valley Region

Contents

Executive Summary

The 2020 Merrimack Valley Regional Transportation Plan (RTP) is the long-range transportation plan that maps out how the Merrimack Valley Metropolitan Planning Organization (MVMPO) will achieve its vision:

> ***The MVMPO envisions a multi-modal, safe, efficient and cost-effective transportation system that supports our communities' livability goals of economic vitality, high quality of life, preservation of natural resources and healthy lifestyles.***

To achieve this vision within a limited budget, the MVMPO chose not to support any major infrastructure projects that would have required allocation of a substantial amount of funding. Instead, the MVMPO chose projects that addressed the goals and objectives (i.e. safety, state of good repair, mobility) on existing roadways or new rights-of-way, such as multi-use trail projects.

Photo: Railroad corridor through Rowley.

Goals and Objectives

Goal 1: Maintain Existing Infrastructure in a State of Good Repair

- Maintain federal-aid roadways in good to excellent condition.
- Maintain and modernize transit capital assets in good to excellent condition.
- Improve conditions of existing pedestrian infrastructure.

Goal 2: Increase Safety for All Modes

- Reduce overall number of crashes for all modes.

Goal 3: Create a Multi-Modal Transportation System to Support Mode Shift

- Implement and expand multi-modal network.
- Improve/increase bicycle parking capacity.
- Increase efficiency and effectiveness of transportation systems to support mode shift.

Goal 4: Promote Economic Vitality

- Direct transportation investment to Priority Development Areas.
- Support freight movement within and through the Merrimack Valley region.
- Improve/increase multi-modal transportation options for tourism.
- Reduce congestion on region's roadways that serve transit and/or existing populations and places of employment.

Goal 5: Promote Environmental Sustainability

- Implement effective stormwater management programs.
- Promote adaptive planning for climate change.
- Improve regional air quality.

Goal 6: Transportation Equity

- Prioritize transportation planning and investments that eliminate barriers for Title VI and Environmental Justice (EJ) communities.
- Break down barriers to participation in MPO process.

Throughout the planning process, the MVMPO collected and evaluated data and spoke with many stakeholders to determine the transportation gaps and needs as well as develop strategies that will then be incorporated into future Unified Planning Work Programs (UPWPs) for the organization. The UPWP is the annual work program that includes studies, data collection, planning, technical assistance and any other programmatic work that the MVMPO staff undertake.

What does the RTP do?

The RTP is the MVMPO region's 20-year plan for transportation projects that can be selected for implementation with federal funds. Implementation typically involves design, permitting and construction, although capital equipment purchases are also programmed.

Each year, the MVMPO programs projects from the RTP that are 'ready-to-go' into its five-year Transportation Improvement Program (TIP). Selected projects have also been evaluation criteria that take into account all the goals found within the RTP — safety, congestion, mobility, economic development, equity and more.

Financial Constraint

A critical element of the RTP is that it must be financially constrained. This means that the total costs of projects and services contained in it may not exceed the amount of funding that can reasonably be expected to be available to the MPO for the time period being considered for this RTP (FFYs 2020-2040). This requirement ensures that the projects identified in the document reflect the region's transportation priorities and needs and that it not be a "wish list" that provides little or no direction or guidance in improving the transportation network.

To ensure that the financial assumptions on funding availability made by the individual MPOs are consistent and fiscally constrained, the Massachusetts Department of Transportation (MassDOT) provided to the MVMPO estimates of the amount of highway and transit funding that are expected to be available in FFY 2020 to FFY 2040. Over $1.1 billion in funds are expected to be available to the MVMPO region between from FFYs 2020 through 2040.

Table 1 provides a summary of the funding available and the estimated cost of the projects chosen for funding through the RTP process. Table 2 provides a full list of those projects recommended for funding. The Universe of Projects, which is a list of projects chosen and not chosen for funding, can be found in the Appendices.

Table 3 summarizes the transit capital expenditures planned for the Merrimack Valley Regional Transit Authority (MVRTA). The focus for this RTP was on fleet replacement for the fixed route system, ADA on-demand service and supervisory vehicles. Funding was also allocated for operations and preventive maintenance.

Table 1: Summary of Transportation Funding in FFY 2020-2040 Regional Transportation Plan

Available Funding	2020-2024	20205-2029	2030-2034	2035-2039	2040	Total
Highway/Bridge/Bicycle/Pedestrian	$54,965,577	$63,018,613	$77,378,696	$85,762,738	$18,241,567	$299,367,191
Transit Funding	$49,150	$48,086,313	$51,450,009	$60,786,697	$11,851,370	$221,324,514
Total Funds Available	**$55,014,727**	**$111,104,926**	**$128,828,705**	**$146,549,435**	**$30,092,937**	**$520,691,705**
Demand						
Total Highway/Bridge /Bicycle/Pedestrian	$54,965,577	$63,018,592	$77,378,696	$85,762,738	$18,241,567	$299,367,171
Total Transit Capital and Operating	$40,709,715	$47,500,469	$50,242,144	$57,399,361	$11,851,369	$207,703,058

Table 2: Roadway and Trail Projects

Project	Community	2020-2024	2025-2029	2030-2034	2035-2039	2040	TOTAL
Reconstruction of South Hunt Rd./Rt. 150/I-495 NB Ramps Intersection	Amesbury		$ 1,904,844				$1,904,844
Elm St. Reconstruction	Amesbury	$7,223,053					$7,223,053
Rt. 133 (Lowell St.) Reconstruction: Lovejoy Rd. to Shawsheen Square	Andover		$18,833,414				$18,833,414
Rt. 133 (Washington St.) N. Andover T.L. to Main St.	Boxford		$8,611,867				$8,611,867
Border to Boston Rail Trail	Boxford		$7,518,039				$7,518,039
Rt. 97 from Moulton St. to Groveland T.L.	Georgetown		$8,814,290				$8,814,290
Border-to-Boston Rail Trail Segment from Georgetown Rd. in Boxford to West Main St.	Georgetown/ Boxford	$1,812,648					$1,812,648
Border-to-Boston Rail Trail North Segment to Byfield	Georgetown/ Newbury	$4,341,120					$4,341,120
Groveland Community Trail	Groveland	$2,064,255					$2,064,255
Bradford Rail Trail (Phase II)	Haverhill	$848,345					$ 848,345

Table 2 Roadway and Trail Projects (Continued)

Project	Community	2020-2024	2025-2029	2030-2034	2035-2039	2040	TOTAL
North Ave. from Marsh Ave. to MA/NH Boundary	Haverhill	$13,678,580					$13,678,580
Rt. 108 /Rt. 110 Intersection Reconstruction	Haverhill	$2,099,520					$2,099,520
Reconstruction of Water St. from Mill St. to Lincoln Blvd./Riverside Ave.	Haverhill		$13,403,842				$13,403,842
Intersection improvements at Broadway/Mt. Vernon St./McKinley St.	Lawrence		$1,460,684				$1,460,684
Amesbury St. Corridor Improvements: Merrimack River to Lawrence St. - Return to Two-Way Operation	Lawrence			$ 6,766,412			$6,766,412
M&L Branch Multi-Use Trail: Methuen Line to Merrimack St.	Lawrence	$15,950,704					$15,950,704
Rt. 114 Reconstruction: I-495 to Waverly Rd.	Law./N. Andover			$29,258,868	$2,964,555		$32,223,423
Resurface Bear Hill Rd. from NH Line to Old Bear Hill Rd. /Replace Culvert	Merrimac		$3,900,830				$3,900,830
Reconstruction of Howe St. from Marston's Corner to Washington St./Improve Howe St./Rt. 213 Ramps Intersection	Methuen			$4,714,804			$4,714,804
Intersection Improvements at Jackson St./Pleasant St,/ Howe St. and Pleasant Valley St. (Rt. 113)	Methuen			$2,410,236			$2,410,236
Rt. 110 Reconstruction: Green St. to Woodland St.	Methuen			$3,962,382			$3,962,382
B2B Rail Trail: Byfield to Scotland Rd. (Off Rd.)	Newbury		$8,054,496				$8,054,496
Intersection Improvements: Merrimac St. at Rt. 1 NB/SB ramps	Newburyport		$3,694,690				$3,694,690

Table 2 Roadway and Trail Projects (Continued)

Project	Community	2020-2024	2025-2029	2030-2034	2035-2039	2040	TOTAL
Rt. 1 Rotary Reconfiguration with improved bike/ped/trail access	Newburyport			$6,685,195			$6,685,195
Rt. 114 (Turnpike St.) improvements from Andover St. to Stop & Shop Driveway	North Andover	$17,399,023					$17,399,023
Rt. 133/Rt. 125 Intersection Improvements	North Andover			$1,993,922			$1,993,922
Rt. 133 @ Rt. 1 Intersection Improvements	Rowley		$2,142,691				$2,142,691
Rt. 1 @ Central St./ Glen St.	Rowley		$2,960,573				$2,960,573
Resurfacing of Rt. 1	Newb./Newb prt./Salis.	$9,807,200					$9,807,200
Reconstruction of Central St. & Glen St.: Main St. (Rt. 1A) to the Mill River	Rowley				$24,210,154		$24,210,154
Rt. 1 Reconstruction from Salisbury Square to MA/NH Boundary	Salisbury	$7,090,517					$7,090,517
Other Roadway Improvements - MPO Target	Regionwide	$3,421,713	$2,394,131	$21,000,000	$56,793,240	$18,241,567	$101,850,651
Other Trail Projects - MPO Target	Regionwide			$586,878			$586,878
Other Intersection Improvements - MPO Target	Regionwide	$1,140,571			$1,794,790		$2,935,361
Total Funding Allocated to Projects		$54,965,577	$63,018,592	$77,378,696	$85,762,738	$18,241,567	$299,367,171
Total Target Funding Available		$54,965,577	$63,018,613	$77,378,696	$85,762,738	$18,241,567	$299,367,191
Statewide Funding Programmed		$31,911,672	$20,675,798				52,587,470
Statewide Funding Available		$31,911,672	$20,675,798				52,587,470
Total Funding Programmed		**$86,877,249**	**$83,694,390**	**$77,378,696**	**$85,762,738**	$18,241,567	**$351,954,641**
Total Funding Available		**$102,232,080**	**$100,034,375**	**$77,378,696**	**$85,762,738**	$18,241,567	**$351,954,641**

Table 3: Merrimack Valley Regional Transit Authority Anticipated Capital Expenditures 2020-2040

Category Capital Expenses	2020-2024	2025-2029	2030-2034	2035-2039	2040	Subtotals
5307 - Preventative Maintenance	$14,411,676	$15,414,480	$15,414,480	$15,414,480	$3,082,896	$63,738,012
5307 - ADA Operating	$7,183,736	$8,164,447	$9,014,209	$9,952,415	$2,111,488	$36,426,297
5307 - Operating	$2,268,315	$2,296,611	$2,535,644	$2,799,556	$593,949	$10,494,077
5307- Planning	$400,000	$400,000	$400,000	$80,000		
Facilities						
Bank Stabilization	$1,400,264					
Vehicles						
Supervisory Vehicles	$153,736	$321,084		$176,234		$651,055
Paratransit Vans	$1,320,080	$2,027,705	$1,885,534	$2,787,079		$8,020,399
Bus Replacement	$5,469,240	$7,640,350	$9,422,459	$11,542,523	$3,256,391	$37,330,964
Engine/Transmission Replacements		$357,728		$1,167,464		$1,525,193
Total Spending Need	**$32,607,047**	**$36,622,408**	**$38,672,328**	**$43,919,754**	**$ 9,044,725**	**$158,185,999**
Carryover	$7,787,600	$2,335,144	$1,167,928	$4,342,011		$15,632,683
5307 Allocation	$31,509,531	$34,925,710	$38,712,262	$42,909,343	$9,124,725	$157,181,571
Federal Funds Allocated to MVRTA	$39,297,131	$37,260,854	$39,880,190	$47,251,354	$9,124,725	$172,814,254

Transportation Equity and Accessibility

The MVMPO looked at several indicators when analyzing the equitable distribution of funds. Overall, the equity analysis showed that the amount of benefit within low-income and minority populations was proportional to non-Environmental Justice (EJ) communities. Certainly, EJ communities receive a much higher share of transit service. Table 4 demonstrates three of these equity measures.

1. Geographic Equity – At least one project was selected for funding in all communities, except for West Newbury.
2. The City of Lawrence was allocated the largest amount of funding for projects. The City of Lawrence also has the largest minority population and the largest low-income population.
3. Not surprisingly, the Town of Rowley has the highest per capita spending. One of the least populated communities in the region, Rowley also has three fairly sizable projects included in the RTP.

Furthermore, the projects included in the RTP are intended to reduce congestion and vehicle hours of delay for all users of the transportation system, while increasing the amount of funding available for alternative modes of transportation, including transit, bicycling and walking – which benefit low-income and minority populations to a greater degree.

Table 4: Project Funding Distribution (American Community Survey (ACS))

Community	# Projects in RTP	Project Funding per Community	Population 2013-2017 ACS	$ Per Capita, 2013-2017 ACS
Amesbury	2	$9,127,897.15	17,218	$530.14
Andover	1	$18,833,414.04	35,375	$532.39
Boxford	2	$17,036,229.41	8,228	$2,070.52
Georgetown	3	$11,891,174.05	8,569	$1,387.70
Groveland	1	$2,064,255.00	6,697	$308.24
Haverhill	4	$30,030,286.73	62,943	$477.10
Lawrence	4	$40,289,512.25	79,497	$506.81
Merrimac	1	$3,900,830.21	6,752	$577.73
Methuen	3	$11,087,420.87	49,575	$223.65
Newbury	3	$ 13,494,122.89	6,964	$1,937.70
Newburyport	2	$13,648,951.10	17,890	$762.94
North Andover	3	$35,504,656.87	30,170	$1,176.82
Rowley	3	$29,313,417.07	6,232	$4,703.69
Salisbury	2	$10,359,583.67	9,021	$1,148.39
West Newbury	0	-	4,545	
Totals		**$246,581,751**	**337,063**	$731.56

Image: Merrimac's town square was reconstructed using federal transportation funds.

Chapter 1

Introduction

The Regional Transportation Plan (RTP) is a federally required long-range strategy and evaluation of the transportation system in the Merrimack Valley. Looking out 20 years, the RTP assesses the needs, impacts and performance that transportation choices and investments have on mobility, safety, environment and the economy.

The RTP must consider all major modes of transportation and be fiscally constrained, which means that each project appearing in the document must include an identified source of funding that will be sufficient in magnitude to allow its completion in the year it is programmed.

When you get right down to it, the RTP spells out how our region will spend federal transportation funding in a way that helps us achieve local, regional and state goals. The goals will impact how people get to jobs, support economic development, achieve environmental sustainability and more. It is also important to plan ahead to ensure that the funding is spent equitably and that transportation infrastructure is maintained in a responsible manner.

This RTP is the Merrimack Valley Metropolitan Planning Organization's (MVMPO) 20-year plan for transportation projects that can be programmed for implementation with federal transportation funds. Each year, the MVMPO programs projects from the RTP that are, or soon will be, 'ready-to-go' into its five-year Transportation Improvement Program (TIP). Only those projects that are identified in the RTP, or are consistent with its recommendations, can be programmed in the TIP. The TIP is also fiscally constrained and projects identified in the TIP are, for the most part, allocated 80% federal funds with a 20% match. Operating funds for transit are matched at 50%.

Beyond simply identifying projects, the RTP also lays out the transportation concepts, programs, analyses and fiscal factors that shape the selection of the projects identified. The analyses, studies and plans that are used to achieve the RTP goals are included in the MVMPO annual Unified Planning Work Programs (UPWPs).

The RTP must consider 10 planning factors identified in the Fixing America's Surface Transportation (FAST) Act, which are reflected in the goals and objectives. In addition, the MVMPO is required to establish performance measures in the areas of:

- Pavement condition
- Performance of the Interstate System
- Bridge conditions
- Safety
- Traffic Congestion
- Air Quality
- Freight movement

Measures of success (performance measures) are included as well as strategies for work toward achieving goals, objectives and performance targets.

Photo: Tree-lined sidewalks in front of Harbor Place in Haverhill.

Image: Construction of the Clipper City Rail Trail in Newburyport.

Meeting Federal Requirements

The MVMPO RTP meets several federal requirements related to the Fixing America's Surface Transportation (FAST) Act of 2015.

Supporting Economic Vitality, Travel and Tourism. Investment focuses on supporting the Priority Growth Strategy and the movement of goods and people. Creating multi-modal connections enhances the visitor experience and addresses congestion.

Transportation Safety. Safety on the roadways is of great importance to the MVMPO. Of the 60 roadway crash clusters, 50% have been either studied or projects initiated. Six projects included in the RTP address safety issues at seven crash clusters.

Increase Mobility and Connectivity of the Transportation System. RTP projects add 10.35 miles to the trail network, create a sidepath along Rt. 97 in Georgetown and add bike lanes to multiple roadways.

System Preservation and Efficient Management. The RTP calls for $176,001,038 to maintain the 75% of the non-interstate federal-aid roadways at good to excellent condition. $59,409,516 will fund the replacement and upkeep of transit vehicles.

Protect and Enhance the Environment. Projects included in the RTP contribute to reducing congestion and increasing mobility choices in order to reduce air pollutant and increase air quality.

Improve Resiliency. The RTP addresses impacts of climate change and stormwater runoff. Specific projects in Merrimac, Lawrence/North Andover and Rowley address stormwater management and river choke points.

Security. Elements such as cameras on highways and bridges, emergency call boxes on trails and security systems on transit vehicles are included in projects.

Equity. The RTP allocates 40% of funding for projects in minority and low-income communities. Projects are identified in 14 of the Merrimack Valley communities.

Photo: Route 125 at Massachusetts Avenue in North Andover is the site of a federally funded project.

What is the MVMPO

The MVMPO was first created by Massachusetts Governor Francis Sargent in 1972. The MVMPO covers the same 15-community geographic area that defines the MVPC region and the MVRTA service area. The MVMPO is a federally-mandated organization created to provide a transparent process for allocating transportation funds. It is essentially a board comprised of representatives from MassDOT, MVRTA, MVPC and member communities. The MVMPO community members include:

- Amesbury
- Andover
- Boxford
- Georgetown
- Groveland
- Haverhill
- Lawrence
- Merrimac
- Methuen
- Newbury
- Newburyport
- North Andover
- Rowley
- Salisbury
- West Newbury

Our member communities represent the diversity of the region, from communities with as few as 4,545 (West Newbury) to as many as 79,497 residents (Lawrence). 34% of the region's population is considered minority, adding to the richness and diversity of the people who call our region home.

The landscape of the 15 communities is also diverse, from the historic mill cities and towns to the seafaring coastal communities. The Merrimack Valley is centered around the Merrimack River and encompasses most of the Great Marsh, which is the largest continuous stretch of salt marsh in New England.

The RTP is representative of how the region balances the needs and gaps in the transportation system, addresses state and federal goals and contributes to achieving local goals that enhance livability for residents, employees, employers and visitors.

The current MVMPO membership is as follows:

- Secretary of Transportation – Stephanie Pollack
- MassDOT Highway Division Administrator–Jonathan L. Gulliver
- Merrimack Valley Planning Commission (MVPC) Executive Director – Karen Conard
- Merrimack Valley Regional Transit Authority Administrator/CEO – Joseph Costanzo
- Mayor of Haverhill – James Fiorentini
- Mayor of Lawrence – Daniel Rivera
- Representing Region 1 (Amesbury, Newburyport, Salisbury) – Neil Harrington
- Representing Region 2 (Newbury, Rowley, West Newbury) – Robert Snow
- Representing Region 3 (Boxford, Georgetown, Groveland, Merrimac) –John Cashell
- Representing Region 4 (Andover, Methuen, North Andover) – Paul Materazzo

Ex officio, non-voting members of the MVMPO include:

- Federal Highway Administration – Massachusetts Division – Jeff McEwen
- Federal Transit Administration – Region I – Peter Butler
- Rockingham Planning Commission MPO (NH), Chairman RPC – Barbara Kravitz
- Boston MPO, President MAPC – Erin Wortman
- Northern Middlesex MPO, Chairman NMCOG – Pat Wojtas
- Nashua MPO (NH), Chairman NRCP – Susan Ruch

Document Organization

The RTP is generally organized to correspond to each goal. Here's what you will find:

Executive Summary

Chapter 1 Introduction

Chapter 2 Vision and Goals – Elaborates on the goals, objectives and summarizes the strategies and performance measures.

Chapter 3 -Socioeconomic Conditions and Projections – Summarizes and explains population, employment and related data and how it impacts transportation planning.

Chapter 4 - Planning Process and Public Participation – Explains the planning process and provides an overview of public input.

Chapter 5 - Fiscal Constraint – Reviews funding availability and projects chosen for funding.

Chapter 6 - Goal 1: State of Good Repair – Reviews existing conditions related to maintenance and operation.

Chapter 7 - Goal 2: Increase Safety for all Modes – Discussion of existing conditions and projects to increase safety.

Chapter 8 - Goal 3: Create a Multi-Modal Transportation System – A review of the strategies and projects selected that will enhance mode choice.

Chapter 9 - Goal 4: Promote Economic Vitality – Looks at how the projects support the Priority Growth Strategy, movement of freight and how the MPO is working with communities to address congestion.

Chapter 10 - Goal 5: Promote Environmental Sustainability – Reviews projects and programs that address stormwater management, resiliency and air quality.

Chapter 11 - Goal 6: Equity – Reviews Title VI and environmental justice populations. Looks at transportation projects and funding distribution with an equity lens – geographic, economic and racial.

Chapter 12 - Summary – A quick look at how the selected projects address regional transportation goals.

Appendix A: Universe of Projects

Appendix B: Equity Maps

Appendix C: List of Choke Points along Federal-Aid Roads

Appendix D: Public Comments – Responses to public comments received during the review and comment period.

Page left Blank.

Chapter 2

Vision and Goals

Vision: Supporting Livable Communities with Transportation

The MVMPO envisions a multi-modal, safe, efficient and cost-effective transportation system that supports our communities' livability goals of equity, economic vitality, high quality of life, preservation of natural resources and healthy lifestyles.

The goals and objectives outlined in this plan detail how we hope to guide and support regional, local and state efforts to improve livability through creating a more dynamic, equitable and safe transportation system. They have been modified from the 2016 RTP to respond to changing policies and the evolving transportation network in the region. They also incorporate new statewide goals as well as those evolved through other planning processes, such as the Merrimack Valley Community Economic Development Strategy (CEDS).

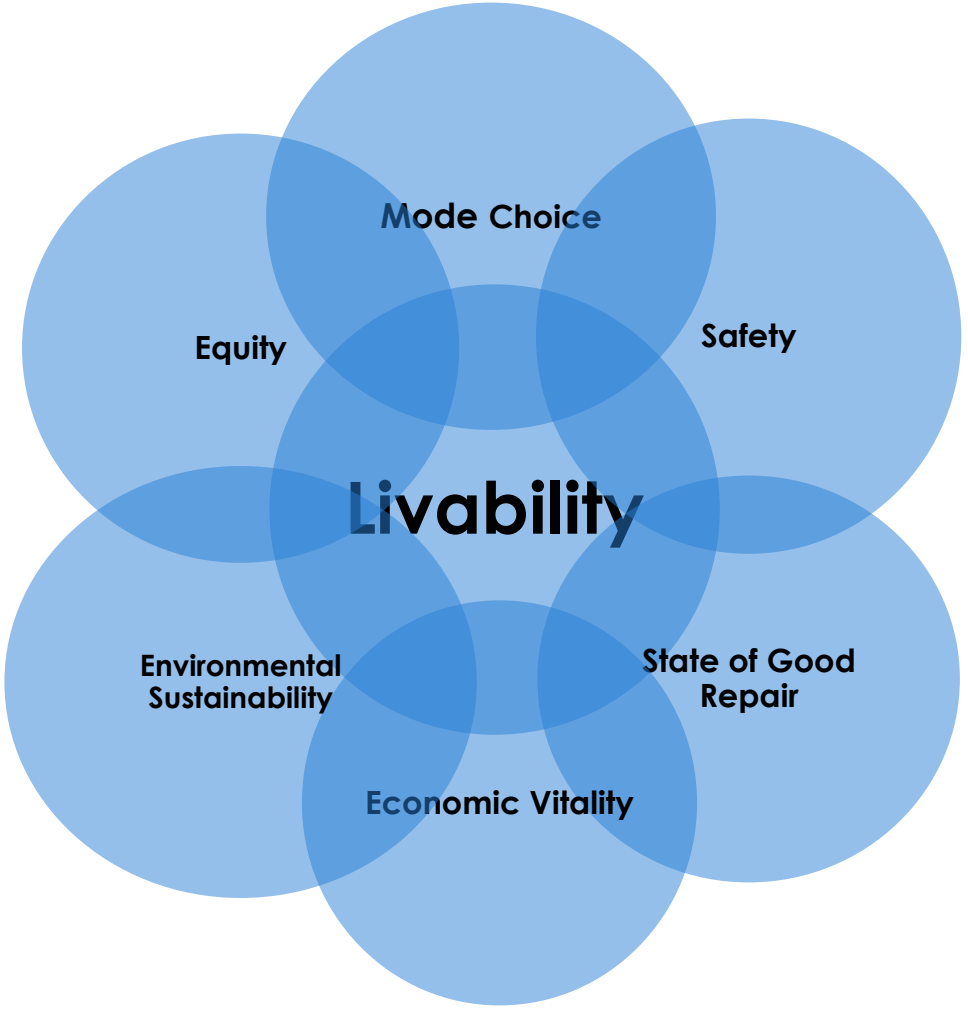


Table 2.1 Summary of Goals, Objectives, Strategies, Performance Measures and Progress

Goal 1: Maintain Existing Infrastructure in a State of Good Repair					
	Objectives	**Strategies**	**Target**	**Performance Measure**	**Progress**
1.1	Maintain federal-aid roadways in good to excellent condition		• 80% of non-interstate federal aid roadways in good to excellent condition • Interstate NHS Pavement: ○ Good: 70% ○ Poor: 4%	• % of non-interstate federal aid roads in good to excellent condition • % of Interstate NHS roadways in Good/Poor condition	• 80.3% of Federal-aid roads are in Good to Excellent Condition • Interstate NHS Pavement: ○ Good: 74.2% ○ Poor .1%
1.2	Maintain and modernize transit capital assets in good to excellent condition		• Exceed 5-year benchmark of 15,502 miles between road calls • Maintenance Cost per revenue mile • Maintenance cost per revenue hour	• Miles between road calls of transit fleet • Maintenance Cost per revenue mile • Maintenance cost per revenue hour • % of revenue vehicles that have met or exceeded their useful life benchmark • % of non-revenue service vehicles that have met or exceeded their useful life benchmark • % of facilities rated below 3 on the condition scale	• 15% increase in miles between road calls (since 2016) • 3% decrease in maintenance cost per revenue miles (since 2016) • 1.8% decrease in maintenance cost per revenue hour (since 2016) • 5% of buses (0% vans) met or exceeded their useful life benchmark • 14% of supervisory vehicles (0% maintenance trucks) met or exceeded their useful life benchmark • 0% of facilities were rated below 3
1.3	Improve conditions of existing pedestrian infrastructure	• Complete sidewalk inventory • Create performance measure for sidewalks • Investigate funding sources	• Create a sidewalk inventory within 5 years	• Miles of existing sidewalks. • Miles of sidewalks in good to excellent condition	• Inventory and condition reports completed in eight communities

Table 2.1 Summary of Goals, Objectives, Strategies, Performance Measures and Progress (Continued)

Goal 2: Increase Safety for All Modes					
	Objectives	**Strategies**	**Target**	**Performance Measure**	**Progress**
2.1	Reduce overall number of crashes for all modes	Conduct safety audits and other studies at priority high crash locations. Follow up with communities to ensure that they are implementing recommendations. Identify the severity of injuries related to crashes.	Statewide Targets: • Total fatalities: CY 19 is 353 • Fatality Rate for CY19 is .58 fatalities per 100 million vehicle miles traveled between 2015-201. • Total number of non-motorized fatalities and incapacitating injuries CY19 is 541 • Total incapacitating injuries for CY19 is 2801 • Incapacitating Injuries Rate for CY19 is 4.37 per 100 million VMT between 2015-2019	• Total Fatalities • Fatality Rate • Total number of non-motorized fatalities and incapacitating injuries • Total incapacitating injuries • Incapacitating injury rate	
		Increase the number of schools participating in SR2S program	• Increase the number of schools by 10% in five years	• Number of schools participating in SR2S • Infrastructure improvement projects at or to schools	• 10 communities are now participating in the program. The City of Haverhill signed up its schools in 2018, which is a 22% increase. • 4 SR2S infrastructure projects have been funded through the TIP since the 2016 RTP.

Table 2.1 Summary of Goals, Objectives, Strategies, Performance Measures and Progress (Continued)

Goal 3: Create a Multi-Modal Transportation System and Increase Capacity to Support Mode Shift					
	Objectives	**Strategies**	**Target**	**Performance Measure**	**Progress**
3.1	Implement and expand multi-modal network	• Implement bike/ped counting program • Support complete of multi-use trail network • Implement Active Transportation Network, state bike/ped plans and complete streets	• 10 miles of new trail complete in 5 years (2020)	• Miles of multi-use trails built • Number of communities with Complete Streets bylaws	• 8.8 additional miles will have been constructed by 2020 • 8 communities have adopted Complete Street policies
3.2	Increase bicycle parking capacity	• Work with communities and agencies to increase bicycle access to stations and park & ride lots • Inventory locations of bicycle parking in town centers	• Increase # of parking spaces by 10% in 5 years	• Number of bicycle parking spaces in PDAs and transit centers	• 13 additional bike racks (26 spots) included in the 2019 TIP for 3 transit centers
3.3	Increase efficiency and effectiveness of transportation systems to support mode shift	• Advocate for increased service along commuter rail lines • Support expansion of region's commuter bus services • Evaluate the need for additional park & Ride lot capacity	• Increase ridership by 2% each year • Park & ride utilization will be at 75%	• MVRTA ridership • MBTA commuter rail ridership • Service frequency • Parking capacity and % utilization at park & ride lots	• MVRA ridership decreased -5% between FY17-FY18 • Utilization rates varied 35% of the lots achieved the target of meeting or exceeding the 75% utilization rate

Table 2.1 Summary of Goals, Objectives, Strategies, Performance Measures and Progress (Continued)

Goal 4: Promote Economic Vitality					
	Objectives	**Strategies**	**Target**	**Performance Measures**	**Progress**
4.1	Direct transportation investment to Priority Development Areas (PDAs)			• Number and quality of infrastructure improvements made to increase mobility to and within PDAs	• 6 multi-modal projects on the 2019-2023 TIP that connect to PDAs
4.2	Support freight movement within and through the MV region	• Advocate for Complete Streets approach to road improvements that include freight needs • Monitor freight needs			
4.3	Improve/increase multi-modal transportation options for tourism	• Investigate bike share and similar options • Complete multi-modal network • Enhance coordinated mobility information for visitors	• Increase # of miles of multi-use trail network	• Miles of trail completed • # of people bicycling to major destinations, such as Salisbury Beach.	• 8.8 additional miles of trail will have been constructed by 2020
4.4	Reduce congestion on region's NHS roadways that serve transit and/or existing population and places of employment	• Promote Smart Growth Land Use Planning and improvements to multimodal access to these areas and PDAs • Review operations (e.g. signal timings etc.) at intersections along Non-Interstate congested road segments. • Investigate potential effectiveness of reopening Breakdown lane on I-93	• LOTTR will meet or exceed statewide system reliability target of 68% on Interstates and 80% on Non-Interstate NHS • TTTR Index will be at or below Statewide target of 1.85 • Boston UZA Peak Hour Excessive Delay target is 18.3 hours per person • Boston UZA Non-SOV travel on the NHS CY 2020 target is 34.5%, CY 2022 Target is 35.1%	• Level of Time Reliability (LOTTR) of interstate and non-interstate NHS roads Statewide • Truck Travel Time Reliability (TTTR) Index Statewide • Annual hours of Peak Hour Excessive Delay in the UZA • Percent of Non-SOV Travel on the NHS in the UZA	• LOTTR for Merrimack Valley was 78.2% for interstate roadway (68% state); 86.5% for non-interstate roadway (80% state) • MV TTTR Index is 1.696, exceeding the state level of reliability

Table 2.1 Summary of Goals, Objectives, Strategies, Performance Measures and Progress (Continued)

Goal 5: Promote Environmental Sustainability					
	Objectives	**Strategies**	**Target**	**Performance Measure**	**Progress**
		• Switch to more fuel-efficient vehicles (hybrid and electric vehicles) for transit and municipal fleets	• Scenario planning underway		
5.1	Implement effective stormwater management programs	• Assess transportation impact on impaired waterways • Continue collaborative community outreach and training • Upgrade stormwater system as road repairs are made		• # of impaired waterway segments addressed through transportation projects	• MVPC has identified 63 impaired waterway segments in the region from Multi-Hazard Mitigation Plan as well as DEP Impaired Waterway list
5.2	Adaptive planning for climate change	• Great Marsh restoration project including invasive species management • Employ planning models to quantify impacts of climate change and sea level rise		• # of coastal communities with adaptation plans	• Salisbury, Newbury, Newburyport and Rowley participated in the Great Marsh Coastal Adaptation Plan (2017)
		• Address choke point culverts and bridges causing flooding • Work with MassDOT to develop model design for reconstruction of roadways damaged in tidal zones and those impacted by coastal storm flow	• Complete inventory and assessment of barriers in the Upper Merrimack River communities by 2025	• # of 'Choke point' culverts addressed on federal aid roadways	• Choke points inventoried and assessed for the Eastern end of the region
5.1	Improve regional air quality	• Support mode shift	• Maintain regional attainment for air quality status. • Establish baseline for regional bike/ped use by 2017	• Pollutants – CO2, CO, PM2.5, PM 10, VOC, NOx	• Region still in attainment for CO2, CO, PM2.5, PM10, VOC, and NOx

Table 2.1 Summary of Goals, Objectives, Strategies, Performance Measures and Progress (Continued)

Goal 6: Transportation Equity					
	Objectives	Strategies	Target	Performance Measure	Progress
6.1	Prioritize Transportation Planning and Investments That Eliminate Barriers for Environmental Justice (EJ) Communities	• Continue investing in infrastructure and services in communities where protected populations are present • Prioritize walking, bicycling and public transit infrastructure and services development/maintenance	• Not less than 33% will be spent in Title VI/EJ communities	• % of funding spent in Title VI/EJ communities	• 67% of federal funding programmed in 2019-2023 TIP was for projects in Title VI/EJ communities
6.2	Break down barriers to participation in MPO process	• Increase engagement of protected populations in the MVMPO's transportation planning activities		• # and quality of outreach opportunities to Title VI/EJ communities	• MVPC staff participated in 31 substantive meetings in Title VI/EJ communities in 2018. This does not include MPO hearings or meetings

Photo: 1 Friends walking in Newburyport by Elaine Gauthier/Essex Heritage

Chapter 3

Socioeconomic Conditions & Projections

Many factors influence the transportation choices that we make every day. These include the availability of different modes of travel for each trip type and destination, the cost of making the trip, congestion and capacity constraints within the transportation network, and many others.

Each of these decisions is primarily influenced by where people live, work, shop, socialize and travel for medical appointments. Conversely, the decision of where people live is often guided by where these activities occur.

Current Conditions

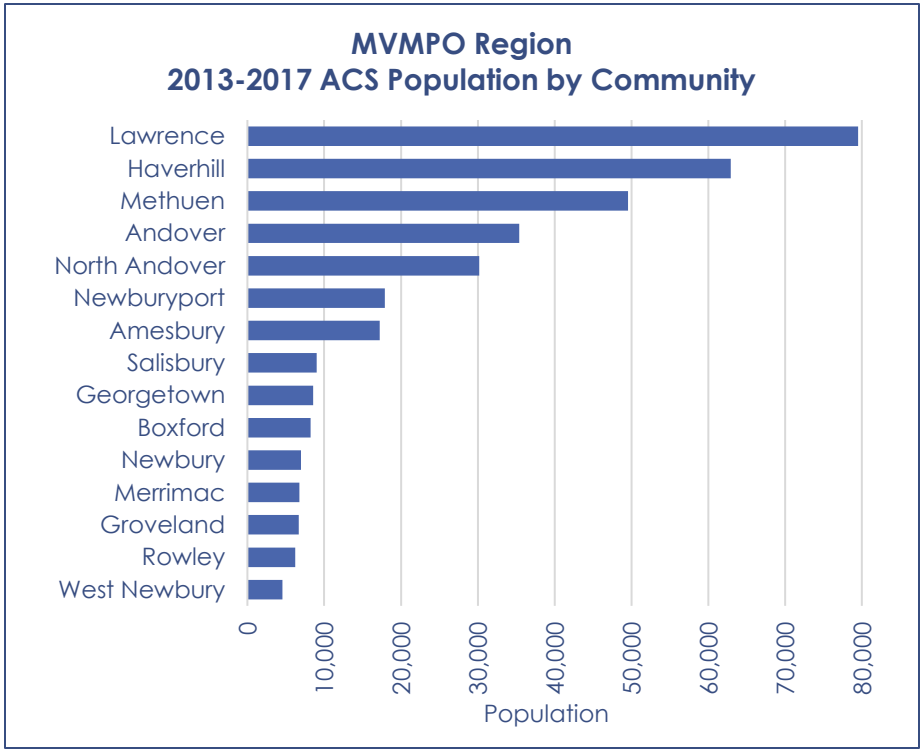
Table 3.1 on the following page presents some key statistics that illustrate the nature of development and transportation in the MVMPO region. These include population, population density, vehicle availability, journey to work characteristics and employment. Each indicator is described in more detail below.

Population

The City of Lawrence has the highest population in the region at 79,497, as measured in the 2013-2017 American Community Survey (ACS). The cities of Haverhill (62,458) and Methuen (49,575) are the next most populous communities.

Over half (55.6%) of the Merrimack Valley's population is located in the Greater Lawrence communities of Lawrence, Methuen, Andover and North Andover. The population in the eastern Merrimack Valley is much lower than in the west, with only Newburyport (17,890) and Amesbury (17,218) having populations in excess of 10,000 residents.

Figure 3.1 MVMPO Region Population by Community



Population Density

The City of Lawrence is far and away the most densely settled community in the region -- 11,471 residents per square mile. It is more than five times that of Methuen and Newburyport, the two next densely populated communities in the region.

The eastern Merrimack Valley communities of Rowley, West Newbury and Newbury are the least densely settled communities in the MVMPO region, each with population densities of less than 350 persons per square mile, which is roughly 1/30th that of Lawrence.

These densities are an important factor in explaining why the City of Lawrence receives the most fixed route bus service in the region and that the eastern Merrimack Valley communities are very difficult to serve by traditional transit.

Figure 3.2 MVMPO Population Density by Community (ACS 2013-2017)

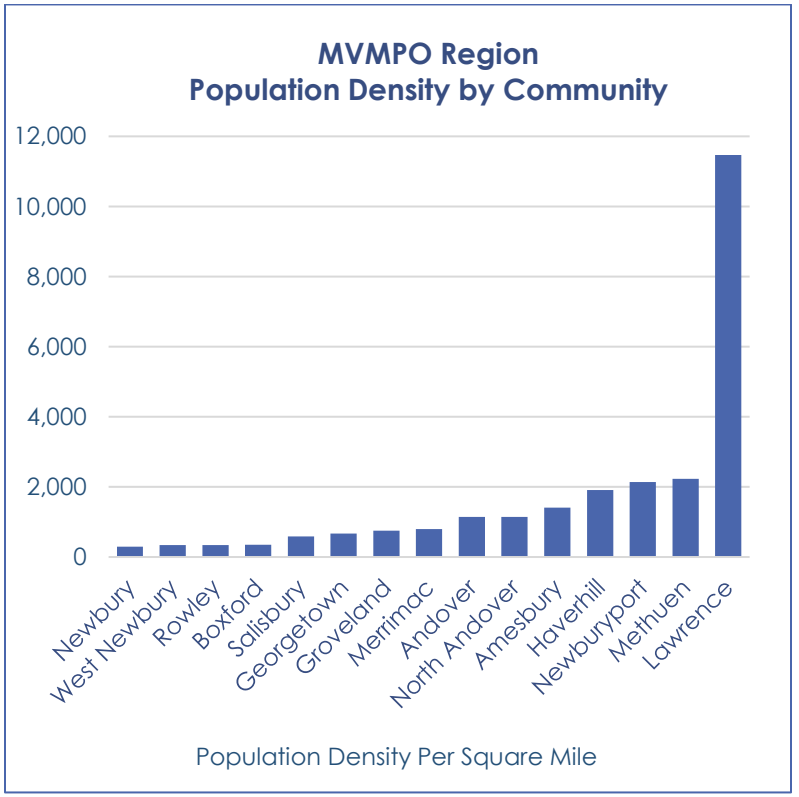


Table 3.1: MVMPO Region: Important Socioeconomic Measures Affecting Transportation

Community	Population[1]	Population Density/Sq. Mi.[1]	Median Age[1]	Median HH Income[1]	% Non White[1]	% Structures w/ 2 to 9 Housing Units	Mean Travel Time to Work[1]	% No Vehicles Available[1]	% Working in MVPC Region[2]	Employment[3]	Employment Density/Sq. Mi.
Amesbury	17,218	1,404	43.5	$78,638	7.2	0.20	30.8	5.6	53.2%	4,926	402
Andover	35,375	1,147	42.3	$143,292	20.6	0.10	33.3	4.1	42.6%	35,108	1,138
Boxford	8,228	349	45.9	$155,034	9.6	0.06	38.3	1.0	27.0%	1,096	47
Georgetown	8,569	666	46.0	$113,417	7.0	0.10	34.6	3.5	36.5%	2,701	210
Groveland	6,697	754	44.6	$95,031	5.0	0.13	28.4	2.0	51.1%	1,253	141
Haverhill	62,943	1,909	38.2	$65,926	26.9	0.33	29.4	10.5	55.5%	21,040	638
Lawrence	79,497	11,471	31.4	$39,627	84.5	0.54	23.4	24.3	62.0%	29,280	4,225
Merrimac	6,752	798	46.9	$84,417	3.7	0.13	36.4	3.4	54.6%	872	103
Methuen	49,575	2,228	39.1	$73,492	35.0	0.19	28.2	5.6	47.4%	16,630	747
Newbury	6,964	298	49.0	$89,433	4.6	0.06	30.3	0.0	47.4%	1,663	71
Newburyport	17,890	2,143	49.0	$89,887	7.2	0.25	31.2	5.7	51.3%	11,615	1,391
North Andover	30,170	1,147	39.9	$105,661	17.2	0.19	33.0	5.9	43.6%	14,500	551
Rowley	6,232	342	44.3	$89,338	3.1	0.12	36.1	4.0	39.2%	2,871	141
Salisbury	9,021	585	45.4	$72,828	7.2	0.30	30.9	5.8	53.3%	3,473	225
West Newbury	4,545	338	46.2	$135,882	2.6	0.09	36.8	1.9	47.6%	703	52
MVMPO Region	349,676	**1,324**	**38.5**	**$73,900**	**34.2**	**0.27**	**29.6**	**9.8**	**50.9%**	**147,731**	**559**

[1]2013-2017 American Community Survey

[2]2011-2015 American Community Survey

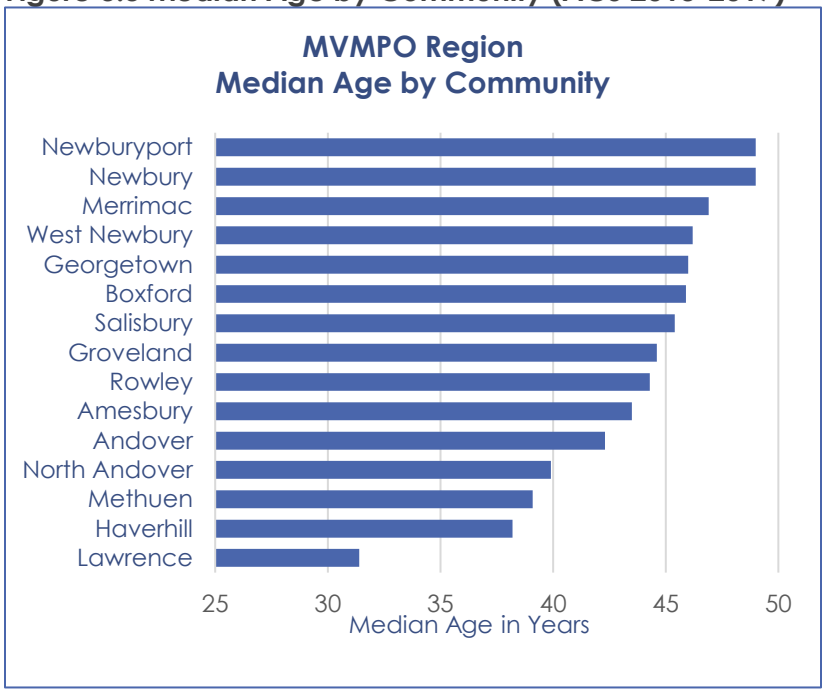
[3]Executive Office of Labor and Workforce Development 2017 ES-202 Data

Median Age

The median age of the population for the MVMPO region is 38.9 years old. However, there is great variability in the median ages in each community.

Seven communities have median ages in excess of 45 years old, with the highest ages (49.0) found in the neighboring communities of Newbury and Newburyport. Four of these seven communities are located in the eastern end of the region.

Figure 3.3 Median Age by Community (ACS 2013-2017)



In contrast, the City of Lawrence has the lowest median age population (31.4 years). The only other Merrimack Valley communities with the median age below 40 years old are two Greater Lawrence communities (Methuen and North Andover) and the City of Haverhill.

The low median age of the City of Lawrence's population can largely be explained by its role as a Gateway Community with a large immigrant population. The relatively high median ages found in communities in the eastern half of the region have been attributed to the high cost of real estate. This presents a barrier to younger families that cannot afford to move into these areas.

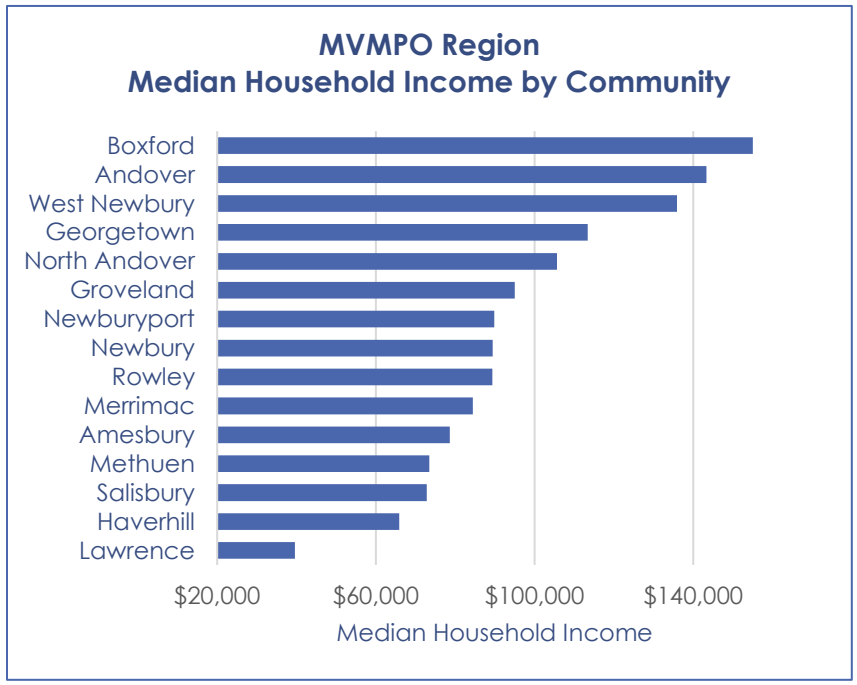
Median Household Income

As is the case with Median Age and Population Density, the Median Household Income for the City of Lawrence is significantly different than those of the other communities in the MVMPO region. Its median

household income of $39,627 is more than $26,000 less than the next highest community (Haverhill) and well below the MVMPO region's Median Household Income of $73,900.

Five MVMPO region communities have Median Household Incomes of over $100,000, with Boxford and Andover having median incomes of $155,034 and $143,292 respectively.

Figure 3.4 MVMPO Region Median Household Income by Community



Non-White Population

With significant Hispanic populations in Lawrence, Methuen and Haverhill and a growing Asian population in Lawrence and Andover, 34.2% of the MVMPO region is Non-White. This is above the 27.1% figure for Massachusetts.

Figure 3.5 Percent Non-White Population by Community

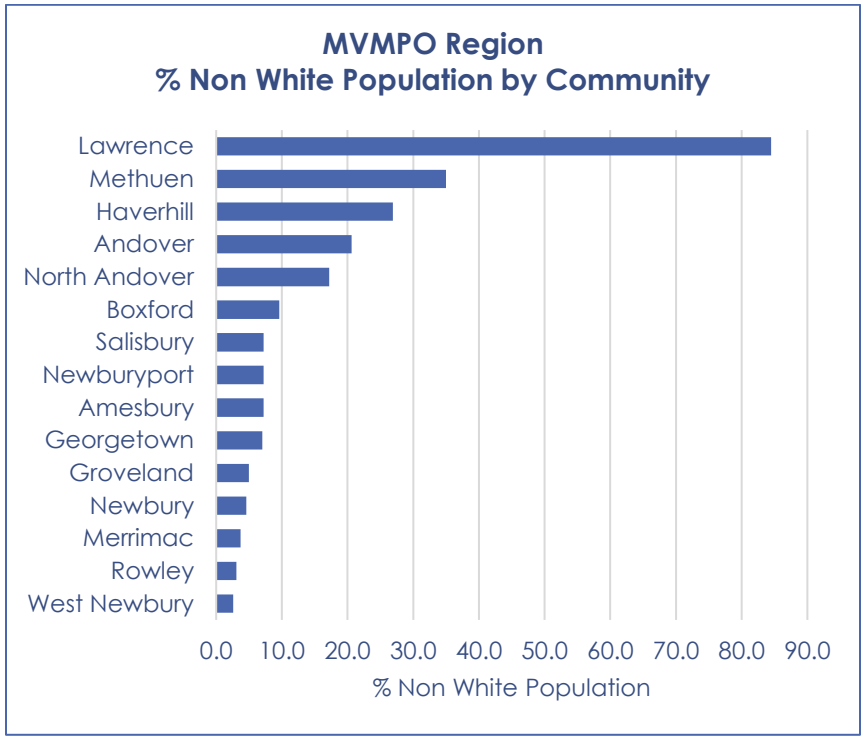


Photo: Residents having fun at the Lawrence Ciclovía.

Over 84% of the City of Lawrence's population is Non-White, which accounts for over half of the region's total. The magnitude of the Non-White populations in Lawrence, Methuen and Haverhill accounts for the fact that the overall Non-White population for the region is so high despite the fact that there are 10 communities with less than 10% Non-White populations and five communities with 5% or less.

Percent of Structures with 2 to 9 Housing Units

Related to Housing Unit Density, this measure provides a more informed glimpse into the nature of the housing stock across the region. The perception is that the City of Lawrence would have far greater numbers of multi-family units of all types than any other community and that is not the case. Lawrence and Haverhill have the greatest percentage of structures with 2 to 9 Housing Units and is indicative of the widespread presence of this type of housing. Interestingly, the percentage of structures with 10 or more units showed much less variability by community. While the City of Lawrence had the highest percentage of such structures (20.2%), it was closely followed by the City of Amesbury (19.2%) and the Town of North Andover (17.2%)

Figure 3.6 Percentage Structures with 2-9 Housing Units

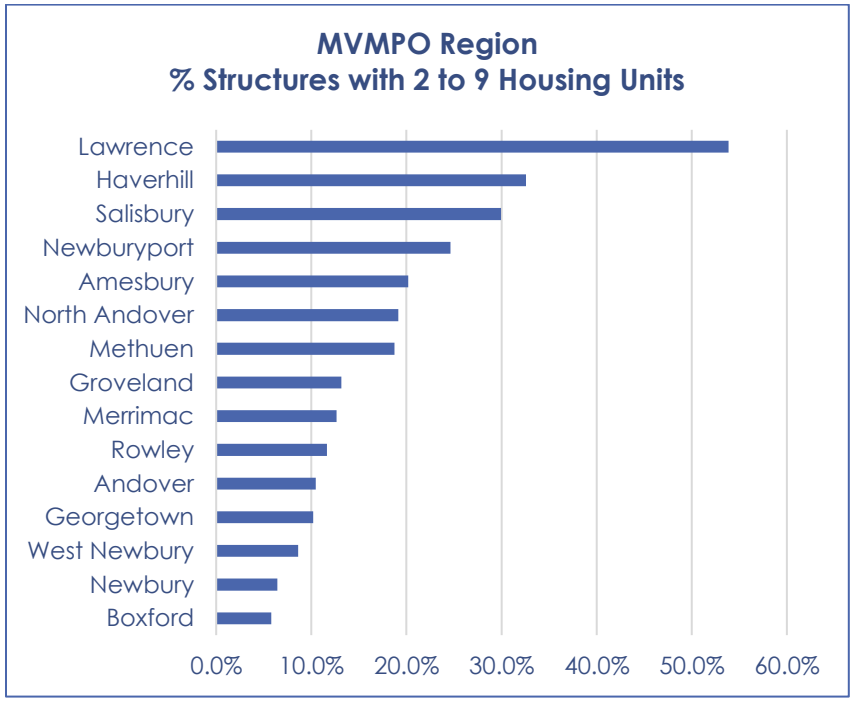
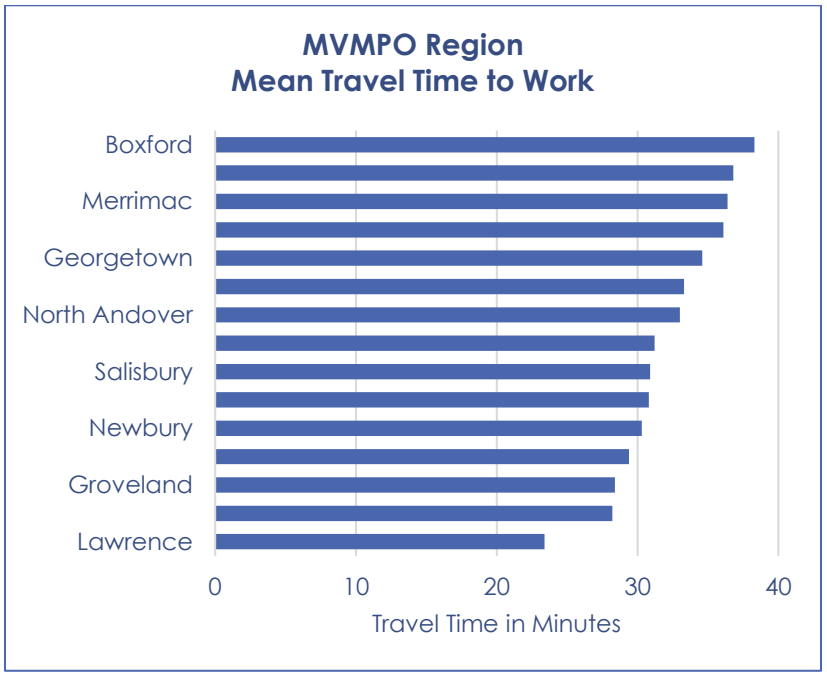


Figure 3.7 Mean Travel Time to Work (ACS 2013-2017)



Mean Travel Time to Work

This figure has been increasing over time in the MVMPO Region to just under 30 minutes as measured in the 2013-2017 ACS. This increase can be attributed to many factors including increasing congestion on the roadways in eastern Massachusetts and the relocation of many workers seeking to obtain more affordable housing.

As should be expected, the lowest travel times to work were found in those communities that had the highest percentages of residents working in the region. Lawrence (23.2%), Haverhill (29.4%) and Groveland (28.4%) all have Mean Travel Times of less than 30 minutes and had more than half of their residents working in the MVMPO Region.

Conversely, the communities with the three lowest percentages of residents working in the region – Boxford (27.0%), Georgetown (36.5%) and Rowley (39.2%) each had Mean Travel Times that were well above the MVMPO Regional Average of 29.6 minutes.

Households with No Vehicles Available

One of the key measures used in identifying areas that are likely to generate high transit ridership is the number of households that have no vehicles available. Again, the City of Lawrence stands apart from the other communities in the region in this measure.

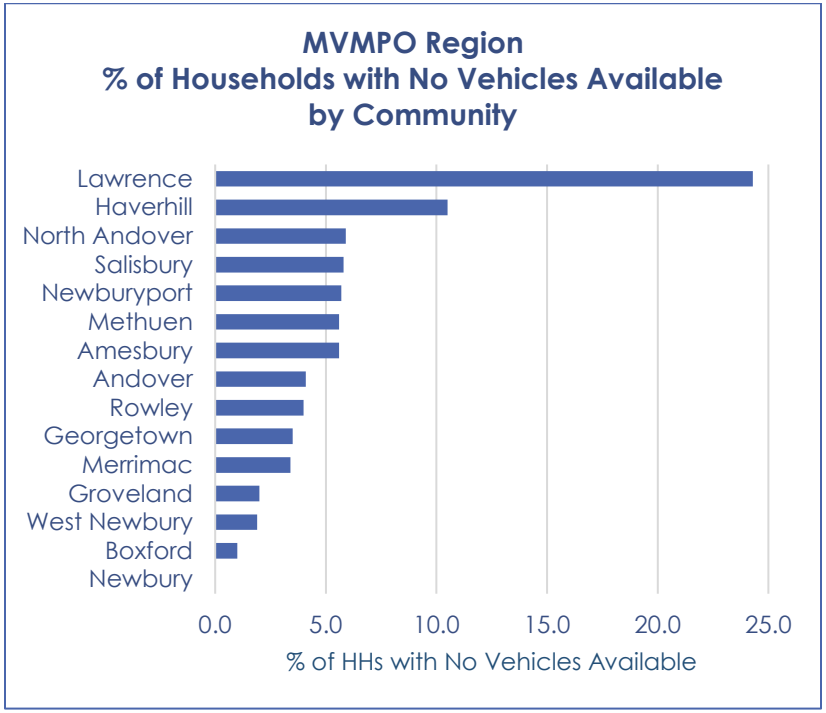
Most of the other communities in the region have approximately 6% or less of their households with no vehicle available. Notable among these is the Town of Newbury, which had no such households counted in the 2013-2017 ACS (Figure 3.8).

Percentage of MVMPO Region Residents that also Work in the Region

One of the most important generators of the demand for transportation is traveling to and from places of employment.

For many years, a solid majority of the residents of the MVMPO Region also worked in the region. Over the years, this percentage has been dropping, from 60% in 2000, to just 50.2% as measured in the 2013-2017 ACS. The

Figure 3.8 Percentage of Households with No Vehicles Available (ACS 2013-2017)

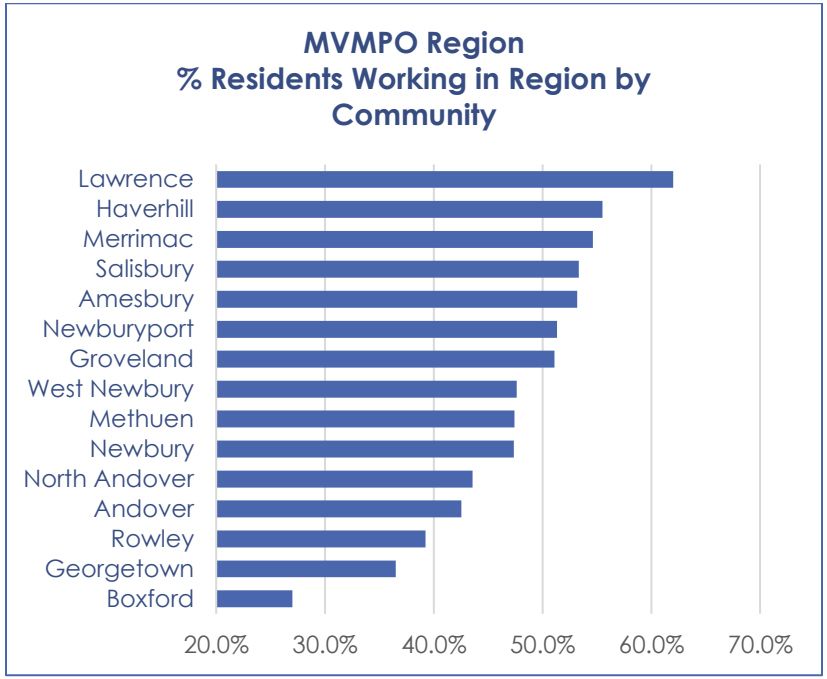


City of Lawrence has the highest percentage (62%) of its residents commuting to jobs within the region, while the Town of Boxford has the lowest at only 27%.

Employment

The number of jobs and location of employment is one of the primary factors affecting transportation demand. The table on the following page refers to the number of jobs

Figure 3.9 Percentage of Residents Working in the Region by Community (ACS 2013-2017)



located in the MVMPO region and *not* the number of MVMPO region residents that are working.

Almost two-thirds (64.7%) of all the jobs located in the region are found in the Greater Lawrence communities of Lawrence, Methuen, Andover and North Andover. The Town of Andover has the most jobs in the region (35,108), followed by the City of Lawrence, which has 29,280. Andover is the only community in the MVMPO Region where the number of jobs is almost as great as the population.

Employment Density

While the Town of Andover has more jobs than any community in the region, The City of Lawrence has a far greater employment density – 4,225 jobs/sq. mi. vs 1,138. In fact, the City of Newburyport has slightly more jobs/square mile (1,391) than does Andover.

Even with a relatively high employment density in the City of Newburyport, Greater Newburyport (i.e. Amesbury, Salisbury, Newbury and Newburyport) has an employment density, which is an important factor to consider when assessing the viability of instituting transit service(s) in an area.

Figure 3.10 Number of Jobs in Each Merrimack Valley Community (ACS 2013-2017)

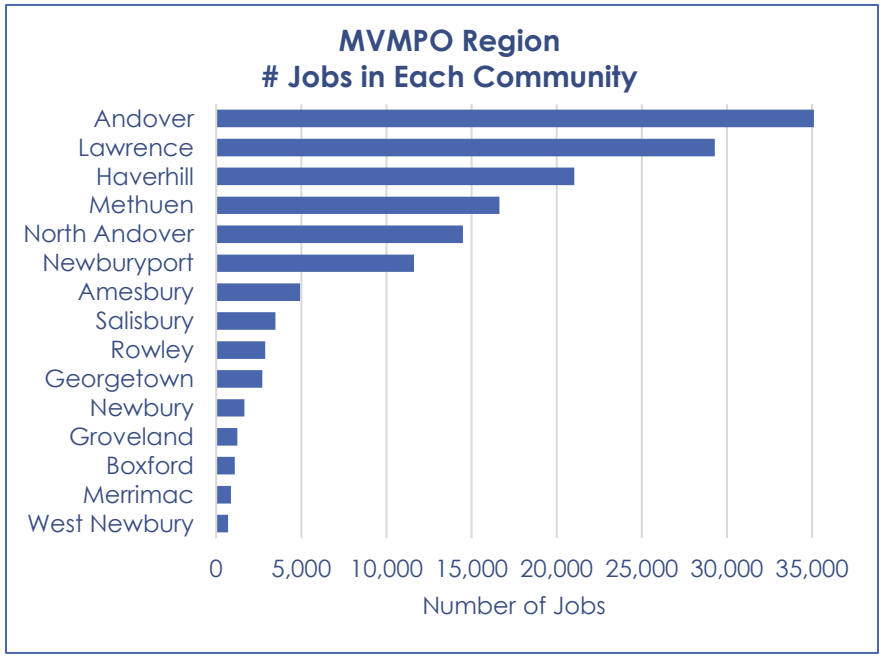
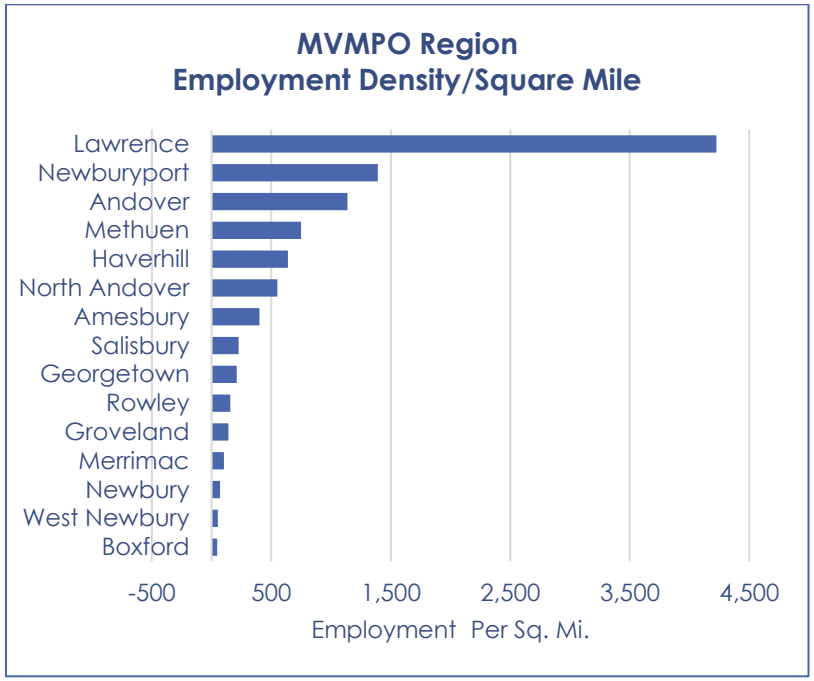


Figure 3.11 Employment Density per Square Mile (ACS 2013-2017)



Photos: Andover's River Road Industrial Park (top) has many jobs but in a less dense development unlike Lawrence's Merrimack Street industrial corridor (bottom). Andover is encouraging more mixed-use development.

Population and Employment Projections

Background

The table below examines the recent history of population and employment changes in the MVMPO region.

The region's share of Massachusetts' population has been growing at a relatively constant rate, from 4.79% in 1990 to approximately 5.15% as counted in the 2013-2017 American Community Survey.

In contrast, the region's share of Massachusetts' Total Employment has remained virtually unchanged between 2000 (4.27%) and 2017 (4.23%).

MassDOT Projections Committee

Early in 2017, MassDOT formed this committee for two essential purposes;

1) to develop and apply comprehensive methodologies for generating employment and population projections at the state, regional, community and Traffic Analysis Zone (TAZ) levels, and
2) to ensure that there was consistency in these projections at each of these levels (i.e. regional, community and TAZ) with statewide control totals.

The Committee was comprised of staff from MassDOT's Office of Transportation Planning, staff from the

Metropolitan Area Planning Council (MAPC), and demographers from the University of Massachusetts' Donahue Institute's (UMDI) Economic & Public Policy Research Group. In addition to these organizations, representatives from each of the 13 MPOs in the Commonwealth were active participants.

Table 3.2: MVMPO Regional Share of Massachusetts Population and Employment

Population	**1990 [1]**	**2000 [1]**	**2010 [1]**	**2015 [2]**
MVMPO Region	288,280	318,556	333,748	349,676
Massachusetts	6,016,425	6,349,097	6,547,629	6,789,319
MVMPO % of	**4.79%**	**5.02%**	**5.10%**	**5.15%**
[1] US Census				
[2] 2013-2017 ACS				
Employment	**1990 [3]**	**2000 [3]**	**2010 [3]**	**2017 [3]**
MVMPO Region	117,138	137,809	145,374	147,777
Massachusetts	N/A	3,227,286	3,199,467	3,493,112
MVMPO % of		**4.27%**	**4.54%**	**4.23%**
[3] Department of Employment				

Population Projections

The Projections Committee employed a methodology that considered the following analyses in developing the population projections that were to be used in each MPO's Regional Transportation Plan:

- Cohort Survival
- Births and Fertility
- Domestic and International Net Migration
- Rate of Household Formation

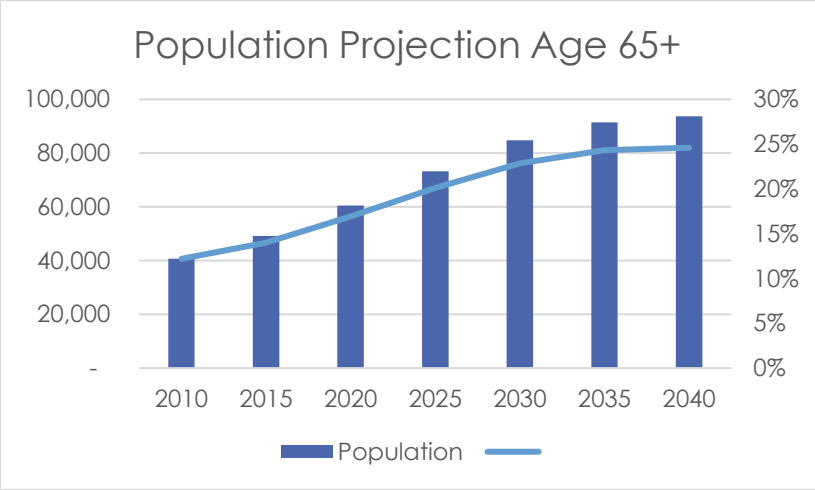
The population projections were defined to include persons in households and persons living in group quarters.

Tables 3.2 and 3.3 show the population and household projections for each MVMPO community out to the years 2020, 2030 and 2040.

The MVMPO Region's population is expected to grow by 14% between 2010 and 2040, which is slightly higher than the projected rate of increase in the total population of Massachusetts (12.7%). In addition, the population of ages 65+ is expected to significantly. Figure 3.12 shows that the proportion of seniors to the whole population is due to increase from 10% to 25% of the population.

The City of Methuen is projected to be the fastest growing community (27%) in the MVMPO region between 2010 and 2040 and the neighboring City of Lawrence is expected to grow by 16%. Combined with the projected growth in the other two Greater Lawrence communities of Andover (14%) and North Andover (13%), the Greater Lawrence area is expected to grow by 17.9%. Population growth is projected to be slightly lower in the eastern and central sections of the MVMPO region than in Greater Lawrence.

Figure 3.12: Merrimack Valley Population Projections 65+ (Source: MassDOT)



Only the Town of Boxford is expected to lose population (7%) between 2010 and 2040, while the Town of Newbury is projected to basically stay at its 2010 population total. Table 3.3 shows that the rate of growth for households in the region will basically be twice as high as the rate of population growth (29.4% vs. 14.0%). This is primarily due to the assumption made by the MassDOT Projections Committee that the long-term trend of declining household sizes in the Commonwealth will continue into the future.

Interestingly, the rate of increase in the number of households is projected to be greatest in the Town of Georgetown (36.9%) and not in the City of Methuen, which has the second highest rate of increase at 35.0%. The Town of Rowley has the third highest rate at 34.2%.

Table 3.3 Merrimack Valley Population Projections (Source: MassDOT)

Community	2000	2010	2020	2030	2040	% Change 2010-2040
Amesbury	16,450	16,283	16,852	17,391	17,800	9%
Andover	31,247	33,201	35,029	36,503	37,724	14%
Boxford	7,921	7,965	7,907	7,697	7,400	-7%
Georgetown	7,377	8,183	8,848	9,178	9,442	15%
Groveland	6,038	6,459	6,731	6,786	6,781	5%
Haverhill	58,969	60,879	65,090	67,340	69,095	13%
Lawrence	72,043	76,377	83,789	86,562	88,691	16%
Merrimac	6,138	6,338	6,596	6,623	6,587	4%
Methuen	43,789	47,255	52,711	56,453	59,900	27%
Newbury	6,717	6,666	6,673	6,708	6,680	0%
Newburyport	17,189	17,416	17,993	18,407	18,673	7%
North Andover	27,202	28,352	30,048	31,159	32,045	13%
Rowley	5,500	5,856	6,241	6,463	6,638	13%
Salisbury	7,827	8,283	8,843	9,016	9,115	10%
West Newbury	4,149	4,235	4,271	4,325	4,341	3%
TOTAL	**318,556**	**333,748**	**357,622**	**370,611**	**380,912**	**14%**

Table 3.4: Merrimack Valley Household Projections (Source: MassDOT)

Community	2000	2010	2020	2030	2040	% Change 2010-2040
Amesbury	6,380	6,642	7,467	8,150	8,588	29.3%
Andover	11,305	11,851	13,404	14,593	15,192	28.2%
Boxford	2,568	2,688	2,910	3,055	3,058	13.8%
Georgetown	2,566	2,937	3,438	3,824	4,020	36.9%
Groveland	2,058	2,346	2,667	2,874	2,956	26.0%
Haverhill	22,976	24,150	27,509	29,750	31,276	29.5%
Lawrence	24,463	25,181	29,081	31,076	32,593	29.4%
Merrimac	2,233	2,417	2,726	2,885	2,965	22.7%
Methuen	16,532	17,529	20,218	22,184	23,667	35.0%
Newbury	2,514	2,594	2,864	3,138	3,290	26.8%
Newburyport	7,519	7,622	8,305	8,858	8,917	17.0%
North Andover	9,724	10,516	11,793	13,085	13,585	29.2%
Rowley	1,958	2,155	2,533	2,792	2,891	34.2%
Salisbury	3,082	3,441	3,956	4,258	4,430	28.7%
West Newbury	1,392	1,508	1,674	1,841	1,919	27.3%
TOTAL	**117,270**	**123,577**	**140,546**	**152,363**	**159,348**	**28.9%**

Employment Projections

The Projections Committee employed a five-step process in developing the statewide and regional employment projections that are used in this RTP. These steps are summarized below.

Incorporating Labor Force Estimates from MAPC

MAPC generated labor force projections by regional planning agency for historical years 2010 as well as future years 2020, 2030, and 2040 that took into account how changes in the state's population will affect labor force participation rates.

Estimating Future Unemployment Rates and Employment Base

UMDI-generated RPA-level unemployment rates using historical data from 1990 to 2017 to forecast these figures.

Projecting Net Commuters

Many residents of nearby states commute into the Commonwealth for work. UMDI pulled data from 1990 to 2017 on net commuters into Massachusetts, which showed a highly cyclical pattern in net commuting, which tends to rise and fall with economic cycles.

Developing Employment Projections by Industry

UMDI used a variety of public and private information sources to generate zip-code-level employment projections for three broad 'super-sectors' – basic, retail, and services—that were used in transportation demand modeling.

MVMPO Community – Level Adjustments

MVPC staff used its own knowledge of employment in the MVMPO region to make minor modifications to the community level employment forecasts that were developed by UMDI while maintaining the regional employment forecast totals.

Table 3.5 Merrimack Valley Employment Projections (Source: MassDOT)

Merrimack Valley Employment Projections (Source: MassDOT)

Community	2000	2010	2020	2030	2040	% Change 2010-2040
Amesbury	4,777	5,312	5,802	5,838	5,910	11.3%
Andover	34,262	26,579	33,417	33,621	34,038	28.1%
Boxford	910	1,260	1,183	1,190	1,205	-4.4%
Georgetown	2,433	2,658	2,656	2,672	2,705	1.8%
Groveland	1,098	913	1,094	1,101	1,115	22.1%
Haverhill	19,163	21,647	23,645	23,790	24,084	11.3%
Lawrence	23,631	26,296	28,724	28,899	29,257	11.3%
Merrimac	957	877	958	964	976	11.3%
Methuen	14,172	18,296	18,605	18,719	18,951	3.6%
Newbury	1,142	1,735	1,640	1,650	1,670	-3.7%
Newburyport	10,155	12,296	12,480	12,556	12,712	3.4%
North Andover	19,274	20,568	21,683	21,815	22,085	7.4%
Rowley	2,399	2,556	2,618	2,634	2,666	4.3%
Salisbury	2,774	3,498	3,406	3,427	3,470	-0.8%
West Newbury	705	883	882	887	898	1.7%
TOTAL	**137,852**	**145,374**	**158,793**	**159,762**	**161,742**	**11.3%**

Forecasting Travel Demand

Statewide Travel Demand Model

The MVMPO relied on MassDOT's Statewide Travel Demand Model to generate forecasts of traffic volumes on the region's federal-aid roadways out to the year 2040. This model uses data on the number of households, auto availability, household income, number of jobs, type of employment and other factors to estimate the demand for transportation on the defined transportation network, which includes all federal-aid roadways in the Merrimack Valley region.

The Statewide Travel Demand Model includes 182 TAZs for the Merrimack Valley region. More densely developed communities have a relatively greater number of TAZs than more rural communities. For example, the City of Lawrence, with a land area of 6.9 square miles and a population of almost 80,000 persons has 30 TAZs while the Town of Newbury, with an area of 23.35 square miles and a population of 6,963 contains only five TAZs.

Allocating Growth to TAZs

Working through MAPC, each MPO region provided data on proposed, planned, reviewed and approved residential developments that was used to help identify areas of population and employment growth over the next 20 years.

This information, coupled with land use data and staff's knowledge of the region, was then used to allocate projected population and employment growth to the TAZs in the region.

High Growth Transportation Corridors

To identify the high growth travel corridors in the region, staff identified those TAZs in the region that are expected to meet the following two criteria.

Table 3.6 High Growth Travel Corridors in the MVMPO Region 2010 -2040

Amesbury
• South Hampton Rd. from Market St. to NH State Line • Market St. from Amesbury Sq. to NH State Line • Congress St. from Elm St. to Salisbury Line
Andover
• Dascomb Rd. from Lovejoy Rd. to Tewksbury Line • Clark Rd. from Dascomb Rd to River St. • River St. from Clark St. to Wilmington Line • Elm St. from Route 114 to Main St.
Haverhill
• Rt. 125 Connector from I-495 to Rt. 125 • Salem St. from Rt. 125 to Groveland Line • Lake St. from W. Lowell St. to Broadway • East Broadway from Groveland St. to East Main St. • Kenoza Ave. from Lawrence St. to Merrimac Line • Amesbury Line Rd. from Rt. 110 to East Main St. • North Broadway from Rt. 97 to NH Line • Broadway from I-495 to NH Line
Lawrence
• Rt. 114 from Andover St. to North Andover Line • Beacon St. from Andover St. to Andover Line • Mt. Vernon St. from Beacon St. to Chandler Rd. • Haverhill St. from May St. to Elm St. • Merrimack St. from Marston St. to Methuen Line
Methuen
• Howe St. from Rt. 213 to Haverhill Line • N. Lowell St. from I-93 to Dracut Line • Lowell St. from I-93 to Dracut Line • Pelham St. from I-93 to NH Line. • Hampstead Rd. from Howe St. to NH Line • Hampshire Rd. from Rt. 28 to Pelham St.

The number of households is projected to grow by 50% or more between 2010 and 2040, and

- The population of the zone is expected to grow by 30% or more over the same period.

Twenty-eight TAZs in the Statewide Travel Demand Model located in eight MVMPO communities met this definition. These communities and the roadways anticipated to see the greatest increase in traffic volumes are shown in Table 3.6

Page Left Blank

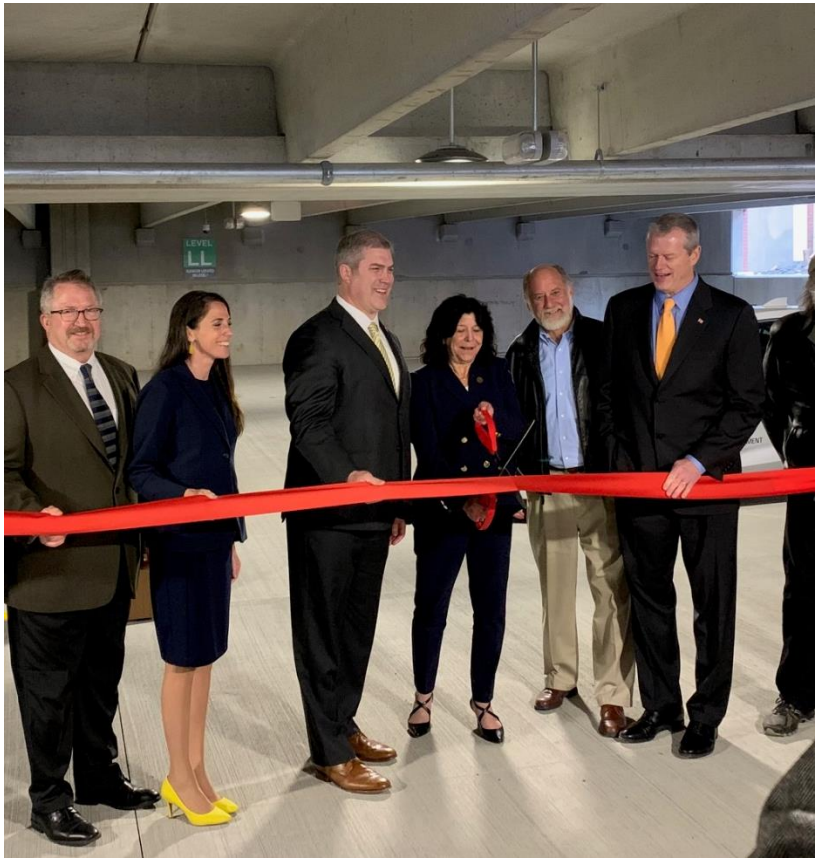


Photo: Ribbon cutting for the Newburyport Intermodal Parking Garage

Chapter 4

The Planning Process and Public Participation

MPOs were created in 1922 as part of the Federal-aid Highway Act to ensure that decisions about transportation fund were made based on the '3C' process – continuing, cooperative and comprehensive.

The RTP requires a planning process that is data-driven and inclusive. Transportation needs must be identified, with solutions identified and projects chosen to address the transportation need. The FAST Act of 2015 required that 10 planning factors must be considered in the conduct of the 3C Transportation Planning Process. Table 3.1 lists the 10 planning factors and the correlating RTP goals that address them. Public input is needed throughout the planning process from a variety of sources. The planning process includes:

1. Review Goals and Objectives

MVMPO staff sought the input of community leaders (mayors and town managers), municipal staff (DPW directors and planners), members of the Equity Working Group and environmental leaders. Suggested changes

Table 4.5 Planning Factors

Planning Factor	RTP Goal
(1) Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency.	Promote Economic Vitality Transportation Equity
(2) Increase the safety of the transportation system for motorized and nonmotorized users.	Increase Safety for All Modes Promote Environmental Sustainability
(3) Increase the security of the transportation system for motorized and nonmotorized users	Promote Environmental Sustainability Promote Economic Vitality Transportation Equity
(4) Increase the accessibility and mobility options available to people and for freight	Create Multi-Modal System to Support Mode Choice Promote Economic Vitality
(5) Protect and enhance the environment, promote energy conservation, and improve quality of life	State of Good Repair Transportation Equity Promote Environmental Sustainability
(6) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight	Create Multi-Modal System to Support Mode Choice Promote Economic Vitality
(7) Promote efficient system management and operation	State of Good Repair Promote Economic Vitality
(8) Emphasize the preservation of the existing transportation system	State of Good Repair Environmental Sustainability
(9) Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation	State of Good Repair Environmental Sustainability
(10) Travel and Tourism	Create Multi-Modal System to Support Mode Choice Promote Economic Vitality

Photo: Town official, MassDOT official and resident discussing the design of the Groveland Community Trail

in strategies and performance measures were evaluated and included into the revised goals and objectives.

2. Data Gathering and Assessment

For the development of the RTP, the MVMPO draws from a variety of sources including plans, available and gathered data and public input. Data, transportation gaps and needs were all incorporated into the goals, objectives and the performance measures throughout the document. Information sources include:

- Comprehensive Economic Development Strategy
- Regional Housing Plan
- Active Transportation Plan
- Congestion Management Process
- MVRTA's Transit Asset Management Plan
- MPO's transportation studies and Road Safety Audits
- Merrimack Valley Priority Growth Strategy
- Data gathering efforts, such as pavement and sidewalk conditions, park and ride lot utilization and traffic counts.
- MassDOT data, such as Crash Cluster locations and socioeconomic projections

3. Model

Modeling is used to both measure existing travel demand and forecast future travel. Input data such as socioeconomic data and transportation projects are included to analyze the impact those projects will have on transportation demand, congestion, air pollution, etc. The MVMPO relies upon the participation in the Statewide Travel Demand Model to perform these functions. MPO staff assigned population and employment data to Traffic Analysis Zones out to 2040 as part of this process.

4. Public Participation

Public input is sought throughout the planning process. The MVMPO's Public Participation Plan outlines the requirements for public input into the federal transportation funding process.

Public Participation Plan

This 2020 RTP was developed in accordance with the Public Participation Process established for the MVMPO. The MVMPO's Public Participation Plan as amended through March 2017, reflects the consultation requirements identified in the FAST Act of 2015 and prior federal transportation authorizations, and the existing transportation planning regulations developed by the U.S. Department of Transportation for the development of RTPs and TIPs. This document identifies a number of stakeholders to be consulted in developing these documents. All MVMPO stakeholders were given notice that the process of developing the 2020 RTP was beginning. Stakeholders were also notified of the availability of the draft document for public review and comment.

Public Participation Plan Stakeholder List

Listed below are categories of interested individuals, organizations and other stakeholders (Interested Parties) identified by the MVMPO for inclusion in the PPP.

The MVMPO continues to add individuals, organizations or other stakeholders to this list and their addition is not considered an act requiring the formal amendment of the PPP. Similarly, any of the individuals or organizations identified below may request to be removed from the mailing list and such action does not necessitate a formal PPP amendment.

Individuals, including:

- Interested individuals, business persons
- Merrimack Valley Transportation Committee (MVTC)
- Libraries
- City/Town Clerks
- MVMPO Region Congressional Delegation
- MVMPO Region/State Legislative Delegation

Affected public agencies, including:

- Select Boards / City Councils
- Chief Elected and Appointed Officials
- City and Town Engineers
- Federal Emergency Management Agency
- Federal Highway Administration
- Federal Transit Administration
- Greater Derry-Salem Cooperative Alliance for Regional Transportation
- Cooperative Alliance for Regional Transportation
- Local Departments of Public Works
- Local Police Departments
- Local Traffic and Safety Committees
- Massachusetts Department of Environmental Protection
- MBTA Commuter Rail Officials
- Massachusetts Executive Office of Housing and Economic Development
- Massachusetts Executive Office of Public Safety and Security
- MassDOT
- Merrimack Valley Regional Transit Authority
- Metropolitan Area Planning Council
- Nashua Regional Planning Commission
- Northern Middlesex Council of Governments
- Rockingham Planning Commission
- U.S. Environmental Protection Agency

Representatives of public transportation employees, including:

- Truck Driver's Union Local #170
- Freight shippers, including:
- P.J. Murphy Transportation
- JB Hunt
- Estes Express

Photo: Public Participation in the development of the Whittier Bridge led to the creation of the Garrison Trail.

- Shaheen Brothers
- ABF Freight
- PanAm Railways
- Bonney's Express

Providers of freight transportation services, including:

- United Parcel Service
- Federal Express

Private for-profit and non-profit providers of transportation in the region, including:

- Assist Incorporated
- C&J Transportation
- Cape Ann Transit Authority (CATA)
- Central Wheelchair and Van Transportation
- EMT Corporation
- Local Taxi Companies
- Northern Essex Elder Transportation (NEET)
- The Coach Company
- TransCare
- Other Transportation Providers Identified in the RTP

Representatives of users of public transportation, including:

- American Training, Inc.
- Cambridge College
- Community Action Incorporated (CAI)
- Emmaus, Inc.
- Elder Services of the Merrimack Valley
- Local Senior Centers/Councils on Aging

- Northeast Independent Living Program
- Merrimack College
- Merrimack Valley Hospice
- MassHire Merrimack Valley Workforce Investment Board
- Northern Essex Community College
- Office of Employment Services

Representatives of bicyclist and pedestrian advocacy organizations, including:

- Andover Trails Committee
- Bay Circuit Alliance
- Coastal Trails Coalition
- Essex National Heritage Commission
- Essex County Trail Association
- Groveland Open Space and Recreation Committee
- MassBike
- Merrimack Valley Off-Road Trails Committee

Representatives for the community of individuals with disabilities, including:

- Executive Office of Health and Human Services
- Northeast Independent Living Program
- Massachusetts Department of Mental Health
- Massachusetts Commission for the Blind
- Area Nursing Homes
- United Cerebral Palsy
- CLASS Inc.
- Fidelity House
- Massachusetts Association of Retarded Persons (ARC)

Organizations and facilities that serve low-income and minority households who traditionally have been underserved by existing transportation systems and may face challenges accessing employment and other services, including:

- MVRTA Transit Centers in Amesbury, Haverhill and Lawrence (post notices)
- Social Security Offices
- Employment Offices (post notices)
- Ethnic, Civic/Social, Faith-Based and Veterans Organizations
- Merrimack Valley Goodwill
- Area Hospitals
- Salvation Army
- Groundwork Lawrence
- Lawrence Community Works
- United Way of the Merrimack Valley
- Methuen Arlington Neighborhood, Inc.
- YMCA/YWCA

Agencies and officials responsible for other planning activities within the MPA that are affected by transportation, including:

a. State and local planned growth:

- Area Planning Boards
- MassDevelopment
- Merrimack Valley Transportation Management Association
- The Junction Transportation Management Organization

b. Economic development:

- Chambers of Commerce
- U.S. Economic Development Administration
- Local Community Development Directors

c. Environmental agencies and federal lands:

- Andover Village Improvement Society (AVIS)
- Essex County Greenbelt Association
- Local Conservation Commissions
- MassRiverways
- Merrimack River Watershed Council
- National Park Service
- Powwow River Watershed Association
- Parker River Clean Water Association
- Shawsheen River Watershed Association
- Trustees of Reservations
- U.S. Environmental Protection Agency (EPA)
- U.S. Fish and Wildlife Service

d. Airport operations:

- Lawrence Airport Commission

e. Other Interested Parties

- Conservation Law Foundation

The notices were sent directly to 870 addressees representing these groups, 600 via e-mail and 270 via traditional mail.

In addition to these direct mailings, and in accordance with this process, public notice of the Draft 2020 RTP was published in the Lawrence Eagle Tribune, Newburyport Daily News, Haverhill Gazette (Published Weekly) and Rumbo News informing the public of its right to comment on the document which would be available at the MVPC office, the MVPC website and local libraries from July 2, 2019 through July 22, 2019. It said that comments would be received through July 22, 2019 and that two separate public hearings on the document would take place on July 17, 2019 at 1:00 PM and at 6:00 PM at the MVPC office at 160 Main Street in Haverhill, MA. The MVMPO will summarize comments that are received during the 21-day review and comment period and will include this summary in the Final 2020 RTP.

Public input in developing the RTP was sought at the following meetings in 2019:

- MVMPO meetings: January 23, 2019, February 27, 2019, March 27, 2019, April 24, 2019, May 22, 2019 and June 26, 2019
- MVRTA Advisory Board meetings held at the MVRTA office: September 27, 2018, November 1, 2018, February 7, 2019, March 7, 2019, May 2, 2019 and June 6, 2019
- Merrimack Valley Planning Commission (MVPC) meetings: February 21, 2019, March 21, 2019, April 18, 2019, May 16, 2019 and June 20, 2019
- Environmental Resiliency/ Sustainability Meeting on March 12, 2019

- DPW Directors/Stormwater Collaborative Meeting on April 3, 2019 and June 5, 2019
- Planning Directors meetings: June 4, 2019 and February 26, 2019

The above meetings were held at the MVPC Office unless otherwise stated.

Beyond the requirements, public input is a necessary part of identifying transportation gaps and needs as well as ideas and solutions.

5. Project Evaluation and Selection

Project priorities are developed over time as a result of studies, such as road safety audits, community economic development needs, state of good repair and enhanced mobility needs. Projects are evaluated using criteria developed in cooperation with MassDOT. Communities were presented with the universe of projects and are asked to review and edit the projects and prioritize them.

6. Budgeting and Equity

Because the RTP must be fiscally constrained, it is not possible to program every project. The project evaluation and selection process are important to inform which projects will be prioritized. Staff must balance the needs for state of good repair with expansion projects, new transportation infrastructure, etc. During the process of selecting and budgeting, the MVMPO staff also applied equity analyses to ensure that (1) there is geographic equity and (2) that protected groups (minority and low income) do not bear excessive burdens nor are their needs ignored.

7. Air Quality and Green House Gas (GHG) Analyses

Armed with fiscally constrained project lists, the state runs air quality and GHG analyses to demonstrate that the RTPs and TIPs support the attainment of federal air quality conformity standards and meet state mandated GHG reduction targets.

Public Outreach Methods

The goal of the public participation process is to involve and inform the public in the transportation planning process. Public input is essential to the identification of gaps in the transportation network, transportation needs and the development and selection of projects. The MVMPO sought public input at different levels.

Public Gatherings. The MVMPO staff sought to engage members of the public at two events – the Lawrence Ciclovía and the Mt. Washington Alliance Health Fair. Both events were in Title VI/EJ communities and sought to reach people who do not normally participate in the transportation planning process. Interactive posters were used to help encourage discussions and ideas. Members of the public were asked about transportation needs, priorities and the ideal transportation network. Feedback revolved around increased transit access, bicycle and pedestrian transportation and job access.

Targeted Audiences. One strategy for encouraging public participation is going to other organizations' meetings. MVMPO staff attended a variety of meeting, such as the Methuen Arlington Neighborhood, Inc. Board Meeting and the Newburyport Livable Streets meeting. Information was presented and members of the public were able to provide their input into the types of projects they would like to see funded through the RTP process.

In addition, the MVMPO also scheduled specific outreach meetings with Asian-speaking elders and veterans to ensure that the needs of those groups were included in the planning process. Interpreters were present to ensure that their voices were heard.

MVMPO Member Community Leaders. Throughout the development of the RTP, MVMPO staff regularly met and corresponded with community leaders (mayors and town managers), municipal staff (public works, planners, public safety), MVPC Commission members and the MVRTA Advisory Board members. Information was presented at regular monthly meetings and individual meetings were held to dig deeper into community needs and project priorities.

Public Meetings and Hearings. The MVMPO scheduled a public meeting in the Town of Salisbury to discuss the results of the data analysis and project selection process. Members of the public discussed the need for road repairs, sidewalks, increased transit and marketing of transit. An additional public meeting is scheduled during the public review period in Lawrence with Spanish interpretation. Two public hearings will be held during the public review and comment period in Haverhill.

Summary of Public Input

Throughout the development of the RTP, MVMPO staff have gathered comments from members of the public. Those comments have been compiled and sorted by RTP topic.

Goals and Objectives

- The Environment Working group provided specific suggested changes to the goals and objectives around stormwater, such as removing the discharge detection program. They suggested adding a strategy for upgrading stormwater treatment as roads are repaired and repaved. Those changes are reflected in the current strategies.

Demographics

- Salisbury's population is likely to be greater than 10,000 by 2040. The projection being used is too low.

State of Good Repair

- Jackson Street from Essex Street going North in Lawrence is in terrible condition and should be repaired.
- Streets in South Lawrence are in tough shape because of the utility work from the gas explosions.

- North End Boulevard (Rt 1A) in Salisbury is in poor condition and needs to be reconstructed. Need better sidewalks and crossings.
- Fix sidewalks and potholes (Haverhill).
- The Route 28 bridge near the Music Hall in Methuen is in disrepair. Children fish off the bridge and the concrete is disintegrating.
- Need functioning stop lights and pedestrian lights in the city, such as at Salem and Osgood Streets in Lawrence.

Congestion

- Route 114 near the North Andover Mall needs to be expanded and there is congestion near the Stop & Shop.
- Union Street in Lawrence is very congested.

Safety

- Route 28 approaching I-495 in Andover is confusing. MVPC staff followed up and MassDOT was implementing changes at this intersection that would correct this.
- Need public information campaign to address pedestrian use of streetlights.
- Intersection at Water/Canal/Broadway needs to be improved for pedestrians and a transit stop is needed.

Environment

- There was considerable discussion about roads that flood, such as Route 114 in North Andover, Plum Island Boulevard in Newbury/Newburyport and Route 1A/Glen Street in Rowley by the Mill River. Newman Road, Newbury is often under water.
- Include green infrastructure and Low Impact Development (LID) as strategies.
- Regarding adaptive planning for climate change, roadway design in areas that have been impacted needs to be improved. Roads get washed out and rebuilt, but not necessarily in a resilient nor environmentally friendly way.
- What is MassDOT's policy on curbs and their impacts on stormwater runoff? Country drainage is preferred with swales for stormwater, but curbs are put in for sidewalks for safety. MassDOT mentioned that Salisbury requested not to have curbs installed near the Beach to prevent blocking the movement of sand.
- There is continued interest to support wildlife crossings.

Mobility

- It is tough to ride bikes along Marston Street in Lawrence near the car dealerships and to get to cross the Duck Bridge to South Lawrence.

- A sidewalk is needed near the top of Oak Street near McDonald's (Pleasant Valley St.) in Methuen.
- Veterans living in Bedford/Acton need transportation to get to the Veterans Court located in Lawrence on Thursdays. There is not coordination with the veteran's health van that provides transportation from the Merrimack Valley to the Bedford Veterans health facility.
- Need better East-West bicycle connections from the North Shore to the Merrimack Valley.
- More walking paths are needed in the Mt. Washington neighborhood and on Broadway (Haverhill).
- Sidewalks are often not cleared of snow (Haverhill).
- Support/advance Complete Street Program.
- Expand, connect and market local and regional multi-use trail networks.
- Develop bike share programs/services in the region.
- Work with Merrimack Valley communities to ensure electric vehicle readiness.
- More bike lanes are needed.
- Better wheelchair access on sidewalks.
- Revise flow of roads in Lawrence to include bicycles.

Transit

- Would like to have a North-South Lawrence circulator bus to connect both sides of the city.
- Would like a bus from Lawrence to Logan Airport. Is there long-term parking at the McGovern for those going to Logan Airport?
- Need a bus shelter on Mt. Vernon Street near the 4-way stop at Beacon Street.
- Veterans noted that there is no discount for veterans on the bus.
- Better bus frequency and additional routes are needed in Salisbury.
- Commuter rail is too expensive. It is hard to for elderly to use. It is also very confusing how you pay.
- Need bus stops for local bus service.
- More frequent service and later bus service.
- Expand rail service on the Haverhill Line.
- Implement bus on shoulder on I-93.
- Consider implementing Bus on Shoulder on I-495.
- More transit is needed for medical appointments.

Economic Vitality

- Increase collaboration with employers in the region to better understand their transportation needs.
- Increase/promote low-cost transportation for all ages.

Amending the Regional Transportation Plan

While the RTP is updated every four years, the MVMPO region's transportation network is always changing. Projects can get added to or deleted from the document, project scopes and estimated costs can change, or new air quality conformity determinations made. The MVMPO 2020 RTP must be able to reflect these changes in order to continue in its role of demonstrating that the document is fiscally constrained, meets current air quality conformity rules, and accurately lists the important transportation projects expected to be completed.

The MVMPO will amend the 2020 RTP under the following circumstances:

- the addition or deletion of a regionally significant project with an estimated cost of $20 million or more;
- a major change in project cost (more than 10%) or project/project phase initiation dates (change of more than five years);
- a major change in project design concept or design scope (e.g., changing project termini or number of through lanes);
- a new conformity determination for the nonattainment /maintenance area.

An amendment to the MVMPO 2020 RTP for the above reasons will be made in accordance to the public review and comment procedures as described in the MVMPO's PPP.

Chapter 5

Fiscal Constraint

A critical element of the Regional Transportation Plan is that is must be financially constrained. This means that the total costs of projects and services contained in it may not exceed the amount of funding that can reasonably be expected to be available to the MPO for the time period being considered for this RTP (FFYs 2020-2040). This requirement ensures that the projects identified in the document reflect the region's transportation priorities and needs and that it not be a "wish list" that provides little or no direction or guidance in improving the transportation network.

Funding Available: Highway

To ensure that the financial assumptions on funding availability made by the individual MPOs are consistent and fiscally constrained, MassDOT has prepared estimates of the amount of highway funding that are expected to be available in Massachusetts for the period from FFY 2020 to FFY 2040. These estimates include funds from state and federal funding sources. Using these estimated statewide funding amounts, MassDOT then derived estimates of the amount of state and federal funding that each MPO can expect to receive during this same period. These estimates are presented in Table 5.1.

Over $1 billion in funds are expected to be available to the MVMPO region between from FFYs 2020 through 2040. All spending under the ***Bridges, Non-Interstate DOT Pavement, Interstate Pavement and Non-Federal Aid Bridge*** categories will be carried out by MassDOT. These include spending for projects to resurface/improve the interstate roadways in the region and those other roadways in the region that the Department has maintenance responsibilities for. MassDOT's Bridge Department will oversee the bridge repair and maintenance work in the MVMPO region.

Remaining Statewide Funding

While the vast majority of funding under this category will be devoted to resurfacing, maintenance and other activities that will be conducted by MassDOT, there specific projects in the region that are being in the financially constrained section of the RTP undertaken.

Under the region's FFYs 2020-2024 TIP, these funds are being programmed for the construction of two sections of the Border to Boston Rail Trail and for the construction of the Manchester and Lawrence Branch Multi-Use Trail in the City of Lawrence. Also included in the TIP is the resurfacing of Route 1 in Newbury, Newburyport and Salisbury.

Table 5.1: Roadway, Trail and Bridge Funding Available to Merrimack Valley MVMPO Region 2020-2040

Year/ Time Band	Remaining Statewide Funding[1]	Bridges[2]	Non-Interstate DOT Pavement[3]	Interstate Pavement[4]	NFA Bridge Preservation[1]	Chapter 90[5]	Target Funding Available for MVMPO[1]	Total
2020	$8,150,075	$7,152,354	$2,443,249	$5,932,599	$4,429,600	$3,070,966	$10,564,815	$41,743,659
2021	$10,645,061	$6,504,804	$2,025,344	$3,905,736	$4,429,600	$3,070,966	$10,778,652	$41,360,163
2022	$10,567,276	$7,152,354	$1,916,948	$3,616,087	$4,429,600	$3,070,966	$10,998,132	$41,751,364
2023	$10,260,974	$7,507,070	$2,114,502	$3,900,481	$4,429,600	$3,070,966	$11,238,340	$42,521,933
2024	$10,095,225	$7,325,376	$2,328,966	$5,129,579	$4,429,600	$3,070,966	$11,385,638	$43,765,350
2020-2024	***$49,718,611***	***$35,641,959***	***$10,829,009***	***$22,484,482***	***$22,148,000***	***$15,354,831***	***$54,965,577***	**$211,142,469**
2025	$10,256,474	$7,442,382	$2,366,166	$5,211,512	$4,527,051	$3,134,842	$11,567,498	$44,505,926
2026	$10,419,042	$7,560,347	$2,403,671	$5,294,116	$4,527,051	$3,200,047	$11,750,847	$45,155,121
2027	$11,023,535	$7,998,983	$2,543,127	$5,601,271	$4,527,051	$3,266,608	$12,432,608	$47,393,184
2028	$11,278,632	$8,184,089	$2,601,978	$5,730,890	$4,527,051	$3,334,554	$12,720,312	$48,377,505
2029	$12,898,597	$9,359,580	$2,975,703	$6,554,026	$4,527,051	$3,403,912	$14,547,348	$54,266,218
2025-2029	***$55,876,280***	***$40,545,382***	***$12,890,645***	***$28,391,815***	***$22,635,255***	***$16,339,963***	***$63,018,613***	**$239,697,953**
2030	*$13,165,041*	$9,552,920	*$3,037,172*	*$6,689,411*	*$4,626,646*	$3,474,714	*$14,847,851*	$55,393,754
2031	$13,437,347	$9,750,513	$3,099,993	$6,827,775	$4,626,646	$3,546,988	$15,154,964	$56,444,225
2032	$13,715,644	$9,952,452	$3,164,196	$6,969,183	$4,626,646	$3,620,765	$15,468,833	$57,517,719
2033	$14,000,063	$10,158,835	$3,229,811	$7,113,702	$4,626,646	$3,696,077	$15,789,608	$58,614,742
2034	$14,290,739	$10,369,758	$3,296,870	$7,261,400	$4,626,646	$3,772,955	$16,117,440	$59,735,808
2030-2034	***$68,608,834***	***$49,784,477***	***$15,828,042***	***$34,861,471***	***$23,133,230***	***$18,111,499***	***$77,378,696***	**$287,706,249**
2035	*$14,587,811*	$10,585,321	*$3,365,404*	*$7,412,348*	*$4,728,433*	$3,851,433	*$16,452,484*	$60,983,234
2036	$14,891,418	$10,805,627	$3,435,446	$7,566,617	$4,728,433	$3,931,543	$16,794,900	$62,153,983
2037	$15,201,704	$11,030,779	$3,507,029	$7,724,279	$4,728,433	$4,013,319	$17,144,848	$63,350,391
2038	$15,518,816	$11,260,885	$3,580,187	$7,885,410	$4,728,433	$4,096,796	$17,502,495	$64,573,021
2039	$15,842,906	$11,496,053	$3,654,954	$8,050,086	$4,728,433	$4,182,009	$17,868,011	$65,822,452
2035-2039	***$76,042,655***	***$55,178,664***	***$17,543,020***	***$38,638,740***	***$23,642,165***	***$20,075,099***	***$85,762,738***	**$316,883,081**
2040	***$16,174,125***	**$11,736,394**	***$3,731,367***	***$8,218,385***	***$4,832,458***	***$4,268,995***	***$18,241,567***	**$67,203,291**
Total	**$266,420,505**	**$192,886,876**	**$60,822,083**	**$132,594,893**	**$96,391,108**	**$74,150,387**	**$299,367,191**	**$1,122,633,043**

Total - All Categories	**$1,122,633,043**
Total - Discretionary Categories	**$426,105,048**

[1] Based on MARPA Formula (4.4296% of State Total)
[2] Based on MPO's Share of Bridges in the State (3.6176%)
[3] Based on MPO's Share of NHS Road Miles in the State (2.8516%)
[4] Based on MPO's Share of Interstate Road Miles in the State (14.2058%)
[5] 33% of Region's Anticipated Chapter 90 Funding

Beyond these TIP projects, the RTP also includes funding to complete the Border to Boston Trail through projects in Boxford and Newbury. Also included are two intersection improvement projects on Route 1 in Rowley. A total of $52,587,470 of Remaining Statewide Funding has been included in the fiscally-constrained Roadway and Trail section of this document.

Chapter 90

Chapter 90 funds are typically provided to communities by the Commonwealth through the recurring vehicle of the Transportation Bond Bill. They are intended to be used for the maintenance, repair, improvement and construction of town and county ways and bridges. These funds are used by communities to maintain their local roadways as well as the Federal Aid roadways that they have maintenance responsibility for. It is anticipated that MassDOT will continue to fund the Chapter 90 program over the course of his RTP.

Target Funding Available for the MVMPO

This is the category from which the MVMPO traditionally identifies and programs Target Projects in its TIP. The $299,367,191 that is expected to be available from this source is the largest amount identified for the region.

Target Funding Available to the MVMPO is expected to increase by 2.08% annually throughout the RTP period. The total amount of federal funding assumed to be available to the MVMPO to program for roadway and trail projects for the period FFY 2020-2040 is $351954,661.

Maintaining Current Road Pavement Conditions

Through the Merrimack Valley Pavement Management Program, MVPC staff determined it that approximately $176 million in resurfacing/ reconstruction spending will be needed to maintain the current condition of the region's locally-maintained Federal-Aid roadways over the course of the RTP. This amount of funding has been factored into this fiscal constraint analysis.

Programmed Projects: Highway

Project Selection

MVPC staff reached out to DPW directors, planners, elected officials and others to identify their transportation project priorities and to eliminate projects that were no longer considered priorities.

In evaluating projects for inclusion in the RTP, staff considered the following factors, which are discussed below.

FFYs 2020-2024 TIP: All MPO Target and selected Statewide projects shown in the FFYs 2020-2024 Time band of the 2020 RTP also appear in the MVMPO's FFYs 2020-2024 TIP.

Proposed RTP Goals: Each of the projects considered in the RTP were evaluated in terms of whether they met the six RTP Goals (see Chapter 12 - Summary).

Project TEC Score: Many of the projects that are included in the Universe of Projects that were considered in developing the 2020 RTP have been assigned a score

based using the MVMPO's Transportation Evaluation Criteria. These scores were a major factor in the project selections and scheduling process.

Community Transportation Priorities: The MVMPO reached out to each community in the region to generate updated lists of their own 'Universe of Projects' and, within that list, identify their higher priority projects.

Project Status: Many of the proposed projects in the Universe of Projects List have already begun to be developed. Projects that were further along in this process and which received higher TEC Scores and met more of the RTP Goals were given higher priorities for inclusion in the RTP.

Regional Equity: An important goal in developing t

Funding Availability: Finally, the amount of funding that was expected to be available to the region in each fiscal year within each of the five-year time bands was an important factor in adjusting the scheduling of priority projects.

Active Transportation Plan

Staff also considered projects that would complete the region's Active Transportation Network. Projects to complete sections of the Border to Boston Rail Trail are shown in the RTP as is the project to build the M&L Branch Multi-Use Trail in Lawrence.

Project Cost Estimates

MVMPO staff relied on four resources in estimating the cost of projects being considered for the RTP. These are:

- Construction cost data from current and recent roadway reconstruction projects, multi-use trail construction projects, and roadway resurfacing projects;
- MassDOT's guidance for estimating the cost of repairing/replacing bridges and making intersection improvements;
- Cost estimates contained in MassDOT's Project Info database, which were adjusted as needed;
- Preliminary Design Construction Cost Estimates developed by communities as part of the Project Development process

All project cost estimates developed using the methods noted above were converted to FFY 2020 and then inflated at a 4% annual rate to their estimated year of implementation.

Table 5.2 summarizes those roadway and trail projects chosen by the MVMPO to be included in the FFY 2020 RTP.

Table 5.2 MVMPO 2020 Regional Transportation Plan Fiscal Constraint - Roadway and Trail Projects

Project	Community	(TIP) 2020-2024	2025-2029	2030-2034	2035-2039	2040	TOTAL
Reconstruction of South Hunt Road/Route 150/I-495 NB Ramps Intersection	Amesbury		$1,904,844				$1,904,844
Elm Street Reconstruction	Amesbury	$7,223,053					$7,223,053
Route 133 (Lowell St.) Reconstruction: Lovejoy Rd. to Shawsheen Square	Andover		$18,833,414				$18,833,414
Route 133 (Washington St.) N. Andover T.L. to Main Street, 1.45 miles	Boxford		$8,611,867				$8,611,867
Border to Boston Rail Trail	Boxford		$7,518,039				$7,518,039
Route 97 from Moulton Street to Groveland T.L.	Georgetown		$8,814,290				$8,814,290
Border-to-Boston Rail Trail Segment from Georgetown Road in Boxford to West Main Street in Georgetown	Georgetown-Boxford	$1,812,648					$1,812,648
Border-to-Boston Rail Trail North Segment to Byfield	Georgetown-Newbury	$4,341,120					$4,341,120
Groveland Community Trail	Groveland	$2,064,255					$2,064,255
Bradford Rail Trail (Phase II)	Haverhill	$848,345					$848,345
North Avenue from Marsh Avenue to MA/NH Boundary	Haverhill	$13,678,580					$13,678,580
Route 108 /Route 110 Intersection Reconstruction	Haverhill	$2,099,520					$2,099,520
Reconstruction of Water St. from Mill St. to Lincoln Blvd./Riverside Ave.	Haverhill		$13,403,842				$13,403,842
Intersection improvements at Broadway/Mt. Vernon St./McKinley St.	Lawrence		$1,460,684				$1,460,684
Amesbury St. Corridor Improvements: Merrimack River to Lawrence St. - Return to Two-Way Operation	Lawrence			$6,766,412			$6,766,412
M&L Branch Multi-Use Trail: Methuen Line to Merrimack St.	Lawrence	$15,950,704					$15,950,704
Route 114 Reconstruction: I-495 to Waverly Road in North Andover	Lawrence/North			$29,258,868	$2,964,555		$32,223,423
Resurface Bear Hill Rd. from NH Line to Old Bear Hill Rd. /Replace Culvert	Merrimac		$3,900,830				$3,900,830
Reconstruction of Howe Street from Marston's Corner to Washington Street/Improve Howe St./Route 213 Ramps Intersection	Methuen			$4,714,804			$4,714,804
Intersection Improvements at Jackson St./Pleasant St./Howe St. and Pleasant Valley St. (Route 113)	Methuen			$2,410,236			$2,410,236
Route 110 Reconstruction: Green St. to Woodland St.	Methuen			$3,962,382			$3,962,382
B2B Rail Trail: Byfield to Scotland Road (Off Road)	Newbury		$8,054,496				$8,054,496
Intersection Improvements: Merrimac St. at Route 1 NB/SB ramps	Newburyport		$3,694,690				$3,694,690
Route 1 Rotary Reconfiguration with improved bike/ped/trail access	Newburyport			$6,685,195			$6,685,195
Route 114 (Turnpike Street) improvements from Andover Street to Stop & Shop	North Andover	$17,399,023					$17,399,023
Route 133/Route 125 Intersection Improvements	North Andover			$1,993,922			$1,993,922
Route 133 @ Route 1 Intersection Improvements	Rowley		$2,142,691				$2,142,691
Route 1 @ Central Street/ Glen Street	Rowley		$2,960,573				$2,960,573
Resurfacing of Route 1	Newbury/Newburyport/ Salisbury	$9,807,200					$9,807,200
Reconstruction of Central St. & Glen St.: Main St. (Route 1A) to the Mill River.	Rowley				$24,210,154		$24,210,154
Route 1 Reconstruction from Salisbury Square to MA/NH Boundary	Salisbury	$7,090,517					$7,090,517

Table 5.2 continued

Project	Community	2020-2024	2025-2029	2030-2034	2035-2039	2040	TOTAL
Other Roadway Improvements - MPO Target	Regionwide	$3,421,713	$2,394,131	$21,000,000	$56,793,240	$18,241,567	**$101,850,651**
Other Roadway Improvements - Chapter 90	Regionwide	$15,354,831	$16,339,963	$18,111,499	$20,075,099	$4,268,995	**$74,150,387**
Other Trail Projects - MPO Target	Regionwide			$586,878			**$586,878**
Other Intersection Improvements - MPO Target	Regionwide	$1,140,571			$1,794,790		**$2,935,361**
Target Funding Programmed		$54,965,577	$63,018,592	$77,378,696	$85,762,738	$18,241,567	**$299,367,171**
Target Funding Available		$54,965,577	$63,018,613	$77,378,696	$85,762,738	$18,241,567	**$299,367,191**
Chapter 90 Funding Programmed		$15,354,831	$16,339,963	$18,111,499	$20,075,099	$4,268,995	**$74,150,387**
Chapter 90 Funding Available		$15,354,831	$16,339,963	$18,111,499	$20,075,099	$4,268,995	**$74,150,387**
Statewide Funding Programmed		$31,911,672	$20,675,798				**$52,587,470**
Statewide Funding Available		$31,911,672	$20,675,798				**$52,587,470**
	Total Programmed	**$102,232,080**	**$100,034,354**	**$95,490,195**	**$105,837,837**	**$22,510,56**	**$426,105,028**
	Funding Available	**$102,232,080**	**$100,034,375**	**$95,490,195**	**$105,837,837**	**$22,510,56**	**$426,105,049**

Statewide Funding
TIP Project

Key Projects

Route 114 Improvements

This roadway in Lawrence and North Andover suffers from congestion, flooding and a lack of adequate bicycle and pedestrian accommodations. The MVMPO completed a study of the corridor in 2010. In 2014, MassDOT approved a project that would reconstruct the section of the highway between Waverly Rd. and the Stop & Shop Driveway in North Andover. This project, which is now in preliminary design, is programmed in the FFYs 2021 and FFY 2022 elements of the Merrimack Valley MPO's FFYs 2020-2024 TIP.

A second project for this corridor has been included in the 2020 RTP, which would widen Route 114 between the I-495 interchange in Lawrence and its intersection with Waverly Road at the Lawrence/North Andover Town Line. This project would remove and replace it with a wider, more resilient bridge over the Shawsheen River and add a southbound travel lane thereby eliminating the bottleneck that currently exists along this section of the highway.

These two projects, one under design and appearing in the TIP and the other a proposal have among the highest Transportation Evaluation Scores of any projects in the MVMPO region.

Maintenance of Locally-Administered Federal Aid Roadways

Exclusive of Chapter 90 spending on Federal-Aid roadways, this RTP shows over $100 million in federal and state funding has been set aside to support the maintenance of the locally administered Federal-Aid roadways in the MVMPO region. This is the largest single expenditure item appearing in RTP and demonstrates the MVMPO's commitment keeping its Federal-Aid roadway network in a state of good repair.

Active Transportation Network

The MVMPO has long supported the development of what is now identified as the region's Active Transportation Network; a system of on-road and off-road bicycle and pedestrian facilities that are intended to promote these alternative travel modes and thereby reduce our reliance on the automobile.

Many sections of this network are complete or under construction, including the Powow Riverwalk in Amesbury, Newburyport Rail Trail, and the Eastern Marsh Trail in Salisbury to name just a few. This RTP includes projects that will complete key sections of the Active Transportation Network such as:

- M&L Branch Multi-use trail in Lawrence;
- Bradford Rail Trail – Phase II in Haverhill
- Groveland Community Trail;
- Sections of the Border to Boston Multi-use Trail in Boxford, Georgetown, Newbury and Salisbury

Complete Streets Projects

in an effort to improve the quality of life of their citizens, many local officials in the region have made it a priority to support 'Complete Streets' roadway projects that would significantly improve the condition and efficiency of these facilities for vehicles and greatly improve their accommodation for other modes of travel In addition to Route 114 in Lawrence and North Andover described earlier, other significant Complete Street reconstruction projects appearing in the RTP include:

- Lowell Street in Andover;
- North Avenue in Haverhill;
- Merrimack Street in Methuen;
- Water Street in Haverhill
- Central Street in Rowley;

Illustrative Projects

Described below are projects that, while of importance to the Merrimack Valley transportation network, have not been included in the fiscally constrained section of this document. This is because they are either bridge projects and would need to be selected by MassDOT as part of the State Bridge Program, are ineligible to receive federal or state bridge funds, or are of such magnitude that they cannot be programmed in the RTP using target funding without significantly compromising the integrity of the region's other transportation assets.

- I-495 Widening/Improvements

  The I-495 corridor through the western half of the MVMPO region experiences recurring congestion during the AM and PM peak travel periods. Most of the interchanges along this section of the roadway are substandard, with traffic often backing up from local roads onto the highway. Conversely, congestion on I-495 has been observed create congestion on connecting arterial roadways such as Route 125 in Haverhill and Route 110 in Haverhill and Methuen.

  A 2008 MassDOT study of the corridor recommended adding a lane in each direction from the Andover/Tewksbury Town Line east to Exit 50 (Route-97) in Haverhill. The estimated cost of implementing all the recommendations identified in the MassDOT Corridor Study (i.e. Route 225 in Westford to I-95 in Salisbury) and adjusted to FFY 2020 dollars is $286,315,4870. In addition, this figure does not include the cost of updating the busy I-93/I-495 Interchange in Andover.

  The bridges that carry I-495 over the Merrimack River near Ward Hill in Haverhill are currently being replaced with wider structures that, when completed in 2026, will be able to carry four travel lanes in each direction and have full-width shoulders.

In addition, one of the recommendations made in this study; the signalization of the I-495 ramps to/from Massachusetts Avenue in North Andover, is included in the Universe of Projects that was considered in the development of the 2020 RTP.

- Howe Street Bridge Replacement

  While not an SD bridge, this structure suffers from a number of limitations and is situated on a roadway that is used by residents of northern Methuen, Haverhill and southern New Hampshire to access MA-213. Current lane widths are substandard (<10 ft. at northern end of structure), there is only one sidewalk, and there are virtually no striped shoulders provided. Methuen officials are concerned that continued growth along the Howe Street corridor north of MA-213 will create additional bicycle and pedestrian traffic that cannot be adequately served with the existing structure.

  Replacement of Middle Street/Plummer Spring Road Bridge between West Newbury and Newburyport

  This bridge was closed to vehicle traffic in 2018 shortly after a partial collapse of the roadway and one of the bridge railings. in While this bridge does not carry a high volume of traffic, it is recognized as an important connector between the two communities and carried a relatively large percentage of heavy trucks. At present MassDOT is unaware of any additional bridge or highway funds that would be available to fund construction of the project. West Newbury and Newburyport are currently overseeing the design of a new bridge, which is estimated to cost approximately $2 million.

Funding Available: Transit

The Merrimack Valley Regional Transit Authority (MVRTA) is the primary provider of transit services in the region. The MVRTA receives its funding from a number of sources and programs, including federal, state and local. Therefore, the Authority's anticipated funding needs must be within the amounts of funding anticipated to be available in certain key state and federal transit funding programs. The major sources of funding are briefly described below.

State Contract Assistance
Provided to the Regional Transit Authorities, these funds pay for not less than 50% and not more than 75% of their net operating deficits generated through the provision of their fixed route, and demand response services.

State Capital Assistance
This state program provides the transit authorities with the matching funds for federal capital funds, which are for the most part provided under the Section 5307 program.

Local Assessments
These are funds that are assessed to MVRTA communities based on the amount of service that they receive.

Fare and Other Revenue
These include funds that are generated through fares and the MVRTA's advertising program, as well as other sources.

Section 5307 Program

Section 5307 is a formula grant program for urbanized areas providing capital, operating, and planning assistance for mass transportation. It is the FTA's primary transit assistance program. Funds are apportioned to urbanized areas utilizing a formula based on population, population density, and other factors associated with transit service and ridership.

Beginning in FY 2004, the MVRTA was included in the Boston Urbanized Area, and funds were distributed through a funding formula agreed to by the regional transit authorities now included in the Boston Urbanized Area.

Section 5307 Funding Availability
Table 5.3 shows the amount of Section 5307 funding that is expected to be provided to the MVRTA for the RTP period of FFYs 2020-2040. These amounts are based on the assumption that the MVRTA's Section 5307 allocation will grow by 2.08% annually. Table 5.4 does not include state or local match for these federal funds.

Table 5.3 MVRTA Section 5307 Funding Availability FFY's 2020-2040 (Federal Amounts Only)

Time Band	Funding
2020-2024	$31,509,531
2025-2029	$34,925,710
2030-2034	$38,712,262
2035-2039	$42,909,343
2040	$9,124,725
Total	$157,181,571

Fiscal Constraint: Capital
Table 5.5 on the following page demonstrates that the MVRTA's anticipated capital expenditure program, including expenditures of Section 5307 funds for operating expenses, can be completed given the amount of capital funding anticipated to be available. Historically, the state has matched federal funding and is expected to continue to do so.

Table 5.4 shows how MVRTA expenditures by type over the RTP period, the MVRTA anticipates

Table 5.4 MVRTA Capital Expenditures by Type

Capital Expense Type	2020-2024	2025-2029	2030-2034	2035-2039	2040	RTP Total
Preventative Maintenance	44.25%	40.56%	38.35%	33.57%	32.52%	38.36%
ADA Operating Assistance	22.06%	21.49%	22.43%	21.67%	22.27%	21.92%
Operating Assistance	11.14%	9.67%	10.09%	9.75%	10.02%	10.10%
Planning	1.23%	1.05%	1.00%	0.87%	0.84%	1.01%
Vehicles	21.32%	27.23%	28.13%	34.13%	34.35%	28.60%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Preventive Maintenance expenditures by the MVRTA will be 38.36% and is the greatest expense type. This figure decreases steadily over the RTP time bands from 44.25% under the FFYs 2020-2024 TIP to 32.52% in 2040.

ADA Operating Assistance spending is projected to remain relatively constant over the period with a high of 22.43% in 2030-2040 and a low of 21.49% in 2025-2029.

General Operating Assistance expenditures will be similar to ADA Operating Assistance in terms of their variability, although this category is expected to see a slight decline from 11.14% under the FFYs 2020-2024 TIP to just over 10% in 2040.

Planning expenditures constitute the smallest capital cost type for the Authority at 1.01% and are expected to decline slightly over time.

Vehicles expenditures are the second largest capital cost type at 28.6%. This percentage increases over the course of the RTP from a low of 21.32% under the FFYs 2020-2024 TIP to a high of 34.35% in 2040. Included are the replacement of 48 fixed route buses, 29 vans and 7 supervisory vehicles……

Photo: MVRTA paratransit van.

Table 5.5 MVRTA Capital Expenditures 2020-2024

MVRTA Capital Expenditures included in the 2020-2024 TIP

Category	2020-2024
Capital Expenses	
5307 - Preventative Maintenance	$18,014,595
5307 - ADA Operating	$8,979,670
5307 - Operating	$4,536,630
5307- Planning	$500,000
Facilities	
Bank Stabilization	$1,750,330
Vehicles	
Supervisory Vehicles	$192,170
Paratransit Vans	$1,650,100
Bus Replacement	$6,836,550
Engine/Transmission Replacements	-
Total Spending Need	**$42,460,045**
Available Funds	
5307 Allocation for MVRTA	$32,607,050
State Contract Assistance	$7,667,165
MVPC	$100,000
RTA Cap	$2,085,830
Carry Over	$7,787,600
Available Funds	**$50,247,645**

Table 5.6 Anticipated Capital Need

Category Capital Expenses	2025-2029	2030-2034	2035-2039	2040	Subtotals
5307 - Preventative Maintenance	$15,414,480.0	$15,414,480.0	$15,414,480.0	$3,082,896.0	$63,738,012.0
5307 - ADA Operating	$8,164,447.4	$9,014,209.6	$9,952,415.8	$2,111,488.6	$36,426,297.4
5307 - Operating	$2,296,611.6	$2,535,644.8	$2,799,556.7	$593,949.5	$10,494,077.6
5307- Planning	$400,000.0	$400,000.0	$400,000.0	$80,000.0	
Vehicles					
Supervisory Vehicles	$321,084.6	-	$176,234.9	-	$651,055.4
Paratransit Vans	$2,027,705.9	$1,885,534.2	$2,787,079.2	-	$8,020,399.3
Bus Replacement	$7,640,350.1	$9,422,459.5	$11,542,523.2	$3,256,391.17	$37,330,964.5
Engine/Transmission Replacements	$357,728.63		$1,167,464.70		$1,525,193.3
Total Spending Need	**$36,622,408**	**$38,672,328**	**$44,239,754**	**$9,124,725**	**$158,185,999**
Carryover	$2,335,144	$1,167,928	$4,342,011	-	$15,632,683
5307 Allocation	$34,925,710	$38,712,262	$42,909,343	$9,124,725	$157,181,571
Federal Funds Allocated to MVRTA	$37,260,854	$39,880,190	$47,251,354	$9,124,725	$172,814,254

Additional Need

The projects shown above in Table 5.6 are funded under the current fiscally-constrained plan. However, there are additional capital needs that are very important to providing mobility, reducing congestion, supporting economic vitality and more.

Commuter Bus Service. The MVRTA provides Boston Commuter Bus Service weekdays from several locations in the Greater Lawrence area to downtown Boston, including South Station. A very popular service, the commuter bus provides a very competitive alternative to single occupancy vehicle driving.

Facilities Maintenance. The MVRTA manages several facilities including:

- Buckley Transportation Center, Lawrence
- Washington Square Transit Center, Haverhill
- Granite Street Parking Garage adjacent to the commuter rail, Haverhill
- McGovern Transportation Center, Lawrence
- Costello Transportation Center, Amesbury
- Gateway Parking, Lawrence
- MVRTA Office/Maintenance Facility

As these facilities age, maintenance will be needed, such as replacement of elevators for accessibility.

Page left blank.

Photo: Reclamation of a roadway.

Chapter 6

Goal 1: State of Good Repair

Keeping existing transportation infrastructure in good, safe condition goes a long way toward ensuring that people can get to where they need to go. Problems such as potholes, weight limits on bridges and buckling sidewalks can occur and impede our ability to get around efficiently and safely. Except for new bicycle and pedestrian infrastructure, the focus in the Merrimack Valley is primarily on fixing and improving existing infrastructure. This chapter reviews how we are accomplishing this task.

Objective 1.1: 80% of All Federal-Aid Roads will be Maintained at Good to Excellent Condition

Existing Conditions

Merrimack Valley Federal-Aid Roads under MassDOT Jurisdiction

Within the Merrimack Valley region, approximately 83% of the approximately 105 miles of non-interstate Federal-Aid roadways under the jurisdiction of the Massachusetts Department of Transportation's (MassDOT) is presently in good or better condition. This high percentage is due in large part to MassDOT resurfacing approximately 20 centerline miles of its non-interstate highways during just the last two years. These projects have been part of planned and programmed capital projects, including:

- Construction and reconstruction of an approximately .75-mile section of Route 110 (Lowell Street) and surrounding roadways as part of the I-93 and Route 110/113 rotary interchange reconfiguration project.
- The following resurfacing projects:
  - 5.5 miles of the multi-lane roadway sections of Route 114 (Winthrop Avenue and Turnpike Street) in Lawrence and North Andover;

- 3.5 miles of the four-lane limited access highway of Route 213 (Albert Slack Highway) in Methuen;
- 2 miles of Route 1A (Beach Road) in Salisbury;
- 2 miles of Route 28 near its I-495 interchange in Andover and Lawrence;
- 1.5 miles of the Storey Avenue section of Route 113 in Newburyport;
- 1 mile of Route 110 (East and Swan Streets) in Methuen; and
- 1 mile of a four-lane roadway section of Route 125 in Haverhill and North Andover.

These paving jobs always involved roadways with standard or near standard base and binder course structures and therefore MassDOT had just the riding course milled and then resurfaced with new pavement. The programmed jobs also always involved other work within the highway layout limits, including the repairing or reconstruction of old and damaged sidewalks and/or the construction of new sidewalks, and the installation of the latest Americans with Disability Act (ADA) standard pedestrian ramps. The work sometimes involved drainage improvement work, including the adjustment or rebuilding of drainage structures, the raising of the castings, and the replacement of damaged sections of granite curbing. The work also involved, in some cases, the replacement of guard rail.

Merrimack Valley Federal-Aid Roads under MUNICIPAL Jurisdiction

Municipalities within the Merrimack Valley and their Departments of Public Works (DPWs) have managed to maintain the Federal-Aid portion of roads under their jurisdiction at a consistent level with nearly 80% of the roads in good or excellent condition. This is the objective of the pavement condition performance measure for the Merrimack Valley region as stated in the MVMPO's 2016 Regional Transportation Plan. It should be noted that these roads, on a centerline mile basis, represent only approximately 27% of the 1,360 miles of roads that municipalities must maintain within the region. However, the Federal-Aid roads are the arterial and collector roadways within these cities and towns and serve the highest volume of traffic over the longest trip lengths. Their widths are generally wider, and they represent approximately 33% of the total municipal roadway pavement surface area. Table 6.1 presents a listing of the cities and towns within the region and the amount of the Federal-Aid roads in good or better condition.

Table 6.6: Municipal Federal-Aid Roadway Conditions

Jurisdiction	Municipal Fed-Aid Roads (miles)	Good or Better Roads (miles)	% Good or Better Roads
MVPC Region	**365.8**	**290.1**	**79%**
Boxford	21.5	21.2	99%
West Newbury	13.5	13.2	98%
Methuen	36.5	34.7	95%
Newbury	15.4	14.0	91%
Andover	54.9	45.3	82%
North Andover	28.1	22.4	80%
Haverhill	61.7	48.8	79%
Georgetown	16.4	12.3	75%
Newburyport	15.7	11.6	74%
Rowley	11.5	8.5	74%
Lawrence	35.1	24.5	70%
Groveland	15.5	10.3	66%
Amesbury	20.6	13.2	64%
Salisbury	9.0	5.5	61%
Merrimac[a]	10.4	4.6	44%

Notes [a]47% of Merrimac's Federal-Aid roads are in good or better condition when discounting the discontinued section of River Road.

As shown in Table 6.1, the rural communities of Boxford and West Newbury have 98 to 99 percent of their arterial and collector roads in good or excellent condition.

To keep roads in good condition, municipalities have employed pavement preservation strategies to extend the life of roadways. Many municipal DPWs have employed techniques, such as crack-sealing and micro-surfacing. To receive a cost savings through volume, some have procured their services through a collaborative procurement process administered by the Merrimack Valley Planning Regional Road Services Consortium.

Some municipal DPWs have put together pavement management plans and programs, generally 5-year plans, which have enhanced their ability to effectively time and apply those pavement preservation strategies. Some have even brought these plans to Town Meeting or City Council to appeal for extra Town or City funds over what the State is reimbursing through its Chapter 90 program for the costlier rehabilitation strategies.

The Merrimack Valley sits wholly within the northern section of Essex County of Massachusetts. In 1999, the state of Massachusetts abolished county government in Essex County, along with seven other county governments around the same time. Municipalities acquired ownership and maintenance of those former county roadways. Because of this, Massachusetts' municipalities control the largest share of roadway mileage within their state compared to all states. According to MassDOT's latest *Road Inventory Year End Report*, approximately 89% of the centerline miles of publicly accepted ways within Massachusetts (and the Merrimack Valley) are owned and maintained by cities and towns in the Commonwealth. By contrast, cities and towns in 37 of the

50 states in the country control less than half of the roadway mileage in their states, according to FHWA. Because of the shift in the burden of roadway maintenance from counties to municipalities in Massachusetts, pavement management programming as a tool and state-aid as a funding source have become even more important factors to city and town DPWs, which have seen steady decreases in departmental staffing.

Recognizing the need for additional funding, for fiscal year 2012, the state increased its Chapter 90 state-aid to cities and towns by approximately 33% from $150 million to $200 million annually to offset large increases in the cost of oil that had driven up the cost of asphalt. Recently, because of further price increases and expected future increases, municipalities have been lobbying the state for an increase to $300 million annually.

Merrimack Valley region communities currently receive approximately $9.2 million annually. Table 6.2 presents the total number of centerline miles that each city and town maintain and their Fiscal Year 2019 Chapter 90 allotment.

Table 6.2: FY19 Chapter 90 Apportionment

Jurisdiction	Municipal Roads(miles)	FY19 Chapter 90 apportionment
MVPC Region	**1,358.2**	**$9,212,991**
Amesbury	59.7	$397,004
Andover	188.2	$1,363,938
Boxford	89.7	$415,020
Georgetown	55.9	$304,154
Groveland	39.7	$212,581
Haverhill	228.4	$1,536,547
Lawrence	123.4	$1,321,797
Merrimac	37.4	$197,598
Methuen	175.0	$1,186,489
Newbury	53.1	$270,409
Newburyport	68.3	$517,057
North Andover	117.5	$810,973
Rowley	41.5	$233,936
Salisbury	34.9	$231,350
West Newbury	45.5	$214,138

Source: MassDOT

Photo: Section of Chestnut Street in Andover where trenches were dug to repair gas utility lines.

Greater Lawrence Natural Gas Disaster

Parts of the three communities of Lawrence, Andover, and North Andover were affected by the natural gas disaster of the Merrimack Valley on September 13th of 2018. There was one fatality and more than two dozen injuries resulting from an over-pressurization of gas lines in the area. Nearly 2,000 families, or 6,891 individuals, were placed in alternative housing while repairs were made to restore service, according to the utility company.

The gas company had to replace approximately 3,500 service lines and approximately 48 miles of gas main, much of which was under roadways and sidewalks. Many repair crews from around the country were mobilized to conduct this work concurrently. Some crews did a better job than others with the asphalt patching of the gas line trenching, as discovered by the staff conducting the pavement inventory at that time. In early May of 2019, officials of Lawrence, Andover, and North Andover together announced an $80 million settlement with Columbia Gas for road restoration and municipal claims. Of the $80 million, $57.1 is going to road repairs, allocated based on the miles of impacted roads: $31.9 million to Lawrence, $13.9 million to Andover, and $11.3 million to North Andover.

Merrimack Valley Federal-Aid Roads by Funding Program and Functional Class

When the federal-aid roads in the region were evaluated by funding program categories, it was found that the National Highway System (NHS) roads are kept in better condition, regardless of jurisdiction, than the Surface Transportation Program (STP) roadway network.

According to the state's year ending 2017 *Road Inventory Report*, there are approximate 56-centerline miles of MassDOT-maintained interstate highway in the Merrimack Valley. In addition, there are 99 miles of NHS roads under other functional classifications, 59 miles of which are maintained by MassDOT. Table 6.3 presents a summary of the pavement inventory results by NHS and STP funding categories.

Table 6.3 Merrimack Valley Region's Non-Interstate Federal-Aid Eligible Roadways (Existing Pavement Conditions)

	MassDOT Maintained Roadways						Municipally Maintained Roadways					
	Arterials				Collectors		Arterials				Collectors	
	NHS		STP		STP		NHS		STP		STP	
Condition	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**
Excellent	**25.08**	42.9	**6.69**	16.0	**0.43**	8.4	**11.07**	27.8	**50.79**	28.8	**47.00**	31.4
Good	**24.92**	42.6	**27.26**	65.3	**3.14**	61.8	**24.59**	61.8	**92.93**	52.7	**63.80**	42.6
Fair	**7.94**	13.5	**7.76**	18.6	**0.45**	8.9	**4.14**	10.4	**24.34**	13.8	**27.69**	18.5
Poor	**0.56**	1.0	**0.03**	0.1	**1.06**	20.9	**0.00**	0.0	**8.16**	4.7	**11.32**	7.5
Total	**58.50**	100	**41.74**	100	**5.08**	100	**39.80**	100	**176.22**	100	**149.81**	100

As shown in Table 6.3, between 86% and 90% of the NHS roads are kept in good condition or better, depending on jurisdiction. It makes sense that these roads are given the most attention and are kept in such good condition by their respective Departments, given that these arterials serve the greatest volume of traffic of all the roadways in the region's network. By contrast, approximately 81% of STP arterials and slightly less than 74% of STP collector roadways are kept in good condition or better.

Of interesting note is the fact that approximately 43% of the 59 miles of MassDOT's NHS roadways are in excellent condition. As mentioned previously, this high percentage has been due in large part to a capital improvement project at the I-93 and Route 110/113 interchange and the Department resurfacing approximately 20 centerline miles of its non-interstate highways during just the last two years, approximately 14 miles of which are NHS roadways. The resurfacing jobs by the Department on the NHS roads include: sections of Route 114 in Lawrence and North Andover, all of Route 213 in Methuen, a section of Route 28 near its interchange with Interstate I-495 in Andover and Lawrence, all the Storey Avenue section of Route 113 in Newburyport, and sections of Route 125 in Haverhill and North Andover, near the City and Town lines.

Future Conditions

MVPC staff used the pavement management program from Cartegraph's Pavement View Plus software module to forecast and analyze what actions are needed to maintain the region's federal-aid roads over the next 20 years.

Some of the model assumptions included initial treatments of any roads in failure condition with a full depth reconstruction or a rehabilitation of hammermill reclamation. Roads that exhibit a high extent of high severity alligator cracking or high severity potholes require a full depth reconstruction. These are roads that generally had a Pavement Condition Index less than 25 and/or are closed to through traffic. If the road is still open to traffic, vehicles may not be able to travel at the posted speed limits.

Precious few of such roads that serve as arterials or collectors in the region are in this state of disrepair. In one case, a road in this state has not been repaired because the town has opted to leave it this way (a section of J.B. Little Road in Groveland). In another, the roadway was closed and discontinued (a section of River Road in Merrimac).

Some of the other model assumptions include full depth reclamation treatments that only municipal DPWs currently employ, because of the state of repair of some of their roads. Roads in the lower range of poor condition, with a large extent of fatigue cracking or potholes, are assumed to demand this rehabilitation of hammermill reclamation. Other model assumptions include the most common rehabilitation treatments that MassDOT and municipal DPWs employ, including pavement overlays or milling of a deteriorated riding surface and resurfacing. Roads in poor or fair condition with little fatigue cracking or potholes are assumed to get the rehabilitation treatments of cold plane and overlay ("mill and fill") or pavement overlay, depending on the presence and

Photo: Example of crack seal applied on a road.

reveal of curbing and/or underground utilities. For roads that are in good condition and exhibit a certain level of age or cracking, an application of only the favored pavement preservation strategy of crack-sealing is made. Roads in excellent condition demand no maintenance.

A pavement degradation curve was used within the model that states that an untreated road will need a reconstruction or reclamation after 30 years (or 35 years for a low-volume road) when it reaches poor or failure

condition, however, this condition is never reached in the future year analysis. It also states that an untreated road will need rehabilitation including a "mill and fill" or overlay after 16 years (or 21 years for a low volume road) when it reaches fair or poor condition. The future conditions analysis assumes that roads that are in good condition will be treated once at the appropriate time with a crack-seal. That action will extend the life of those pavements by about 4 years, therefore the overlays or "mill and fills" will be deferred to 20 years (or 25 years for low volume roads) after their reconstruction or rehabilitation.

Based on those degradation assumptions (and an assumption of an annual inflation rate of 4%), the maintenance needs of the municipally-owned Federal-Aid roads within the Merrimack Valley over the next 20 to 21 years (to the planning horizon of 2040) is $176 million.

Given that the Federal-Aid roads represent only approximately 33% of the total municipally-owned roadway surface in the MVPC communities, using only 33% of Chapter 90 state-aid will not be enough to keep all roads in the current state of repair. Applying some of the MVMPO's target funds in addition to Chapter 90 state-aid will allow municipalities to keep these regionally significant roads, consisting of arterials and collectors, in nearly the same state of repair that currently exists.

Photo: Replacement of the Basiliere Bridge (shown in background) is programmed in the 2024 element of the TIP.

Improve Conditions of Bridges

Bridge projects are not generally included in the MVMPO's target funding. MassDOT has separate funding for and manages the maintenance and replacement of the bridges. This section provides a discussion of those bridges that are in need of repair and are priorities for the region. However, the bridges are not included as part of the fiscal constraint section of this document.

The MVMPO region has 241 federal-aid bridges. Bridges are inspected each year and evaluated to determine their structural soundness and other criteria. Through this process, MassDOT determines whether a bridge is either Functionally Obsolete (FO) or Structurally Deficient (SD). What do these terms mean?

Functionally Obsolete: deck geometry, load-bearing capacity, vertical and horizontal clearances or approach roadway alignment do not meet the criteria for the roadway system of which the bridge is a component.

Structurally Deficient: includes bridges that must have vehicle weight restrictions, immediate rehabilitation to remain open, or must be closed.

According to the most recent bridge list supplied by MassDOT (December 2017), there are 27 structurally deficient bridges. Of those, one bridge, North Main Street over the railroad tracks in Andover, is under construction. Ten of the bridges carry I-495. Three additional bridge projects have been programmed in the 2020-2024 TIP:

- The Basiliere Bridge (Route 125 over the Merrimack River) in Haverhill, a 5-year project to begin in 2024,
- The North/South bridges of I-495 in Haverhill at the Methuen Border (2023)
- I-495 over Route 28 and the railroad in Andover (2023)

In addition, MVMPO communities have prioritized six bridges, which are not Structurally Deficient, but which may be Functionally Obsolete or have other additional needs. Those projects include:

Daisy Street Bridge. This functionally obsolete bridge was included in the Merrimack Valley Multi-Hazard Mitigation Plan as a choke point on the Spicket River and is a location of flooding in the City of Lawrence.

High Street over the Clipper City Rail Trail East and West. High Street crosses over two sections of the loop which creates the Clipper City Rail Trail in Newburyport.

Washington Street over Route 1. The Washington Street bridge has appeared in the MVMPO's TIP in the past and continues to be a major concern for the City of Newburyport.

Route 28 over Shawsheen River. In Andover, the Shawsheen River flows under Route 28 and during major storms sometimes floods over the bridge. The bridge was included in the Merrimack Valley Multi-Hazard Mitigation Plan.

Union Street over North Canal. This functionally obsolete bridge in Lawrence needs improvements. Sidewalks to the east side are in poor condition.

Middle Street/Plummer Spring Road. On the border between West Newbury and Newburyport, this bridge spans the Artichoke River. The road is not on the Federal-aid roadway system, but serves as an important link between these two communities. Design of the bridge is underway, though construction funds have not been identified. Better pedestrian access is also needed on this bridge.

Table 6.4 Structurally Deficient Bridges

Town	Bridge Description	Bridge #	SD	Priority	Status
Amesbury	I-495 over Route 110 (NB/SB)	A-07-025	Y		
Amesbury	I-495 over Middle Road (NB/SB)	A-07-021	Y		
Andover	I-495 NB/On-ramp over MBTA	A-09-037	Y		TIP 2024
Andover	Route 28 over MBTA	A-09-011	Y		Construction
Andover	High Plain Road over I-495	A-09-040	Y		
Andover	Chandler Road over I-93	A-09-028	Y		
Andover	Greenwood Road over I-495 SB	A-09-032	Y		
Andover	Tewksbury Street over railroad	A-09-015	Y		
Haverhill	I-495 NB/SB over Merrimack River	H-12-040	Y (NB)	Y	TIP 2023
Haverhill	Route 125 over Merrimack River/trail (Basiliere Bridge)	H-12-007	Y	Y	TIP 2024
Haverhill	I-495 SB over railroad and Little River	H-12-048	Y		
Haverhill	Route 97 Broadway over I-495 SB	H-12-043	Y		
Lawrence	I-495 Upper Level over I-495 Lower Level	L-04-035	Y		
Lawrence	Route 114 over Shawsheen River	L-04-021	Y	Y	
Lawrence	Route 28 (Broadway) over Spicket River	L-04-007	Y		
Lawrence	Amesbury Street over South Canal	L-04-025	Y	Y	
Methuen	I-495 NB over Merrimack Street (Route 113)	M-17-031	Y		
Methuen	Route 213 EB over railroad tracks	M-17-026	Y		
Methuen	Osgood Street over Spicket River	M-17-003	Y		
Newbury	Route 1 over Little River	N-10-004	Y		
Newburyport	Route 1 over Merrimack River	N-11-011	Y		
North Andover	I-495 NB ramp over Sutton Street/MBTA	N-15-018	Y		
Rowley	Route 1A/Main Street over MBTA	R-11-001	Y		

Notes: SD- Structurally deficient. Priority refers to community priority.

Table 6.5: Bridges: Community Priority Bridges (non-Structurally Deficient)

Town	Bridge Description	Bridge #	SD	Priority	Status
Lawrence	Daisy Street Bridge over Spicket River	L-04-008	N	Y	
Newburyport	High Street (Rt 113) over Clipper City Rail Trail	N-11-002	N	Y	
Newburyport	High Street (Rt 1A) over Rt 1	N-11-014	N	Y	
Newburyport	Washington Street over Rt 1	N-11-015	N	Y	
Andover	Route 28 over Shawsheen River	A-09-001	N	Y	
Lawrence	Union St. over North Canal	L-04-004	N	Y	
West Newbury	Middle Road over Artichoke River	N/A	N/A	Y	Design

Notes: SD- Structurally Deficient. Priority refers to community priority. N/A - bridge is not on a federal-aid roadway, so it is not included on MassDOT's bridge list.

Photo: MVRTA fixed route bus at North Andover Mall.

Objective 2: Maintain and Modernize Transit Capital Assets

Measuring Success

The MVRTA regularly schedules maintenance and replacement of its vehicles to ensure that the transit system runs efficiently. The MVRTA fleet includes 50 transit buses, 6 commuter buses, 24 ADA accessible vans and 7 supervisory vehicles.

The MVRTA uses the following performance measures to evaluate its fleet:

- Miles between road calls – tracks the distance traveled between mechanical breakdowns.
- Maintenance cost per revenue hour – a lower maintenance cost per revenue hour indicates an increased effectiveness of the maintenance program.
- Maintenance cost per revenue mile – a lower maintenance cost per revenue mile, the more effective the maintenance program.
- Percentage of vehicles that meet or exceed the useful life benchmark.

Maintenance Cost. The average of the preceding five years is used as the benchmark for these measures. For FY 2015-2019, the MVRTA did not consistently meet its goals every year for maintenance cost per revenue mile and maintenance cost per revenue hour.

Table 6.6: MVRTA Performance Measures

Performance Measure	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Maintenance Cost per Revenue Hour	$8.00	$8.82	$8.11	$8.33	$8.42
Benchmark	$8.85	$8.23	$8.48	$8.33	$8.36
Maintenance Cost per Revenue Mile	$ .74	$ .81	$ .73	$ .76	$ .77
Benchmark	$ .77	$ .76	$ .77	$.76	$ .76

Notes: Benchmarks are based on the preceding five-year average.

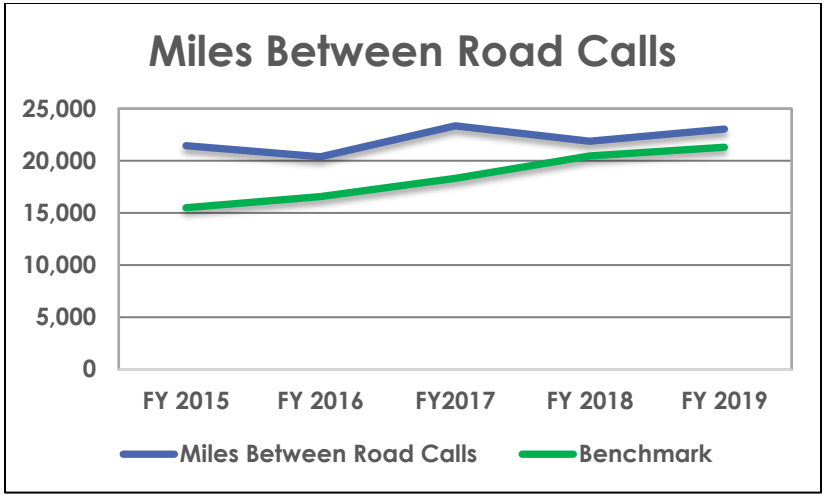


Figure 6.1 Miles Between Road Calls

Miles Between Road Calls. As shown in Figure 6.1, the MVRTA has consistently exceeded its benchmark for miles between road calls. This can be attributed to its successful implementation of a regular maintenance program as well as to replacing vehicles according to their useful life benchmark.

Vehicle Service Life. According to the MVRTA's Transit Asset Management Plan, the MVRTA has used the minimum service life benchmark for buses as 12 years and 4 years for ADA vans. According to the Transit Asset Management Plan, 3 model year 2007 buses had met their useful life benchmark and will be replaced. One model 2013 supervisory vehicle is also scheduled to be replaced. The conditions of all MVRTA facilities are at a 5.0, excellent.

2040 Projections

This RTP shows a projected federal budget of Section 5307 Federal Transit Funding of $157,181,571. Historically, the state has matched the federal funding and is expected to do so. An inflation rate of 2.08% was applied to the funding throughout the time period (See Table 6.7).

The goal for this RTP was preservation of the transit system with a focus on maintenance and replacement of the fixed route buses and ADA vans. Replacement of supervisory vehicles was also included. An inflation rate of 3% was applied to all vehicle purchases. In the past, the MVRTA has replaced buses every 12 years, the minimum. The current fiscally constrained budget requires a 14-year replacement schedule, which is acceptable under FTA guidelines.

Section 5307 funding may also be used for operations and ADA operations. An inflation rate of 2% was applied to these line items. A 1% inflation rate was applied to preventative maintenance. Planning funds remained static. No funding was programmed for commuter coaches or facility maintenance or updates.

Table 6.7: Merrimack Valley Regional Transit Authority Anticipated Capital Expenditures 2020-2040

Category Capital Expenses	2020-2024	2025-2029	2030-2034	2035-2039	2040	Subtotals
5307 - Preventative Maintenance	$14,411,676	$15,414,480	$15,414,480	$15,414,480	$3,082,896	$63,738,012
5307 - ADA Operating	$7,183,736	$8,164,447	$9,014,209	$9,952,415	$2,111,488	$36,426,297
5307 - Operating	$2,268,315	$2,296,611	$2,535,644	$2,799,556	$593,949	$10,494,077
5307- Planning	$400,000	$400,000	$400,000	$80,000		
Facilities						
Bank Stabilization	$1,400,264					
Vehicles						
Supervisory Vehicles	$153,736	$321,084		$176,234		$651,055
Paratransit Vans	$1,320,080	$2,027,705	$1,885,534	$2,787,079		$8,020,399
Bus Replacement	$5,469,240	$7,640,350	$9,422,459	$11,542,523	$3,256,391	$37,330,964
Engine/Transmission Replacements		$357,728		$1,167,464		$1,525,193
Total Spending Need	**$32,607,047**	**$36,622,408**	**$38,672,328**	**$43,919,754**	**$ 9,044,725**	**$158,185,999**
Carryover	$7,787,600	$2,335,144	$1,167,928	$4,342,011		$15,632,683
5307 Allocation	$31,509,531	$34,925,710	$38,712,262	$42,909,343	$9,124,725	$157,181,571
Federal Funds Allocated to MVRTA	$39,297,131	$37,260,854	$39,880,190	$47,251,354	$9,124,725	$172,814,254

Photo: MVPC interns collecting data on sidewalks.

Objective 3: Improve Conditions of Existing Pedestrian Infrastructure

Whether walking to school or work, to visit a friend, to run an errand, or to walk from a parking lot to a store downtown, people need safe places to walk. In order to succeed in increasing the number of people who walk, the region's pedestrian infrastructure needs to be improved to support this mode.

The 2016 RTP called for a strategy to inventory conditions of existing pedestrian infrastructure within five years. In 2018, the MVMPO received a grant from the Executive Office of Energy and Environmental Affairs to inventory the conditions of sidewalks in the region. Seven communities jumped on board for the project. To date, the MVMPO has completed sidewalk data collection in five of those communities – Amesbury, Georgetown, Methuen, North Andover and Salisbury. Data collection continues in Andover and Lawrence. In 2015, MVPC had completed a similar inventory for the City of Haverhill.

As shown in Table 6.8, 68% of the sidewalks in the six communities were classified as being in good to excellent condition. Only 3% of the sidewalks were considered in very poor condition. Conditions were classified as the following:

Very Poor. Sidewalk structure has failed and requires entire **replacement**. Mobility-impaired pedestrians would be unable to use this sidewalk.

Poor. Sidewalk structure is severely distorted; buckling and break up of structure may be present. The extent of the distresses within the structure is typically greater than half of the structure. **Major maintenance is needed.** Mobility-impaired pedestrians would have difficulty using this sidewalk.

Fair. Sidewalk structure is partially distorted. The severity of the distresses is slightly greater than those in good condition. Some fairly predominant distresses exist constituting between one quarter and one half of the sidewalk area. **Minor maintenance** efforts would be

Table 6.8: Sidewalk Conditions 2018 (Haverhill 2015)

	Excellent	Very Good	Good	Fair	Poor	Very Poor	Total
Amesbury	3.5	6.5	20.5	11.7	7.4	2.1	51.7
Georgetown	1.1	8.6	10.2	2.3	0.8	0.2	23.1
Haverhill	13.5	15.0	80.5	26.0	17.8	5.2	158.0
Methuen	2.5	9.5	33.2	22.5	13.2	1.1	81.9
North Andover	4.0	20.3	20.6	6.8	2.3	0.7	54.7
Salisbury	0.9	3.2	7.4	1.7	0.9	0.8	14.9
Total Miles	25.4	63.1	172.4	70.9	42.3	10.2	384.3
% Condition	7%	16%	45%	18%	11%	3%	100%

required to correct this problem, Mobility impaired pedestrians could use this sidewalk with a little difficulty.

Good. Sidewalk structure is in good condition. Some localized distress exists. The extent of the localized problems consists of a few Portland Concrete (PCC) slabs, a few bricks or cobblestones that may be loose, or less than one quarter of the bituminous concrete sidewalk area is in poor condition. **Localized minor maintenance** is required. Mobility impaired pedestrians could easily use this sidewalk.

Very Good. Sidewalk structure has no visible defects, however it is more than a few years old. No distresses exist. **No maintenance** is required. Mobility-impaired pedestrians could easily use this sidewalk.

Excellent. Sidewalk structure is newly or recently-constructed. **No maintenance** is required.

Strategy for Progress

- **Complete sidewalk inventory in five years.**
- **Create performance measure for miles of existing sidewalks and % in good to excellent condition.**
- **Investigate funding sources and quantify cost for achieving performance measure.**

Photo: Truck turning at Route 110/Route 108 intersection during a Road Safety Audit. (Source: *Road Safety Audit: Amesbury Road (Rt. 110) at Newton Road (Rt. 108)*, June 29, 2018, MassDOT/Toole Design Group)

Chapter 7

Goal 2: Increase Safety for All Modes

Ensuring that the transportation network is safe for all users is a priority for the region, the state and the country. It is the subject of many of the meetings the MVMPO staff have with communities, the purpose of studies that are performed and reason projects are chosen for funding.

Objective 2.1: Reduce Overall Number of Crashes for All Modes

Safety Performance Measures (PM1)

The Merrimack Valley MPO has chosen to adopt the statewide safety performance measures and targets set by MassDOT for Calendar Year (CY) 2019. In setting these targets, MassDOT has followed FHWA guidelines by using statewide crash data and Highway Performance Monitoring System (HPMS) data for vehicle miles traveled (VMT) in order to calculate 5 year, rolling average trend lines for all FHWA-defined safety measures.

For CY 2019 targets, four of the five safety measures—**total number of fatalities**, **rate of fatalities per 100 million vehicle miles traveled, total number of incapacitating injuries, and rate of incapacitating injuries per 100 million VMT**—were established by extending their trend lines into the 2015-2019 period. All four of these measures reflect a modest decrease in statewide trends.

The fifth safety measure, **the total number of combined incapacitating injuries and fatalities for non-motorized modes**, is the only safety measure for which the state-wide trend line depicts an increase. MassDOT's effort to in-crease non-motorized mode share throughout the Commonwealth has posed a challenge to simultaneously reducing non-motorized injuries and fatalities. Rather than adopt a target that depicts an increase in the trend line, MassDOT has elected to establish a target of non-motorized fatalities and

injuries and for CY 2019 that remains constant from the rolling average for 2012–2016.

In recent years, MassDOT and the MVMPO have invested in "complete streets," bicycle and pedestrian infrastructure, intersection and safety improvements in both the Capital Investment Plan (CIP) and Statewide Transportation Improvement Program (STIP) to support increasing non-automotive mode share use to incorporate safety mitigation elements into projects.

Moving forward, MVMPO, alongside MassDOT, is actively seeking to improve data collection and methodology for bicycle and pedestrian VMT counts and to continue analyzing crash clusters and crash counts that include both motorized and non-motorized modes in order to address safety issues at these locations.

In all safety categories, MassDOT has established a long-term target of "Toward Zero Deaths" through MassDOT's Performance Measures Tracker and will be establishing safety targets for the MPO to consider for adoption each calendar year. While the MPO is not required by FHWA to report on annual safety performance targets, FHWA guide-lines require MPOs to adopt MassDOT's annual targets or to establish their own each year.

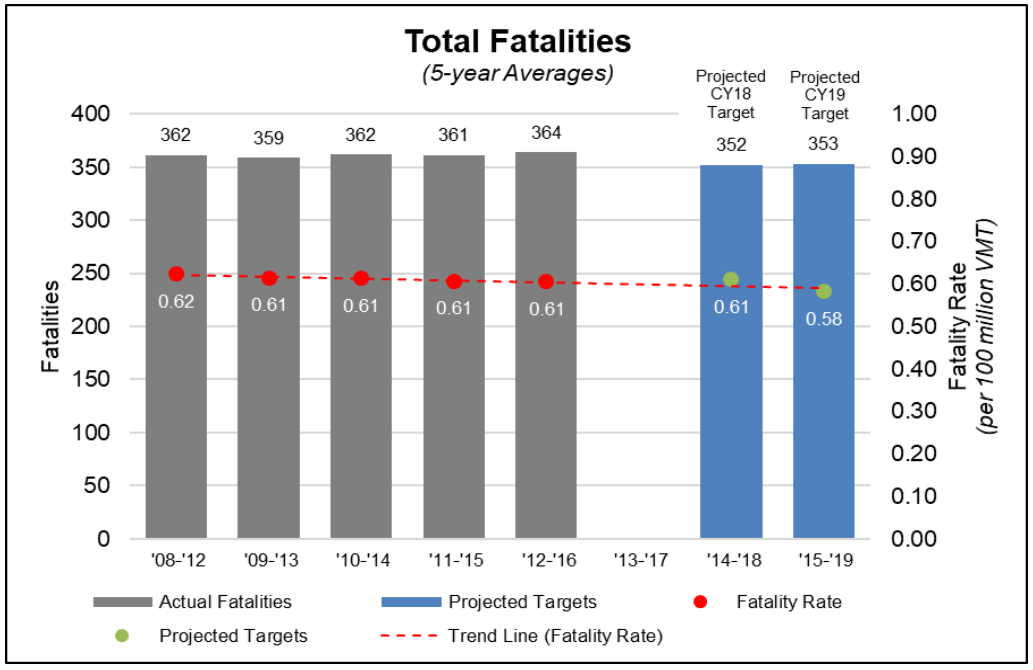
The safety measures MassDOT has established for CY 2019, and that the MVMPO has adopted, are as follows:

Fatalities

The target number of fatalities in Massachusetts for CY 2019 is 353, down from an average of 364 fatalities for the years 2012–2016. Similar to the state, the MVMPO region also saw a slight decline in fatalities over the same period. [See Figure 7.2 for Our MPO vs. Figure 7.1 statewide comparison of the trend for this performance measure]

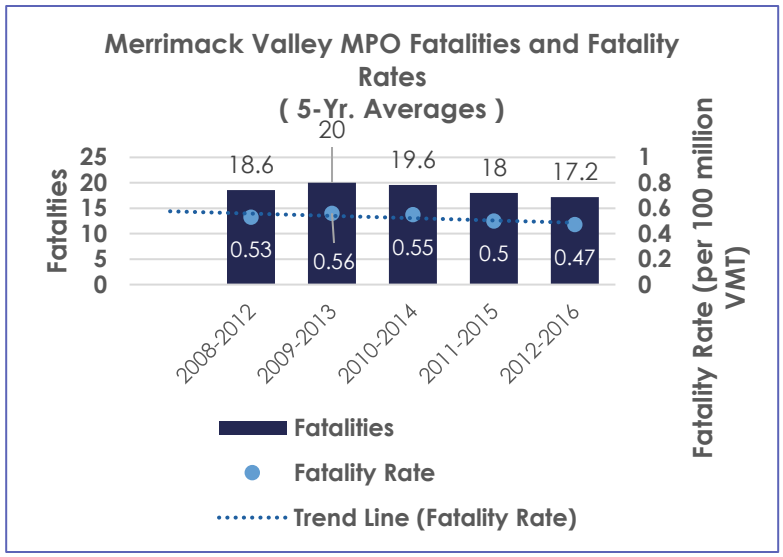
The target rate of fatalities per 100 million VMT for Massachusetts in CY 2019 is 0.58, down from a 0.61

Figure 7.1 Statewide Total Fatalities and Fatal Crash Rates – 5-Year Averages



average for years 2012–2016. The MVMPO Region saw a similar decline between the years 2009-2013 and the period from 2012-2016.

Figure 7.2 Merrimack Valley Total Fatalities and Fatal Crash Rates – 5-Yr. Averages



Serious Injuries

The target number of incapacitating injuries in Massachusetts for CY 2019 is 2,801, down from the average of 3,146 for years 2012–2016. [See Figure 4 for Our MPO vs. Figure 7.3 statewide comparison of the trend for this performance measure]

Rate of Incapacitating Injuries per 100 million VMT: The incapacitating injury rate target for CY 2019 is 4.37 per year, down from the 5.24 average rate for years 2012–2016. [See Figure 7.4 for Our MPO vs. Figure 7.3 statewide comparison of the trend for this performance measure]

Figure 7.3 Statewide Total Incapacitating Injuries and Incapacitating Injury Crash Rates

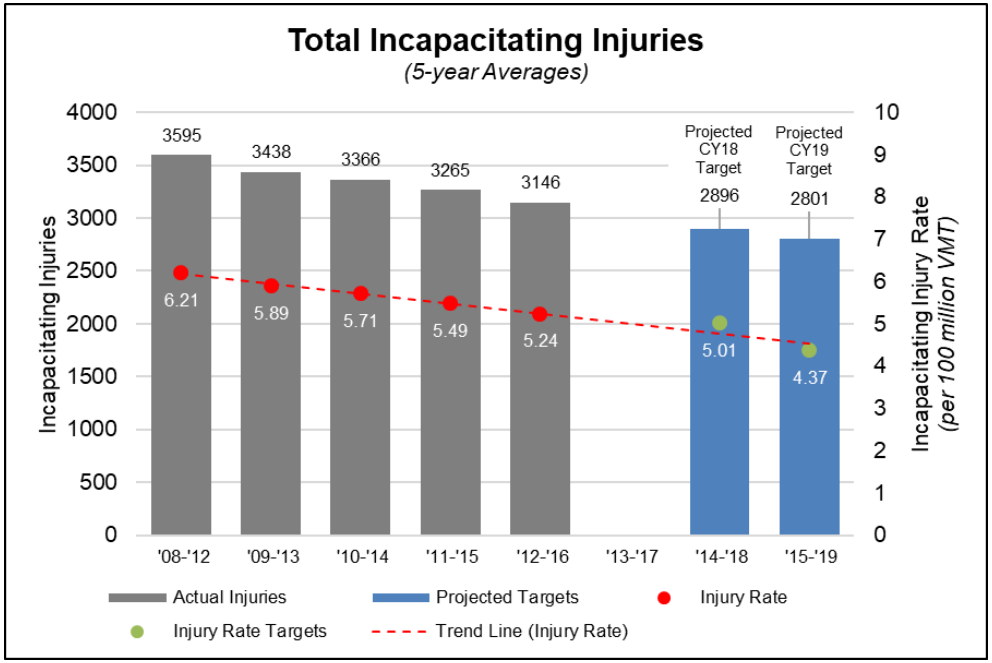
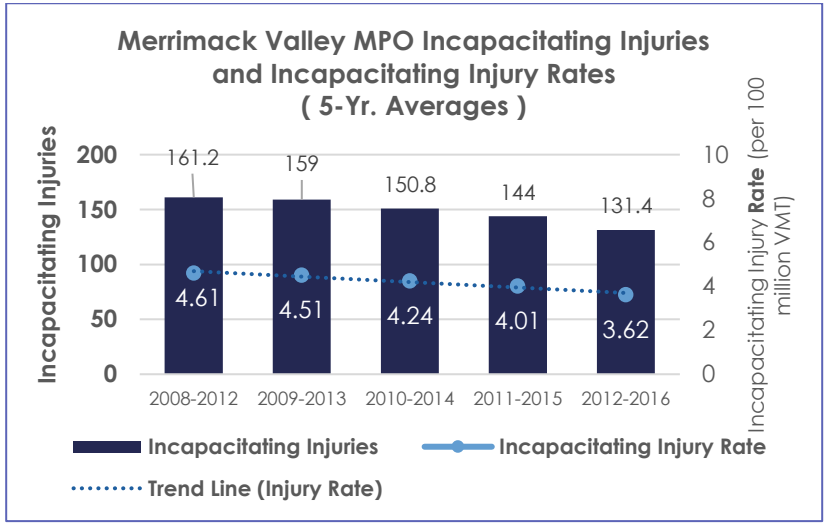


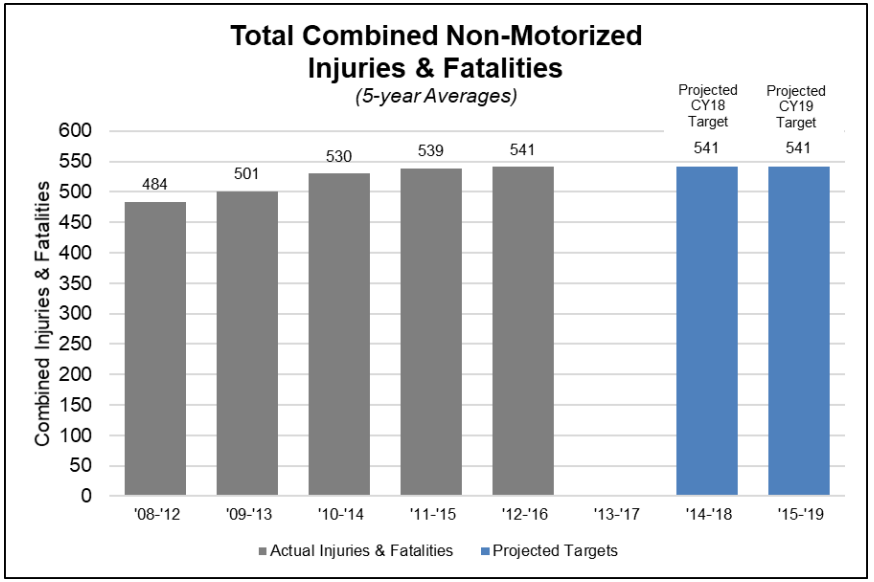
Figure 7.4 Merrimack Valley Total Incapacitating Injuries and Incapacitating Injury Crash Rates



Total Number of Combined Incapacitating Injuries and Fatalities for Non-Motorized Modes

The CY 2019 target number of fatalities and incapacitating in-juries for non-motorists in the Commonwealth is 541 per year, the same as the average for years 2012–2016. It should be noted that the trend for this measure in recent years has been upward as more people walk and ride bicycles in the Commonwealth. [See Figure 7.6 for Our MPO vs. Figure 7.5 statewide comparison of the trend for this performance measure]

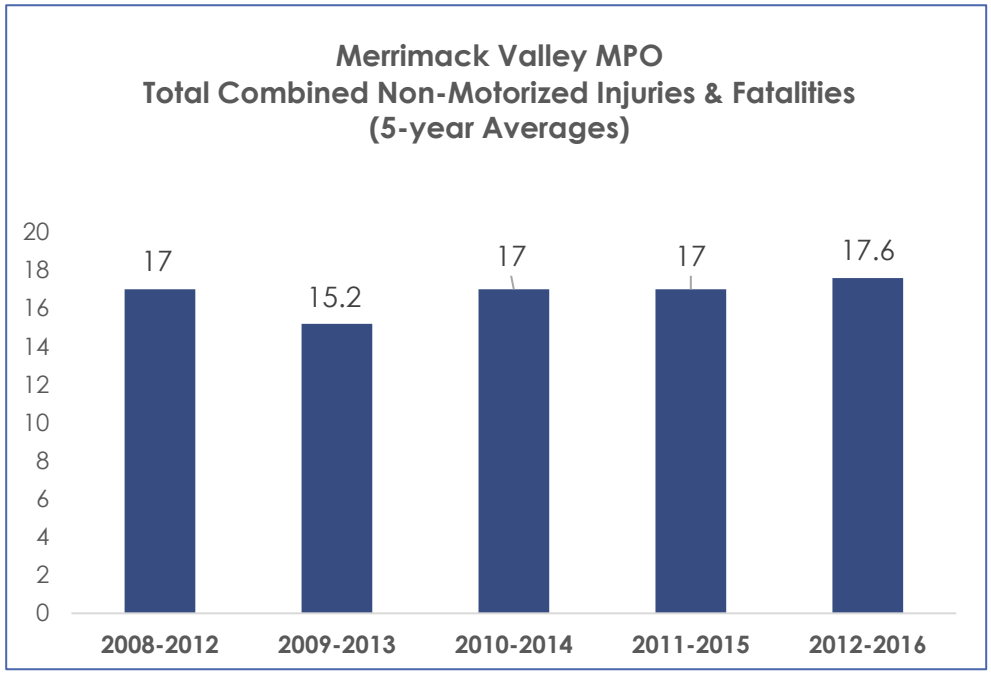
Figure 7.5 Statewide Combined Cyclist and Pedestrian Fatalities and Injuries



This trend is also evident in the MVMPO Region over the same period.

Massachusetts and MVMPO Region rates for Combined Non-Motorized Injuries & Fatalities could not be determined given the absence of data on bicycle and pedestrian person miles traveled.

Figure 7.6 MVMPO Combined Cyclist and Pedestrian Fatalities and Injuries



MassDOT Crash Clusters

For many years, MassDOT has developed lists of 'Crash Cluster' locations in the state. These locations are identified based on the number and nature of crashes using the latest three years of crash data available. MassDOT develops three such lists. One identifies locations where there are a high number of crashes between motor vehicles. Other lists identify the locations of crashes between motor vehicles and pedestrians and between motor vehicles and bicyclists.

The MVMPO has used these lists as the primary source of in information in identifying high crash locations on the region's roadway network. In particular, MVPC staff uses this information to identify sites for upcoming traffic studies, Road Safety Audits, or other analyses.

Roadway Crash Cluster Locations in MVMPO Region

MassDOT has identified 60 Roadway Crash Cluster locations in the Merrimack Valley region based upon crash data from 2014-2016. These locations were identified based upon their Equivalent Property Damage Only (EPDO) scores. Those intersections and roadway segments with scores that are in the Top 5% of all such locations in the MVMPO Region appear on this list. This is significant in that these locations are therefore eligible to receive federal Highway Safety Improvement Program (HSIP) for any improvements that are to be made.

MassDOT slightly revised the way that it calculated EPDO Scores for each location in developing its 2014-2016 Crash Cluster list. Each crash that involved a fatality, serious injury, or non-serious injury was given a value of 21 points while all crashes that involved property damage received just one point. This was done in an effort to better identify those locations that had a higher incidence of injuries and fatalities.

The table on the following pages shows the 60 Roadway Crash Cluster locations in the MVMPO region along with the nature of the severity of the crashes. In addition, MVPC staff has identified the status of efforts to develop or implement improvements for each location identified (Table 7.1 below).

Table 7.1: Summary of Actions Taken for 2014-2016 Roadway Crash Cluster Locations

Summary of Status of 2014-2016 Roadway Crash Cluster Locations

Status	No.
Upcoming Study/RSA	5
Study/RSA Completed	16
Project in Design or in TIP	8
Project Completed	10
No Actions Taken	21

This table shows that 39 of the 60 Roadway Crash Cluster locations in the region have either been analyzed, will be studied, are in the process of being improved or have recently been improved.

Table 7.2: 2014-2016 Roadway Crash Clusters in MVPC Region by EPDO Score

Community	Crash Cluster Location	Fatal/ Serious Injury	Non-Serious or Possible Injury	Property Damage Only	EPDO Score	Upcoming Study/ RSA	Study/RSA Completed	Project in Design or in TIP	Project Completed
Rowley	Rt. 1 @ Rt. 133	1	11	18	270		●		
North Andover	Rt. 125 @ Mass Ave.	2	10	17	269			●	
Haverhill	Rt. 125 Connector @ Ward Hill Ave/Shelley Rd.	0	11	25	256	●			
Lawrence	Bennington @ Park St.	2	10	4	256				●
Lawrence	Spruce @ Park St.	2	10	4	256				
Salisbury	Main St. @ Toll Rd.	1	10	22	253				
Haverhill	Rt. 97 @ Rt. 110 (White St.)/Emerson St.	2	8	19	229		●		
North Andover	Rt. 114 @ Rt. 133 (Peters St.)	1	9	15	225			●	
Lawrence	Rt. 28 @ Lowell St.	1	8	16	205	●			
Lawrence	Rt. 28 @ Essex St.	1	8	15	204		●		
Methuen	Rt. 110 @ Burnham Rd./Green St.	0	9	13	202		●		
Haverhill	Rt. 125 @ Winter St./Summer St.	0	8	33	201				●
Haverhill	Rt. 125 @ Ginty Blvd/Bailey Blvd	0	8	31	199				●
Lawrence	Rt. 28 @ Daisy St./Manchester St.	0	9	8	197				
Methuen	Rt. 28 @ Osgood St./Charles St.	0	8	23	191		●		
Methuen	East St. @ Prospect St./Milk St.	0	8	21	189				
North Andover	Rt. 114 @ Rt. 125 (Andover St.)/Elm St.	0	8	21	189			●	
North Andover	Rt. 114 @ Rt. 125 (Andover Bypass)	0	8	21	189			●	
Lawrence	Hampshire St. @ Center St.	0	8	16	184				
Haverhill	Rt. 125 @ Primrose St.	0	8	15	183	●			
Methuen	Rt. 113 @ Jackson St./Pleasant St/Howe St./	0	7	35	182		●		
Lawrence	Commonwealth Dr. @ Marston	1	7	12	180			●	
Haverhill	Rt. 125 @ Boston Rd./Ferry Rd.	0	8	10	178				●
North Andover	Mass Ave. @ Waverly Rd.	1	7	10	178				
North Andover	Rt. 114 @ Mill Rd.	0	8	9	177			●	
Lawrence	Amesbury St. @ Canal St.	1	7	5	173				
Lawrence	Rt. 28 @ Rt. 110 (Haverhill St.)	0	7	12	159		●		

Table 7.2 2014-2016 Roadway Crash Clusters in MVPC Region by EPDO Score (Continued)

Community	Crash Cluster Location	Fatal/ Serious Injury	Non-Serious or Possible Injury	Property Damage Only	EPDO Score	Upcoming Study/ RSA	Study/RSA Completed	Project in Design or in TIP	Project Completed
Groveland	Rt. 97/113 @ Salem St.	2	5	11	158				●
Haverhill	Rt. 110 @ Washington Ave./Washington St.	1	5	31	157	●			
Methuen	Rt. 28 @ Rosewood St.	0	6	30	156		●		
Lawrence	Rt. 28 @ Tremont St.	0	7	7	154		●		
Lawrence	Milton St @ Lowell St.	1	6	7	154				
Lawrence	Salem St. @ Newton St.	1	6	5	152				
Lawrence	Rt. 110 (Haverhill St.) @ Lawrence St.	0	7	3	150	●			
Lawrence	S. Union St. @ Merrimack St.	0	6	19	145				●
Haverhill	Rt. 125 @ S. Elm St/Salem St.	1	5	16	142				●
Lawrence	Union St. @ General St.	2	4	15	141				
Haverhill	Rt. 125 @ Water St./Merrimack St.	0	6	14	140				●
Lawrence	Rt. 28 @ Shattuck St.	1	5	11	137				
Lawrence	Rt. 28 @ Andover St.	0	6	10	136				
Lawrence	Ames St. @ Essex St.	0	6	9	135			●	
Andover	Rt. 28 @ I-495 Ramps	1	5	8	134				
Andover	North St. @ Mt. Vernon St./Greenwood Rd.	0	6	7	133				
Lawrence	Rt. 114 @ Market St.	0	6	6	132				
Andover	Dascomb Rd. @ Smith Way	1	5	5	131		●		
Haverhill	Rt. 110 @ Lowell Ave.	0	5	26	131		●		
Lawrence	Rt. 114 @ Chickering St.	0	6	3	129				
Lawrence	Franklin St. @ Common St.	0	6	3	129				
Lawrence	Rt. 28 @ Water St./Canal St.	0	5	17	122		●		
Lawrence/North Andover	Rt. 114 @ Waverly Rd.	1	4	17	122			●	
Haverhill	Rt. 97 @ Primrose St.	0	5	16	121				
Methuen	Pleasant Valley St. @ Milk St./Loop	0	4	36	120		●		
Haverhill	Hilldale Ave. @ Rt. 97 (Lafayette	0	5	14	119		●		

Table 7.2 2014-2016 Roadway Crash Clusters in MVPC Region by EPDO Score (Continued)

Community	Crash Cluster Location	Fatal/ Serious Injury	Non-Serious or Possible Injury	Property Damage Only	EPDO Score	Upcoming Study/ RSA	Study/RSA Completed	Project in Design or in TIP	Project Completed
Methuen	Rt. 113 @Railroad St./Pelham St. /Hampshire St.	0	5	14	119		●		
Methuen	Rt. 110 @ Rt. 113 (W of former Rotary)	0	5	13	118				●
Lawrence	Rt. 114 @ Merrimack St.	1	4	12	117				
Haverhill	Rt. 110 @ Lawrence	0	5	11	116				
Methuen	Pelham St. @ I-93 NB Ramps	0	5	11	116				
Lawrence	Lawrence St. @ Arlington St.	1	4	10	115				
Methuen	Rt. 110 @ Prospect St.	0	5	9	114				

Locations that have EPDO Scores of 175 or greater and have NOT been analyzed include:

- Spruce St. @ Park St. in Lawrence
- Main St. @ Toll Rd. in Salisbury
- Rt. 28 @ Daisy St./Manchester St. in Lawrence
- East St @ Prospect St./Milk St. in Methuen
- Hampshire St. @ Center St. in Lawrence
- Massachusetts Ave. @ Waverly Rd. in North Andover

The MVMPO will consider including these sites in developing the MPO's FFY 2021 Unified Planning Work Program.

Motor Vehicle/Pedestrian, Bicycle Crash Cluster Locations

In addition to tracking Motor Vehicle Crash Clusters in the Commonwealth, MassDOT also uses the Crash Cluster approach to identify locations where there are concentrations of crashes between motor vehicles and pedestrians and between motor vehicles and bicycles. Improving the overall safety for these two modes is particularly important in supporting the Commonwealth's efforts to double the percentage of people that are walking or traveling by bicycle.

Table 7.3 shows the nine Pedestrian Crash Clusters that were identified by MassDOT based upon 2007-2016 crash data. All these clusters are located in the two largest communities, Lawrence and Haverhill.

The downtown Haverhill area extending north from Washington Square and out along Routes 97 and 110 has the highest EPDO score of any pedestrian cluster in the region. This is followed by the Route 28 Corridor in downtown Lawrence between Methuen St. and Green St.

In recent years the MVMPO has conducted traffic studies or Road Safety Audits and/or completed projects in six of the nine Pedestrian Crash Clusters. These include:

- Winter St.(Route 97) @ White St. (Route 110) Intersection Study in Haverhill
- Route 28 @ Haverhill St. RSA in Lawrence
- Route 28 @ Water and Canal St. RSA in Lawrence
- Lafayette Square RSA in Haverhill
- Main St. Corridor Intersection Improvements in Haverhill
- South Main St. Reconstruction in Haverhill

All four of the Bicycle Crash Cluster locations in the MVMPO region are located in the City of Haverhill and two (Route 97 &125 Corridor and Route 97 Corridor) overlap with identified pedestrian Clusters.

The MVMPO has conducted traffic studies or Road Safety Audits and/or completed projects in three of the four Bicycle Crash Clusters.

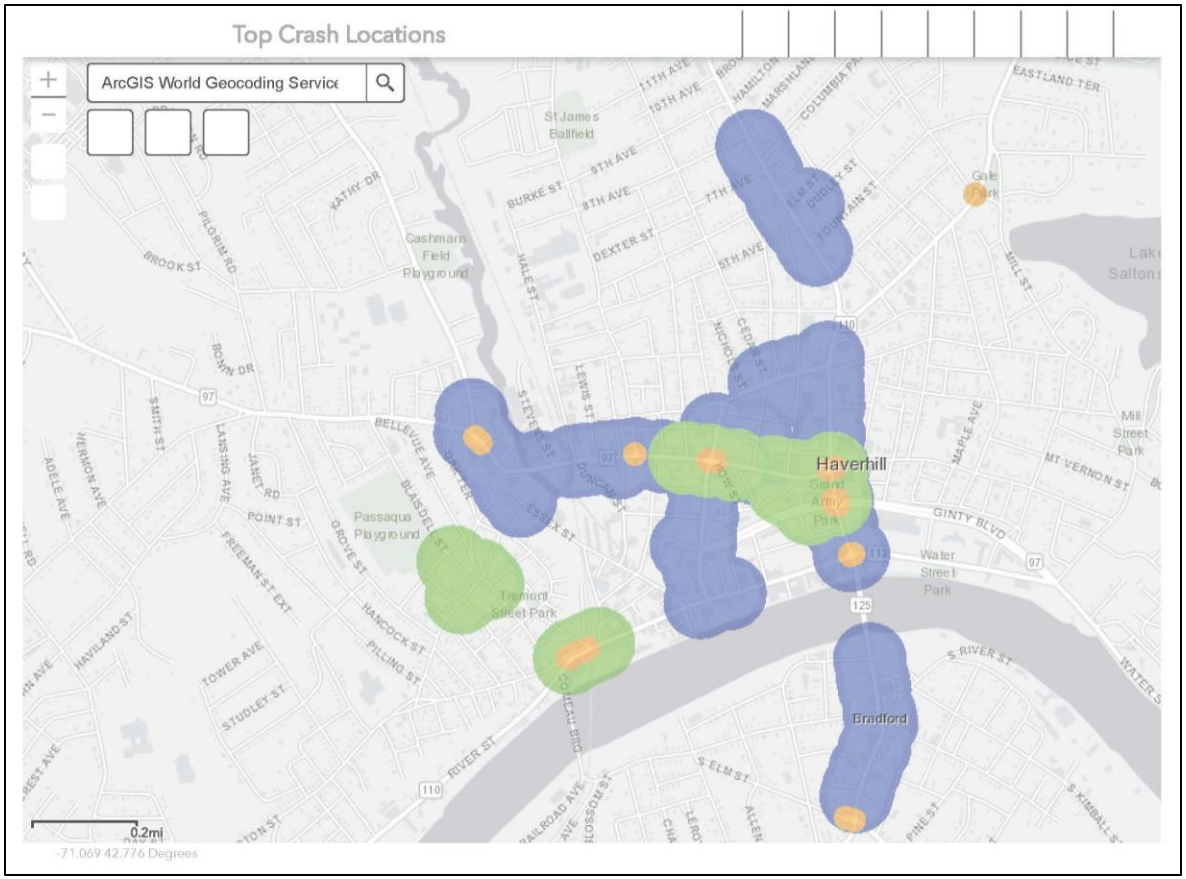


Photo: Image taken from MassDOT's crash cluster map on-line that shows both bicycle and pedestrian crash clusters in the City of Haverhill (https://gis.massdot.state.ma.us/topcrashlocations/).

Table 7.3: MVMPO Region 2007-2016 Bicycle and Pedestrian Crash Clusters

Merrimack Valley MPO Region 2007-2016 Bicycle Clusters

City	Name	Limits	Fatal/ Serious Injury	Non-Serious or Possible Injury	Property Damage Only	EPDO Score	Study/RSA Completed	Project in Design or in TIP	Project Completed
Haverhill	Rt. 97/Rt. 125 Corridor	Nichols St. to Newcomb St. to Parkway	0	7	3	150			●
Haverhill	Rt. 97 Corridor	Locust St. to Nichols St.	0	5	2	86	●		
Haverhill	High St. Corridor	Jackson St. to Arch St.	4	4	0	84			
Haverhill	Railroad Sq.	River St. to Wingate St./ Washington St.	1	2	3	66	●		

Merrimack Valley MPO Region 2007-2016 Pedestrian Clusters

City	Name	Limits	Fatal/ Serious Injury	Non-Serious or Possible Injury	Property Damage Only	EPDO Score	Study/RSA Completed	Project in Design or in TIP	Project Complete
Haverhill	Rt. 97/Rt. 110 Area	Lafayette Sq. to Main St./Washington St.	4	36	17	857	●		
Lawrence	Rt. 28 Corridor	Methuen St. to Green St.	5	17	7	469	●		
Haverhill	Rt. 125 Corridor	Cherry St. to Monument Sq.	4	14	1	379			
Haverhill	Rt. 125 Corridor	Cherry St. to Merrimack River	2	14	10	346			●
Haverhill	Lafayette Sq.	Oak Ter. To Hale St.; High St.	1	13	10	304	●		
Lawrence	Park St. Corridor	Kendrick St. to Walnut St.	2	10	4	256			●
Haverhill	Rt. 125 Corridor	Merrimack River to Salem St.	1	9	5	215			●
Haverhill	Rt. 125 Corridor	Marshland St. to Howard St.	0	10	6	213			
Lawrence	Downtown Area	Amesbury St. to Jackson St.	2	8	3	213			

Safe Routes to School

One of the strategies that the MVMPO region and the state are employing to increase bicycle and pedestrian safety through the Safe Routes to School Program. Ten Merrimack Valley communities are now participating in the state Safe Routes to School program. In addition, active community participation has increased with the roll out of increased walking audits and school arrival/dismissal evaluations. In addition, the City of Lawrence hosted the national Safe Routes to School workshop at the Arlington School.

Several communities have participated in the infrastructure program. North Andover and Lawrence were early participants. Lawrence has continued to explore these projects as is the City of Haverhill. The City of Newburyport is a recipient of the most recent infrastructure project, which is on the 2019 TIP.

Strategies that should be explored include:

- Increase school zone visibility and uniformity across school districts and the region
- Increase pedestrian visibility by not allowing parking around crosswalks, designing a procedure for regularly monitoring sidewalk vegetation in and around schools, and using inroad pedestrian signage
- Increase air quality through a No Idling campaign
- Consider snow ordinances for sidewalk and crosswalk accessibility in and around schools
- Work with SRTS to encourage school policy directed toward codifying school traffic safety and mitigation.

Photos: (Top) Safe Routes to School course in Lawrence and walking audit during the course (bottom). Source: Massachusetts Safe Routes to School: *National Course Report, June 5, 2018.*

Massachusetts Strategic Highway Safety Plan

Created under SAFETEA-LU and continuing in the FAST Act, the Highway Safety Improvement Program (HSIP) is designed "to achieve a significant reduction in traffic fatalities and serious injuries on all public roads." Funds may be used for design and/or construction of projects on any public road or publicly owned bicycle and pedestrian pathway or trail.

A key component of the HSIP is the State Highway Safety Plan (SHSP), which is a "data-driven" document that "provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads".

The Massachusetts 2018 SHSP updates the safety goals and targets that were established in the 2013 document using crash and other data collected in the Commonwealth over the past five years.

As noted earlier in this chapter, Massachusetts has been successful in reducing the rate of serious injuries and fatalities over the years, but this has become more difficult given the increase in traffic on Massachusetts roadways as a result of the Commonwealth's robust economic growth.

MassDOT has identified 14 Emphasis Areas in its 2018 SHSP:

- Bicyclists
- Heavy Trucks
- Older Drivers
- Impaired Driving
- Motorcycle Crashes
- Pedestrians
- Speeding/ Aggressive Driving
- Driver Distraction
- Lane Departures
- Younger Drivers
- Intersection Crashes
- Occupant Protection
- Rail Grade Crossings
- Safety of Persons Working in Roadways

In an effort to attain the more stringent goals and targets for fatalities and serious injuries contained in the 2018 SHSP, MassDOT is proposing five new legislative measures to reduce the number and severity of crashes in the state. These are:

- Hands Free policy for motorists using mobile devices
- Primary Seat Belt enforcement
- More stringent Work Zone Safety Rules
- Ignition Interlock for All Offenders
- Truck Side Guards for certain heavy vehicles registered in the state
- Giving municipalities option of using Automated Enforcement using cameras and radar.

Under its FFY 2020 Unified Planning Work Program, the MVMPO will review data for the MVMPO region within each of the 14 Emphasis Areas and compare it to the statewide data shown in the SHSP.

MVRTA Transit

The MVRTA measures safety by tracking preventable accidents. An accident is considered preventable when the operator has failed to do everything reasonable to prevent the accident.

The MVRTA has set a benchmark of 2.04 preventable accidents per 100,000 miles for the Fixed Route Bus Service.

Figure 7.7 MVRTA Fixed Route Preventable Crashes per 100,000 Miles

Source: MVRTA.com

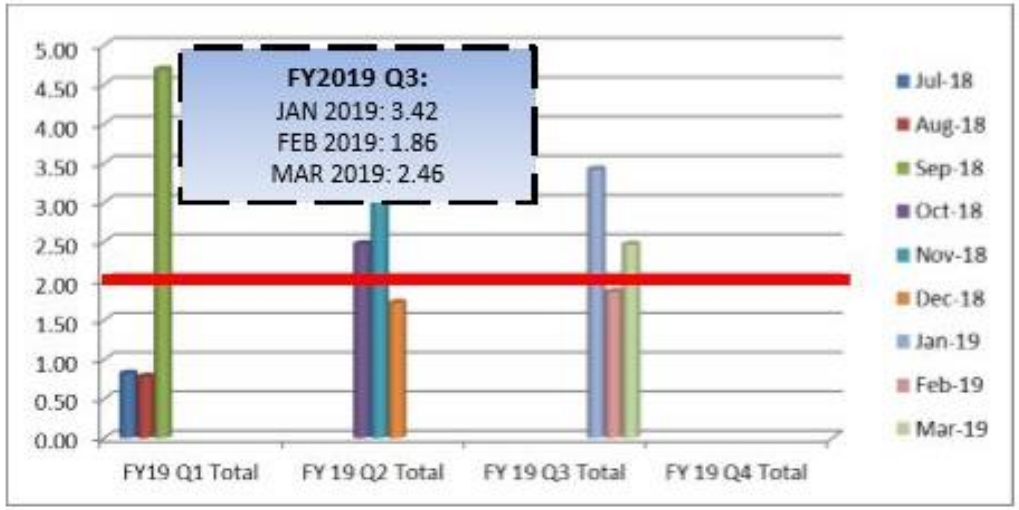
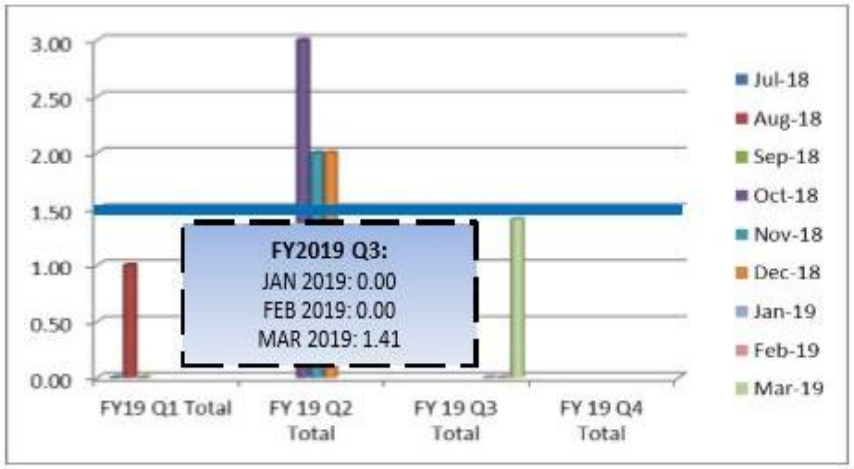


Figure 7.7 shows the performance of the MVRTA in preventing crashes on its Fixed Route bus service for the first three quarters of State Fiscal Year (SFY) 2019 (July 2018 - March 2019). It met its safety target in four of the nine months evaluated in SFY 2019

The MVRTA has set a benchmark of 1.50 preventable accidents per 100,000 miles for the Paratransit Service.

Figure 7.8 shows the performance of the MVRTA in preventing crashes on its Paratransit Services for the first three quarters of State Fiscal Year 2019 (July 2018 - March 2019), with a focus on the Third Quarter (January – March 2019). The data shows that the Authority has met or exceed its target for six of the nine months of evaluated in SFY 2019.

Figure 7.8 MVRTA Paratransit Preventable Crashes per 100,000 Miles



Source: MVRTA.com

Roadway Rail Crossings

Trains are very heavy and take a long time to stop when the brakes are applied. Depending on its speed, it is likely that it will not be able to stop for something on the tracks by the time the train operator sees the obstruction.

While occurring infrequently, there have been six crashes involving passenger or freight trains at at-grade roadway crossings in the Merrimack Valley in the past ten years. Two of the six crashes occurred at the same crossing, Andover Street near the PanAm Railways Rail Yard in South Lawrence. In one crash, the car driver went around the gates that were already down, while in the other the driver was stuck in traffic and the gate came down on the car.

The one fatal accident involved a pedestrian trespasser. The two accidents with injuries involved drivers going around railroad crossing gates that were already down.

The nature of these crashes highlights the need for people to obey the laws and not trespass on the tracks, and not go around crossing gates that are down and if the road is congested, do not proceed until the vehicle can cross the tracks completely before needing to stop.

Strategies for Progress

- **Conduct safety audits and other studies at high crash locations.**
- **Work with communities to ensure that they are implementing recommendations.**
- **Identify the severity of injuries related to crashes.**
- **Increase the number of schools participating in the Safe Route to School program.**

Page left blank.

Chapter 8

Goal 3: Create a Multi-Modal Transportation System to Support Mode Shift

Creating a dynamic transportation system requires offering a variety of transportation choices and connections between them. Improving opportunities for people to walk and bicycle will encourage more people to choose these modes, thus promoting environmental sustainability and encouraging healthier lifestyles. Collaborating with our member communities and MassDOT, the MVMPO seeks to create a flexible and seamless multi-modal transportation network for people of all ages and abilities.

Several plans have informed the work of the MPO over the years and projects have emerged from the public participation process. These plans include:

- Active Transportation Plan (2015)
- Merrimack River Reconnaissance Plan (2011)
- Comprehensive Economic Development Strategy (2018-2023)
- Priority Growth Strategy (2015)
- MassDOT Statewide Bicycle and Pedestrian Plans (2019)
- MVRTA Regional Transit Plan (2015)

Photo: The Garrison Trail along I-95's Whittier Bridge opened in October 2018.

Objective 3.1: Implement and Expand Multi-Modal Network.

In the Merrimack Valley, creating a dynamic multi-modal network requires:

- Building a multi-use trail network and regional connections.
- Increasing options for taking short trips by walking, bicycling and transit through Complete Streets.
- Promoting connections between modes.

Multi-Use Trail Network and Regional Connections

Multi-use trails are considered non-motorized transportation corridors connecting destinations, such as train stations, downtowns, employment centers and residential neighborhoods. Together with our member communities, the MVMPO has focused on developing a network of multi-use connecting corridors, often along former rail rights-of-way.

For years, the MVMPO has supported the work of local and regional trail development throughout the region. This has taken the form of feasibility studies, coordinating committees and support during the TIP development process.

The *Coastal Trails Network* incorporates on- and off-road segments that connect four communities – Amesbury, Salisbury, Newburyport and Newbury. Portions of this network include the Border to Boston Trail.

Border to Boston Trail is a multi-use trail connecting the Merrimack Valley communities of Salisbury, Newburyport, Newbury, Georgetown and Boxford to trails south into Boston and north into New Hampshire. This trail also serves as a section of the East Coast Greenway (Maine to Florida).

The *Georgetown Branch Trail* connects the Bradford Train Station to downtown Georgetown, where it intersects with the Border to Boston Trail. This corridor includes the Bradford Rail Trail and the Groveland Community Trail and will also include a side path being designed along Route 97 in Georgetown.

The combined development of the M&L Branch Trail, Spicket River Trail and Shawsheen River Trail from Methuen south through Lawrence and Andover would create a significant sub-regional multi-modal transportation system connecting

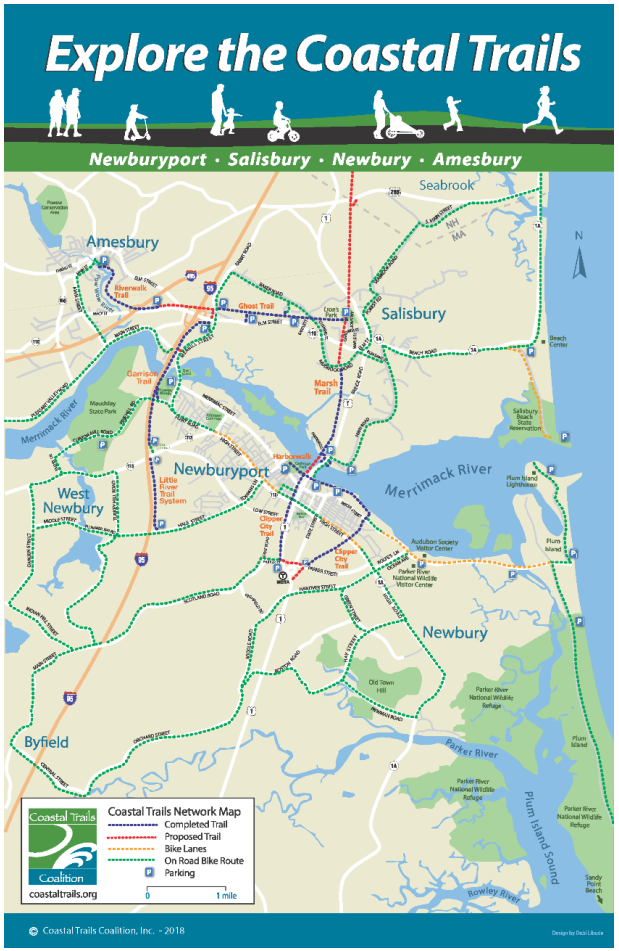


Photo: The Coastal Trails Network is the most intricately planned network in the Merrimack Valley.

jobs, recreation areas, grocery stores, transit hubs and more. In addition to the Massachusetts sections, the rail-trail continues into New Hampshire and provides access to additional jobs and recreational opportunities.

Measuring Success

In the Merrimack Valley Region, approximately 40 miles of multi-use trail are in some stage of conception, planning, design, construction, or have been completed and are open to the public. Funding for these projects has largely come from federal transportation funds that include MVMPO target TIP funds, but also statewide funding allocated by MassDOT through the bridge program (Garrison Trail) or statewide Congestion Mitigation and Air Quality funds. Since the 2016 RTP, several trails segments have either opened or have begun construction:

- Methuen Rail Trail
- Garrison Trail (along I-95)
- Bradford Rail Trail Phase I
- Clipper City Rail Trail (under construction)
- Salisbury Eastern Marsh Trail Phase 2
- Salisbury-Amesbury Trail Connector

The MVMPO's target for trail development was to complete 10 miles of trail in 5 years (by 2020). Of the 39.55 miles included in this trail network, 43% of the miles are now open for public use. Six miles of trail have been constructed since the last RTP. An anticipated 2.8 miles are under construction, just short of the 10-mile goal. However, an additional 7.75 miles have been programmed on the 2019-2023 TIP. Still, several projects remain in the conceptual stage and require additional work with feasibility studies and design.

To date, no comprehensive counting program has been implemented. The MVMPO has not yet invested in bicycle and pedestrian counting technology. Staff has investigated video technology, which is cost prohibitive. Tubes have been tested on Newburyport's Clipper City rail trail. Staff has also requested guidance from MassDOT on preferred counting technology. For pedestrian studies, the MVMPO staff have used police video recordings at one intersection and manual counting techniques.

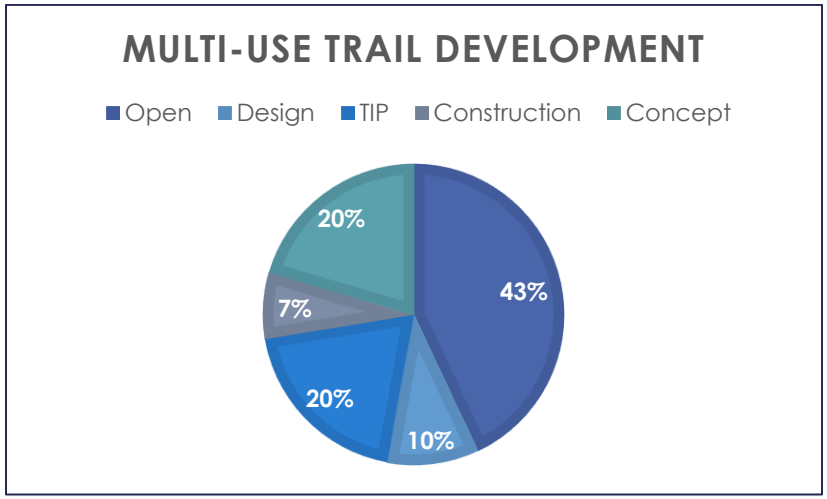


Figure 8.1: Multi-Use Trail Development

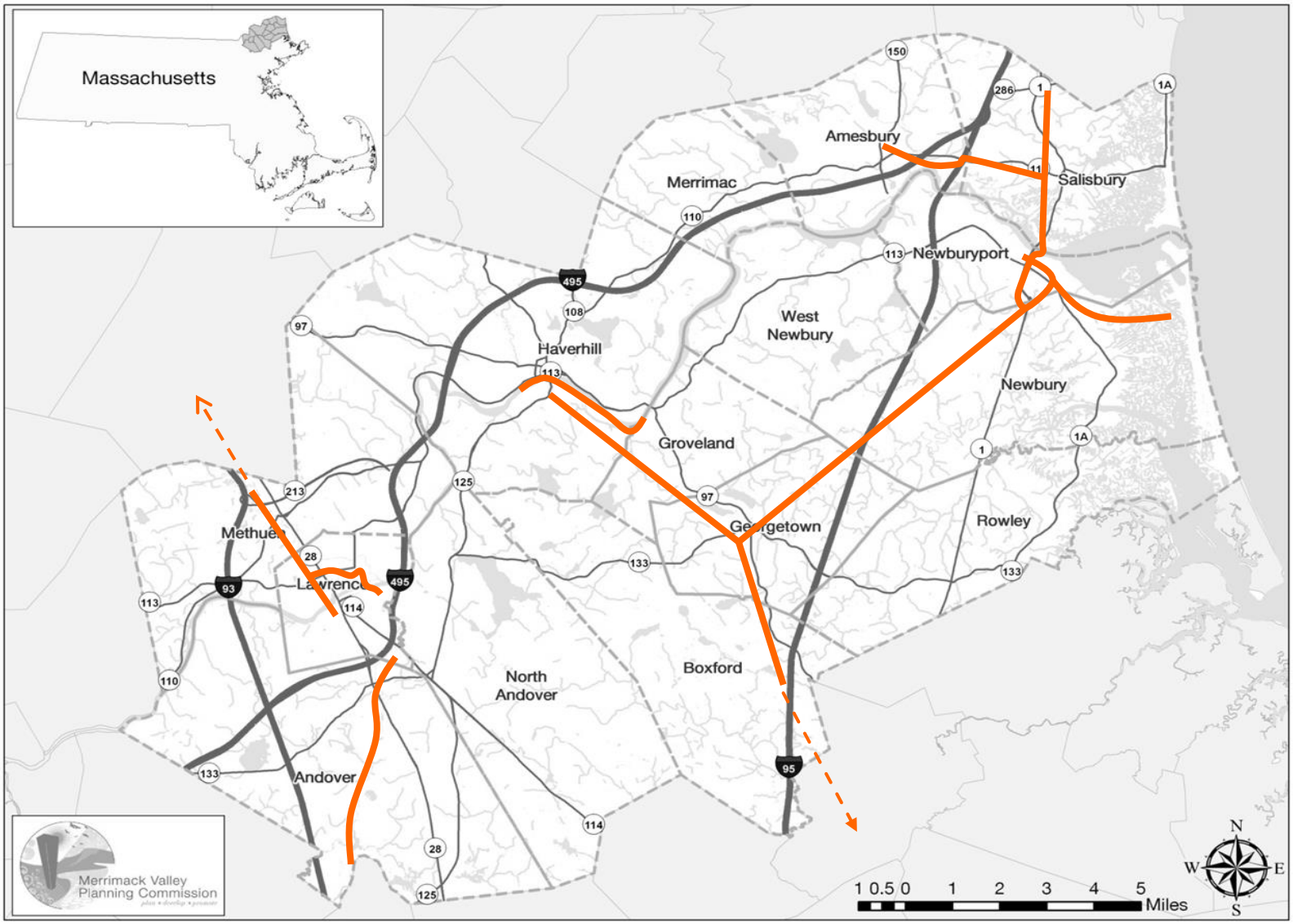


Figure 8.2: The trail system connects many destinations and to other regional trails. More information can be found in the Statewide Bicycle Plan as well as in the Bicycle Inventory interactive map (currently being updated) found on GeoDOT.

Complete Streets

Complete Streets are an integrated network of streets designed and operated for all users, including young, elderly, people in wheelchairs, and all modes, such as bicyclists, pedestrians, cars, trucks and emergency vehicles. Complete Streets are an important part of creating a multi-modal network and is fully supported and promoted by MassDOT. MassDOT created a funding program that requires the adoption and implementation of a local Complete Streets policy and prioritization plan. To date, **nine of the15 Merrimack Valley communities are at some stage of participation in the program.** Salisbury, Lawrence and Merrimac have been awarded Complete Streets funding through the state program.

Complete Streets are considered for all current and future projects. Road safety audits and other roadway studies include Complete Streets elements. MVMPO staff continues to work with MassDOT District 4 staff to identify Complete Streets elements that need to be included in state projects.

To help our communities with their prioritization plans and complete streets work, the MVMPO received a grant from the Executive Office of Energy and Environmental Affairs to collect data on the conditions of sidewalks in seven Merrimack Valley communities. More information on this can be found in the State of Good Repair chapter.

Active Transportation Network (ATN)

In 2015, MVPC published the ATN, which prioritized those rights-of-way that are important for creating a system that connects communities. Many of these connections go beyond trail work and require complete streets, sidepaths, completed sidewalks, etc. The ATN will be updated in FY 2020.

Photo: Before/After visualization of High Street Safe Routes to School Project in Newburyport (Source: MassDOT/TEC)

Table 8.7 Complete Streets Components of Proposed Projects

Project	Community	Project Detail
Funded Projects		
Elm Street Reconstruction	Amesbury	New sidewalks; reconstruction of existing sidewalks
Route 133 (Lowell Street) Reconstruction: Lovejoy Road to Shawsheen Square	Andover	New sidewalks and bike lanes
Route 133 (Washington Street) N. Andover T.L. to Main Street, 1.45 miles	Boxford	New Sidewalks and bike lanes
Route 97 from Moulton Street to Groveland T.L.	Georgetown	New two-way side path
North Avenue from Marsh Avenue to MA/NH Boundary	Haverhill	New sidewalks
Route 108 /Route 110 Intersection Reconstruction	Haverhill	Truck, pedestrian and bicycle accommodation
Reconstruction of Water Street from Mill Street to Lincoln Blvd./Riverside Ave.	Haverhill	Enhanced bicycle and pedestrian accommodation
Intersection improvements at Broadway/Mt. Vernon Street/McKinley Street	Lawrence	Enhanced pedestrian accommodation.
Route 114 Reconstruction: I-495 to Waverly Road	Lawrence/ N. Andover	New sidewalks and bicycle accommodation
Intersection Improvements: Merrimac Street at Route 1 NB/SB ramps	Newburyport	Sidewalk, crosswalk and bicycle accommodation
Route 1 Rotary Reconfiguration with improved bike/ped/trail access	Newburyport	Bicycle and pedestrian access across rotary
Route 114 Improvements from Andover Street to Stop & Shop Driveway	N. Andover	New sidewalks and bicycle accommodation
Route 133/Route 125 Intersection Improvements	North Andover	Improved pedestrian crossings, bicycle accommodation
Reconstruction of Central Street & Glen Street: Route 1A to the Mill River.	Rowley	New sidewalks and bicycle accommodation
Route 1 Reconstruction from Salisbury Square to MA/NH Boundary	Salisbury	New sidewalk and bicycle accommodation
Unfunded Projects		
Water Street between Mill Street and Riverside Street; Buttonwoods Trail	Haverhill	Enhanced bicycle and pedestrian accommodation
MA-97, Research Drive to Computer Drive	Haverhill	New sidewalks
Merrimack Street (Broadway to South Union St)	Lawrence	Bicycle and pedestrian side path
Intersection of Broadway, Water St and Canal St	Lawrence	Pedestrian crossing to accommodate trail crossing.
Reconstruction of Market Street from Loring Street to South Union Street	Lawrence	New sidewalks
Reconstruction of Oregon Ave./ Floral Street / Doyle Street/ Hancock St/ School Street intersection	Lawrence	Pedestrian improvements
MA-133 from US-1 to US-1A	Rowley	New sidewalks
MA-133 from Georgetown Line to Newburyport Turnpike (US-1)	Rowley	New sidewalks
MA-110 from Merrill Street to Salisbury Square	Salisbury	New sidewalks
US-1 Reconstruction from Square south to Newburyport Line	Salisbury	New sidewalks

State Bicycle and Pedestrian Plans

MassDOT's draft statewide bicycle and pedestrian plans focus on improving safety and accessibility for every day trips only along MassDOT-owned roads. Priority corridors include:

- Route 28 in Andover, Lawrence and Methuen
- Route 110 in Amesbury, Haverhill, Lawrence and Methuen
- Route 125 in North Andover
- Route 114 in Lawrence and North Andover
- Route 113 in Groveland
- Newburyport Route 1 connecting to downtown Newburyport

Bike Share

While bike share programs have not yet made it to the Merrimack Valley, a few communities are investigating this option. These services may be useful for example in those communities where bike ownership is low or alternatively

Photo: Bike rack at Ballardvale commuter rail station is outdated.

where tourists could take advantage of better bicycle access.

The MVRTA's new bike racks on its buses will further enhance the connection between these two modes of transportation.

Strategies for Progress

- **Implement a bicycle/pedestrian counting program.**
- **Support completion of multi-use trail network.**
- **Support implementation of Active Transportation Network, state bicycle and pedestrian corridor priorities and Complete Streets in the region.**

Objective 3.2: Increase Bicycle Parking

Creating better connections among different modes of transportation will lead to a more efficient, equitable, and user-friendly transportation system. Ample, safe, and convenient bicycle parking adds tremendous value to a bicycle network, promotes bicycle trip making, and prevents bicycle parking in unwanted places. In the MVMPO region, bicycle parking is typically found at libraries and transit stations, but it is hard to find ample parking in downtown

districts or village centers. In addition, the type of parking available varies and is sometimes not useable.

Table 8.2: Bicycle Parking at Park & Ride Lots and Commuter Rail Stations

Community	Location	No. of Parking Spots	Bikes Parked	Comments	Connected to Other Bike Facilities (trails/lanes, etc.)
Commuter Rail					
Andover	Railroad Ave	28	7	10 sheltered	No
Andover	Ballardvale	24	6	Old school style	No
Haverhill	Bradford	4	0		Yes (Bradford Rail Trail)
Haverhill	Railroad Square	11	0	6 sheltered	No
Haverhill	MVRTA Intermodal Center Granite St	18	3		No
Lawrence McGovern	Merrimack St	9	1		Yes (bike lane)
Newburyport	Lot A	11	0		Yes (Clipper City Rail Trail)
Newburyport	Lot B	7	0		Yes (Clipper City Rail Trail)
Rowley	Railroad Ave	7	6		No
Park & Ride Lots					
Andover	Dascomb Road	6	0	Sheltered	No
Andover	Shawsheen Square	0	0		Yes (bike lane)
Andover	Faith Lutheran Church	0	0		No
Methuen	Pelham St	6	0	Unusable	No
Newburyport	Storey Ave	7	3		Yes (Garrison Trail)

Note: Counts were taken on 3/27/19 and 4/10/2019. No precipitation and temperatures were 45 degrees and 43 degrees Fahrenheit respectively.

In 2017, the MVMPO joined other regional planning agencies participating in the Metropolitan Area Planning Council's (MAPC) bicycle parking program, which offers discounted bicycle parking. To date, no Merrimack Valley communities have taken advantage of this program. In 2019, the MVMPO included a project on the 2019 element of the TIP to purchase racks for all MVRTA fixed route buses. In addition, bike racks will be purchased for the Buckley Transportation

Center, the McGovern Transportation Center and the Costello Transportation Center.

Measuring Success

The MVMPO counted the number of bicycles parked at park & ride lots as well as at transit centers. Table 8.2 provides data on the number of parking spaces available and the usage of the bike parking. Use of bicycle parking varies over the year. Currently, there are 138 spaces available with 20 additional spaces anticipated through the TIP funding process. The 2019 survey was taken in April, before the bicycle season was considered truly underway. Regardless, commuters (it is assumed) were bicycling to the commuter rail stations primarily, with three commuters bicycling to the Storey Avenue lot to catch a commuter bus.

Bicycle parking styles varies. The sheltered parking is consistently more popular at the Andover stations, which has three different parking areas. Commuters do park bicycles at the Ballardvale station, though that style rack is often referred to as a wheel bender. The bike rack at the Methuen park & ride lot needs to be moved. It is currently placed too close to the bus shelter, essentially hiding it and making it impossible to use properly.

Currently, only the In order to increase the use of the parking at the various locations, the MVMPO, MassDOT and communities should work together to improve bicycle access to the stations. Several projects have been implemented and a few more proposed that would increase access to these destinations including:

- Clipper City Rail Trail (completed)
- Bradford Rail Trail (completed)
- Garrison Trail (completed)
- Merrimack Street reconstruction, Lawrence
- Lawrence Rail Trail
- Route 1 Rotary redesign, Newburyport
- Shawsheen River Trail
- Railroad Street reconstruction, Andover

Strategy for Progress

- **Work with communities and agencies to increase bicycle access to stations and park & ride lots.**
- **Inventory locations of bicycle parking in city and town centers.**

Objective 3.3: Increase Efficiency and Effectiveness of Transportation Systems to Support Mode Shift

Merrimack Valley Regional Transit Authority

The MVRTA provides the bulk of transit service in the Merrimack Valley. Services include:

Fixed Route: MVRTA operates 17 local fixed bus routes, 4 intercity routes, 1 employment route and 1 seasonal beach bus. The majority of fixed bus routes provide service in the greater Lawrence and Haverhill areas. Regional routes connect Lawrence to Lowell (Route 41), Lawrence to Haverhill (Route 01), Haverhill to Amesbury (Route 51) and Amesbury/Newburyport/Salisbury (Route 54).

EZTrans: The MVRTA operates required on-demand ADA service within ¾ mile of the fixed bus route system to those qualified customers. Non-ADA service is provided beyond the ¾ mile area for those 65+ and/or qualified for ADA service.

Ring & Ride: This on-demand service is primarily operated in those Merrimack Valley communities not receiving fixed bus route service. Exceptions include Ring & Ride service in Methuen, Andover and North Reading.

Medi-Ride Service: In response to public input, the MVRTA instituted on-demand service from Merrimack Valley communities to Peabody- and Boston-based hospitals and medical centers.

Salem Employment: In response to public input, the MVRTA instituted an on-demand service for employment only along Route 28 in Salem, NH.

Boston Commuter Service: The MVRTA operates commuter bus from Methuen, Lawrence, Andover and North Andover to several destinations in downtown Boston.

Measuring Success

Ridership of the different services provided by the MVRTA mimics the overall trends across the country. Overall, **fixed route** ridership is down 5% from FY 2017 to 2018 (see Table 8.3). However, it was still 1% up over the five years FY14-18. It is not unusual for the fixed route system ridership to experience ups and downs, which often correspond with economic changes. However, the popularity of transportation network companies (TNCs) such as Uber and Lyft may be impacting ridership.

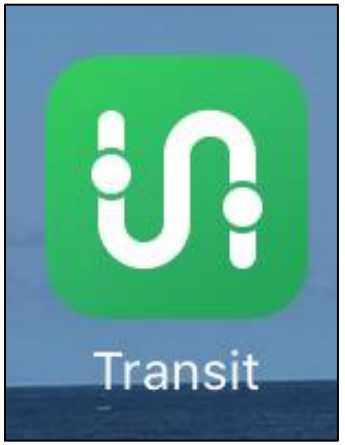


Image: Image of transit app used by MVRTA

Boston Commuter Bus service ridership service is at the lowest it has been since FY 2012. Job changes and more work from home policies have contributed to this reduction.

On the other hand, as the elder population grows, so too has the use of the ADA and non-ADA **on-demand** services (11% increase between 2017-2018). This trend is expected to continue through the time span of this document.

Service Improvements

In FY2018, the MVRTA implemented a real time bus location system, which is made available to the public through the Transit App. Further improvements are being made to this system. In addition, the MVRTA was awarded a MassDOT grant to implement technology to notify EZTrans of the actual arrival time of the van, which would increase efficiency and customer service.

Table 8.3: MVRTA Ridership FYs 2010-2018

Service	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Change 17-18
Fixed Route	1,758,689	1,770,678	1,912,293	1,954,667	2,024,281	2,175,917	2,285,958	2,157,133	2,046,556	-5%
Boston Commuter	45,052	48,749	52,175	63,470	63,207	62,994	65,627	63,104	60,765	-4%
Special Services	64,713	64,262	66,895	66,245	66,271	62,228	63,192	70,534	77,962	11%
Total	1,868,454	1,883,689	2,031,363	2,084,382	2,153,759	2,301,139	2,414,777	2,290,771	2,185,283	-5%

Mobility as a Service (MaaS)

Imagine convenient one-stop shopping for transportation on your phone. Finding the fastest, cheapest, most direct or healthiest transportation options could be at your fingertips. Options such as bike share, scooter share, transportation network companies (i.e. Uber, Lyft), ride sharing, transit, rail would be on the menu. Select the mode, book it and pay for it – all in one place. This is the future of transportation and will enhance people's ability to strategically use different modes of transportation.

The MVRTA has already taken the first step toward such a system by integrating its fixed route service with the *Transit* app, which will also provide access to Uber and Lyft rides. Other regional transit authorities around the country are beginning to allow riders to purchase trips using the app.

Milwaukee and Pittsburgh transit authorities have partnered with bike share companies on duel promotion, pay structures making it easier for people to use bike share as a 'last mile' solution when using transit that doesn't quite get them to where they need to go.

Transit is an important mode of transportation in the Merrimack Valley. It provides access to jobs and recreation as well as to essential services such as grocery stores, medical facilities, schools and social services. But in order to encourage people to use transit, it must be efficient and effective, convenient and safe.

Image: The Newburyport commuter rail station celebrates 20 years this year. The photo depicts the grand opening in 1999.

Commuter Service to Boston

Almost 12,000 people commute to Boston every day for work from the Merrimack Valley (ACS 20011-2015). Current choices for that commute include driving alone, carpooling, commuter bus and commuter rail. To encourage mode shift away from driving alone, it is important to offer efficient, affordable and convenient alternatives.

The services provided by the commuter coach companies as well as the Massachusetts Bay Transportation Authority (MBTA) and MVRTA provide a menu of options for accessing these alternatives as well as providing more than one option for destinations in Boston.

Commuter Rail

The MBTA provides commuter rail service between the Merrimack Valley and Boston's North Station along the Newburyport and Haverhill lines, serving seven stations. General observations include:

- Service is not 24-hours; it runs between 5:05 a.m. to 1 a.m.
- Only 15 trains run in one direction between Boston and Haverhill and 17 along the Newburyport line – compared to the Lowell line's 25 trains.
- Bicycles are allowed on most trains, though only on one train during the peak inbound commuting period. Bike racks are located at every commuter rail station and bike share bicycles can be found near North Station.
- The schedule does not allow for good reverse commuting, which has been a sticking point especially along the Haverhill line.
- Daily ridership counts show that boardings on the Newburyport line decreased by 6% between 2012 and 2018 and by 7% on the Haverhill line. (CTPS report)
- In 2018, the MBTA reduced parking prices to $2 on weekdays at the Bradford, Haverhill and Rowley stations and $2 on weekends for all Merrimack Valley stations.

Existing Conditions

To the east, the 27.7-mile **Newburyport** line operates between Boston's North Station and Newburyport, with only two stops in the Merrimack Valley at Rowley and Newburyport (the terminus). The MBTA operates 17 Newburyport to Boston inbound trains throughout the day. The first weekday train leaves at 5:20 a.m. and the last inbound train leaves at 11:30 p.m. Outbound trains begin arriving in Newburyport at 7:29 a.m. and the last one arrives at 1:18 a.m.

The MBTA allows bicycles on board on all non-peak period trains; only the 5:20 a.m. inbound train allows bicycles during the peak period. Outbound, bicycles are permitted on all trains except during between 4:30 p.m. and 6:45 p.m.

On the weekends, the MBTA runs 6 trains in and out of Boston to Newburyport with the first inbound train leaving at 8:56 a.m. and the last at 9 p.m. Outbound trains from Boston arrive between 10:34 a.m. and 11:24 p.m. Bicycles are allowed on all weekend trains.

During weekdays, the MBTA operates 15 inbound trains originating in **Haverhill** and making four additional stops in our region at Bradford Station (Haverhill), McGovern Center (Lawrence), Downtown Andover and Ballardvale Station (Andover). The first outbound train departs from Haverhill

Table 8.4: MBTA Commuter Rail Ridership Comparison 2012-2018

	All Inbound Boardings		
Station	**2012**	**2018**	**% Change**
Newburyport	538	463	-14%
Rowley	77	113	47%
Haverhill	386	290	-25%
Bradford	206	170	-17%
Lawrence	536	455	-15%
Andover	354	396	12%
Ballardvale	146	197	35%

Notes: Source: Central Transportation Planning Staff, 2018

at 5:05 a.m. and the last at 10:50 p.m. Beginning with the 9:05 a.m. train, Bradford, Downtown Andover and Ballardvale stations become flag stops. Bicycles are allowed on the 5:05 a.m. train and all trains from 9:05 a.m. and after.

Outbound trains begin arriving in Haverhill at 8:43 a.m. and end at 1:19 a.m. Bicycles are allowed on all trains except those between 3:15 p.m. (leaving North Station) and 7:40 p.m.

On the weekends, the MBTA operates 6 trains along the Haverhill line starting at 7:15 a.m. and ending at 10:15 p.m. Bicycles are allowed on all trains.

Table 8.5 Bus and Rail Options for Boston Commuting

Company	Type	Merrimack Valley Stops	Boston Destinations	Inbound Trips	Fare: one way/ multiride pass
Coach Co.	Bus	Georgetown Boxford	Haymarket, Government Ctr, Park Street, St. James Avenue, Copley Square	2	$8.20 Georgetown $8.70 Boxford
C&J	Bus	Newburyport	South Station, Logan Airport	22	$16/$114 (10 rides)
MVRTA	Bus	Methuen Park & Ride McGovern Transportation Ctr, Lawrence Broadway, Lawrence Mt. Vernon, Lawrence Shawsheen Square, Andover Faith Lutheran Church, Andover	Government Center Cambridge/Somerset Sts Park Street Stuart/Tremont Sts Park Place South Copley Square South Station	3	$6/$50 (10 rides)
MVRTA	Bus	North Andover: West Mill Massachusetts Ave	Government Ctr, Cambridge/Somerset Sts, Park Street, Stuart/Tremont Sts, Park Place South, Copley Square, South Station	1	$6/$50 (10 rides)
MBTA	Rail	Newburyport Rowley	North Station	17	$12.25 Newburyport $11.00 Rowley
MBTA	Rail	Haverhill Bradford Lawrence Andover Ballardvale	North Station	15	$11.00 Haverhill/Bradford $10.50 Lawrence $9.75 Andover $8.75 Ballardvale

Significant investments were made in the Haverhill line to double track the line. At this time, the line is double tracked in the Merrimack Valley, except for the Ballardvale Station.

Cost to Ride

The MBTA has proposed to increase fares for commuter rail effective July 1, 2019. For Merrimack Valley stations, this means anywhere from a 13-17% increase. In addition, the MBTA has revised parking fees for its stations, lowering those with unused capacity to $2/day while those that fill up earlier remain at $4/day. For the Merrimack Valley, this means that the Bradford, Haverhill and Rowley stations are now $2/day. All Merrimack Valley lots that are operated by the MBTA are $2/day on the weekends.

Table 8.6: Commuter Rail Parking Fares

Station	Fare (state fiscal year) 2014	2020
Newburyport	$10.50	$12.25
Haverhill, Bradford and Rowley	$9.75	$11.00
Lawrence	$9.25	$10.50
Andover	$8.50	$9.75
Ballardvale	$7.50	$8.75

Rail Vision

In 2018-2019, the MBTA undertook a RailVision study to look ahead at what improvements would lead to achieving their goal of leveraging the commuter rail's network to meet the transportation and economic needs of the region. As part of the process, MassDOT surveyed over 2,500 non-riders to learn about barriers to riding the commuter rail. More than cost, convenience ranked as the highest factor stopping people from riding the commuter rail. As a result, the proposed alternatives looked at ways to reduce travel time, increase service frequency, and improve system connectivity. Double tracking, frequent service, span of service, high platforms, express service and other improvements were included in the mix along with electrification of the system.

Commuter Bus

Commuter bus service to Boston from the Merrimack Valley is provided by three companies: Coach, C&J and the MVRTA. See Table 8.5 for a comparison of the services. The services are complementary to the commuter rail. None of the bus options make stops at North Station, but rather provide additional coverage for passengers. The commuter buses also offer service to communities not directly on the commuter rail line, such as Methuen, Boxford and Georgetown. All services have stops at park & ride lots, but also pick up passengers at locations with no parking available. The C&J, which operates the Storey Avenue Park & Ride in Newburyport, states clearly on its web site that parking is at capacity and recommends carpooling or drop off. The Coach

Company recently announced an end to its bus routes from Newburyport and cited parking as a problem.

The MVRTA provides service to communities on the western end of the region. Congestion along the I-93 corridor has long been a problem for on-time performance for commuter bus service. In 2014, the MVMPO completed a study and recommended Bus-on-Shoulder (BOS) during peak periods along I-93 to enable faster service for those commuters. However, the report noted that the BOS would need to be implemented in the Boston Metropolitan Region. It may be time to revisit the implementation of an extended bus/carpool/vanpool lane starting at the Anderson Transportation Center.

Park & Ride Lots and Transit Centers

Commuter Rail and Park & Ride lots serve as the transition between walking, driving or bicycle trips and commuter bus, commuter rail or car-pooling. They present important opportunities to encourage multi-modal transportation and reduction in single-occupancy vehicle use.

Bicycle racks are provided at most lots, but not all. The majority do not have bicycle infrastructure, such as bike lanes, connecting to the lots. Newburyport and Haverhill have rail-trails that connect to commuter rail stations and/or park & ride lots. Lawrence is developing a rail trail that will bring commuters closer to the train station.

Image: The Storey Avenue Park & Ride lot is popular for commuting as well as for long-term parking for people going to Logan Airport.

Findings from the MVPC Park & Ride Lot Study in 2016 include:

- Park & ride lot use is expected to increase over the next 20+ years as the number of residents who are projected to work in Boston and travel to Logan Airport continues to grow.
- The most successful lots are those located at roadway interchanges along I-93 and I-95.

Table 8.7: Park & Ride Lot/Commuter Rail Lot Use 2015/2019

Community	Location	Spaces	Cars 2015	Cars 2019	% change	Electric Spaces in Use	Usage Rate	Bikes Parked
Commuter Rail								
Andover	Railroad Ave	150	93	134	44%	0	89%	7
Andover	Ballardvale	114	107	121	11%	0	106%	7
Haverhill	Bradford	270	78	69	-12%	0	26%	0
Haverhill	Railroad Square	149	41	115	180%	0	77%	0
Haverhill	MVRTA Intermodal Center Granite St	315	152	169	11%	3	54%	3
Lawrence McGovern	Merrimack St	845	447	574	28%	0	67%	1
Newburyport	Lot A	317	59	169	186%	0	53%	0
Newburyport	Lot B	301	148	177	20%	0	59%	0
Rowley	Railroad Ave	278	44	63	43%	0	23%	6
Park & Ride Lots								
Andover	Dascomb Road	154	136	141	4%	0	92%	0
Andover	Shawsheen Square	31	16	17	6%	0	55%	0
Andover	Faith Lutheran Church	69	56	50	-11%	0	72%	0
Methuen	Pelham St	200	87	80	-8%	0	40%	0
Newburyport	Storey Ave	675	650	832	28%	0	123%	3

- Demand at small lots will likely increase at a slower rate as long as transit service remains relatively unchanged.
- There are no park & ride lots along I-495 in the Merrimack Valley region.
- The level of park and ride lot activity observed at the Salem, NH lot on I-93 in New Hampshire (including the growing number of Massachusetts residents using the facility), the Dascomb Road lot and the Faith Lutheran Church indicate that there is likely a market for a larger lot that could be located along the I-93 corridor in Andover.
- There is a clear need to expand capacity in the I-95 corridor to accommodate commuters in both Massachusetts and New Hampshire.

Recommendations included the following:

- MassDOT should consider establishing a park and ride lot on Carleton Street in Haverhill to provide area residents with a park and ride lot option in the I-495 corridor. This new facility would also help MassDOT and the MVMPO to help assess whether construction of a larger facility nearby at Exit 50 is warranted.
- The MVRTA should examine the feasibility of providing express bus service from the Methuen Park and Ride Lot to Boston. There is parking capacity available at this location and such a connection would provide Methuen and Lawrence residents with a level of service more similar to that enjoyed by those who access the current service at the Faith Lutheran Church in Andover.
- MassDOT must continue to examine options for expanding park & ride Lot capacity in the I-95 corridor. If the Newburyport Park and Ride Lot cannot be expanded as has been recently proposed, MassDOT should re-examine the feasibility of its proposal to construct a new park and ride lot at Exit 55 (Route 133) in Georgetown and at Exit 56 (Scotland Road) in Newbury.
- MassDOT and the MVMPO should contact community development officials in Andover to investigate options, including joint development and Public Private Partnerships, for constructing a larger park and ride lot in the I-93 corridor.

Measures for Success

MVPC does not measure daily use of park and ride lots. Counts are taken once annually. Only four lots have a utilization rate of 75% or greater. Utilization varies by location with lots. For example, use of the Storey Avenue lot consistently remains high, whereas the use of Methuen's Pelham Street is less than 50% full. Reduction in use of the Faith Lutheran Church is consistent with a reduction in the MVRTA's commuter bus ridership.

Summary

Encouraging people to switch from single occupancy vehicle use to alternative modes requires that those modes be safe, convenient, efficient and cost-effective. The MVMPO region continues to invest in projects and strategies that improve transportation choice.

- Multi-use trail network will connect multiple communities to activity nodes as well as transportation centers.
- Focusing on Complete Street accessibility will continue to create a safer environment for people who can ride their bikes or walk for shorter trips and/or to commuter transition points (commuter rail and bus). It is also important to provide ample bicycle parking to make it easier for cyclists to use the system.
- Further advocate for park and ride opportunities along the I-495 corridor.
- Continue to invest in and improve the fixed route system to make it competitive not just in cost, but in effectiveness and convenience.
- Following national trends, the need for ADA on-demand service is increasing and will continue to do so as the population ages. Providing effective and cost-effective service will continue to be a challenge, but one that is valuable to a growing population of people.

Image: The second phase of the Clipper City Rail Trail connects the downtown Newburyport to Parker Street. The third phase will complete the loop to the commuter rail station. (Photo by Geordie Vining)

Photo: Reconstruction of the Powow Riverwalk enhanced non-motorized transportation to the Lower Mill Yard in Amesbury.

Chapter 9

Goal 4: Promote Economic Vitality

Transportation impacts the economic health of the region as well as each community, business and household. Transportation is an essential component for the movement of people and goods.

In 2018, MVPC engaged with over 80 stakeholders to guide the development of the **2018-2023 Merrimack Valley Comprehensive Economic Development Strategy (CEDS)**. Through this process, four primary themes emerged: City and Town Centers, Manufacturing, Natural and Cultural Resources and Transportation. The transportation-related objectives and strategies developed through this process have been incorporated into the RTP. The CEDS vision for transportation is:

> ***Our multi-modal transportation system will be efficient and effective, and can play a key role in attracting and retaining employers and employees to/in the region, in helping individuals access jobs and job training, and in attracting visitors.***

Objective 4.1: Direct Transportation Investment to Priority Development Areas

The 2015 Merrimack Valley Priority Growth Strategy (PGS) identifies Priority Development Areas (PDA) where communities want to encourage growth. It also identifies Priority Preservation Areas (PPA) that should be off limits to development to preserve the character of the region and protect environmental resources. It also evaluates the suitability of the regional transportation network to serve these land use patterns and recommends improvements that could be made to make it more complementary.

The MVMPO's objective is to optimize the region's existing transportation infrastructure, enhance mobility choice and ensure that it best serves people so they can

access those priority employment sites and business districts that the region has identified through the PGS. The strategies that are employed include:

Rehabilitate essential infrastructure to support smart growth development. RTP projects examples:

- Basiliere Bridge, downtown Haverhill (TIP 2023)
- Reconstruction of Elm Street, Amesbury (TIP 2020)

Selectively expanding transportation services and infrastructure to better serve the region's smart growth PDAs. Projects include:

- Rail to trail conversion of the M&L Branch line in Lawrence, which will connect two PDAs and create a second link in an inner-city greenbelt
- Developing the Shawsheen River Trail, which will connect three PDAs in Andover

Support measures to help the region's residents and businesses contain transportation costs by maintaining the existing transportation network, while improving conditions for ridesharing, transit, walking and bicycling. Projects include:

- Support the MVRTA's and MBTA's efforts to increase transit service to/from and within the Merrimack Valley region
- Improve the bicycle and pedestrian network so that residents have additional transportation choices

Promote Transit Oriented Development. The MVMPO continues to support the efforts of communities to increase development near transit hubs. Projects include:

- Reconstruction of Railroad Street from Essex Street to Route 28, Andover
- Route 1 rotary reconfiguration with improved bike/ped/trail access

Measures of Success

Number and quality of infrastructure improvements made to increase mobility to and within PDAs

Each transportation project being considered for federal funding through the MVMPO is evaluated based on criteria that look at the magnitude of improvement in the condition, mobility and safety of transportation projects, as well as the community effects and support, land use and economic development impact and the environmental effects.

Table 9.1 Transportation Evaluation Criteria (TEC) Summary provides a glimpse into these scores as they pertain to the impacts that transportation projects included on the TIP since 2012 have had on economic vitality (a full list is in the appendix). Here's how it breaks down.

Consistent with PGS (0-3 points) – This is a subcategory within the Land Use and Economic Development

category. The higher the score, the greater the impact on PDAs.

Total Averaged Land Use and Economic Development (0-3 points) – This is an average of the four subcategories (includes job creation, land use plans, etc.). The higher the score demonstrates a greater impact on economic development.

Total TEC Score (18 points maximum) – An aggregated score of all evaluation criteria. This score provides a **quality** measure, because the higher the score, the greater the impact across all categories.

Since the last RTP, 16 projects included in the TIP have improved mobility to or within at least one PDA. The Clipper City Rail Trail and the Powow Riverwalk scored the highest in the Economic Development category, though no project scored a 2 or a 3.

The three overall highest scoring projects include South Main Street reconstruction in Haverhill, the Methuen Rotary and the Lawrence St./Park St. intersection reconstruction project in Lawrence. These scores show the quality of the projects as they address mobility, safety and more. No project has ever received an overall score of 18 overall, the highest possible score.

Table 9.1 shows the TEC scores for projects that appear in the MVMPO's FFYs 2015-2018 TIP. Table 8.2 shows scoring for all future projects being considered for inclusion in the RTP. Only those projects that have begun the project development process are scored.

Photo: Abel Vargas, (former) Economic Development Director for the City of Lawrence, speaking at a public planning meeting on the Lawrence Rail Trail, which will provide a much-needed non-motorized connection to priority growth areas and jobs.

Table 9.1: Transportation Evaluation Criteria (TEC) for Projects on the TIP

Project Number	Project Description	Consistent with PGS	Total Land Use & Economic Dev.	Total (2020-2024)
	Lawrence - North Andover Reconstruction of Route 114 from I-495 to Route 125 (Andover Street)	2	1.75	13.05
608095	North Andover Reconstruction of Route 114 from Route 125 (Andover Street) to Stop & Shop	2	1.75	11.32
608930	Lawrence - LMRC Rail Trail	3	2.5	11.25
608336	Andover - Route 133 from west of Lovejoy Road/Greenwood Road to Shawsheen Square	2	1.75	11.00
608761	Haverhill - Intersection Improvements at Route 108 / Route 110	2	1.75	8.87
602202	Salisbury - Reconstruction of Route 1 (Lafayette Road)	2	1.5	8.60
608721	Haverhill - Corridor Improvement Water Street from Ginty Boulevard / Mill St. to Lincoln Avenue/ Riverside Avenue	2	1.25	8.18
608788	Haverhill - Reconstruction of North Avenue from Main Street to NH	0	0	8.00
608029	Newburyport Intersection Improvements Route 1 at Merrimac Street	2	1.25	7.67
605694	North Andover - Route 125, Resurfacing and related work	2	1.25	7.45
608027	Haverhill - Bradford Rail Trail extension	2	1.25	7.15
609251	Lawrence - Intersection Improvements at South Broadway (Route 28) and Mount Vernon Street	0	0.5	7.02
602843	Georgetown - Route 97 from Moulton Street to Groveland town line	2	1.5	6.63
602418	Amesbury - Reconstruction of Elm St.	2	1.5	5.98
606721	Boxford - Reconstruction of Route 133 (North Andover town line to Main St)	1	0.5	5.60
607708	Andover - Route 28 resurfacing and related work	1	0.5	5.22
607542	Georgetown - Square to Byfield (Northern) section of Border to Boston Trail	2	1.5	5.22
607541	Georgetown - south of Square (Southern) section of Border to Boston Trail	2	1.25	5.22
608298	Groveland Community Trail	2	1	4.87
607540	Boxford - section of Border to Boston Trail	1	0.5	3.32

Objective 4.2: Support Freight Movement Within and Through the Merrimack Valley Region

According to the MA Executive Office of Labor and Workforce Development, ES-202, as of September 2017, manufacturing is the third largest source of employment in the Merrimack Valley after education and healthcare. (*Comprehensive Economic Development Strategy*, pg. 12). It is important that our businesses be able to rely on transportation infrastructure that supports their needs.

Truck Freight

In 2019, the MVMPO adopted MassDOT's performance measure for Level of Truck Travel Time Reliability (TTTR). TTTR is based on the amount of time it takes trucks to drive the length of a road segment. This measure is only required at the state level and on the interstate system. According to MassDOT's analysis, the Merrimack Valley region's TTTR Index rate is 1.696, which is lower than the statewide target of 1.85.

In 2018, MassDOT released the final state Freight Plan with the following vision and guiding principles:

Those who maintain and operate the Massachusetts Freight System will:

- Be safe, secure, and resilient.
- Improve the condition of key freight assets.
- Improve the state's economic competitiveness.

As part of the planning process, the state was required to establish a National Highway Freight Network (NHFN), and identify Critical Rural and Critical Urban Freight Corridors.

National Highway Freight Network

The Primary Highway Freight System (PHFS) comprised of select sections of Interstates and other Non-Interstate Federal Aid Roadways;

- Non-PHFS segments of the Interstate System, and
- Rural and Urban Critical Freight Corridors.

Massachusetts identified 75 miles of Critical Urban Freight Corridors and 150 miles of Critical Rural Freight Corridors to complete its portion of the NHFN. The MVMPO identified the critical corridors in the Merrimack Valley region to assist in this process. The MVMPO compiled a list of all the critical freight corridors in the region further pared down the list for MassDOT to provide priority corridors which were based on strict mileage limits. These limits for the MVMPO region are as follows:

- Critical Urban Freight Corridors: 3.96 miles
- Critical Rural Freight Corridors: 1.15 miles

Figure 8.2: Proposed priority freight corridor, which was subsequently approve by the MVMPO.

Requirements

The Selection of Critical Urban Freight Corridors must meet at least one of the following requirements:

- Connects an intermodal facility to:
  - The Primary Highway Freight System (i.e. designated Interstates and Non-Interstates);
  - The Interstate System;
  - An intermodal freight facility;
- Is located within a corridor of a route on the PHFS and provides an alternative highway option important to goods movement;
- Serves a major freight generator, logistics center, or manufacturing and warehouse/industrial land; and
- Is important to the movement of freight within the region, as determined by the MPO or State.

Identification Process

MVPC Transportation staff examined 2014 total employment and industrial/transportation/warehousing employment data in the region along almost 18 miles of potential Critical Urban Freight Corridors to evaluate the demand for freight service and identify the sites that would be directly served by each alternative alignment. The complete list of freight corridors in the Merrimack Valley can be found in Table 9.2.

This analysis showed that the River Road /Andover Street/Broadway/Merrimack Street corridor in Andover and Lawrence served the most employment while remaining under the MVMPO's 3.96-mile Critical Urban Freight Corridor limit. The areas served along this route include the River Road Industrial Park in Andover, the Lawrence Industrial Park and numerous manufacturing

and warehousing sites along Merrimack Street in Lawrence.

This corridor also provides an alternate truck route to I-495 between Exit 44 (Merrimack Street) on I-495 in Lawrence and Exit 45 (River Road) on I-93 in Andover (see attached map). No rural corridors were chosen.

In 2017, the MVMPO identified critical freight corridors in the region (see Table 9.2). Of those, the MVMPO further identified three corridors as priority corridors to contribute to MassDOT's efforts to prioritize freight corridors federal funding. Those corridors include:

- River Road, Andover and Andover Street, Lawrence between Shattuck Road in Andover and Route 28 in Lawrence;
- Route 28 between Andover Street and Merrimack Street, Lawrence; and
- Merrimack Street, Lawrence.

The City of Lawrence received a MassWorks grant to fund design and construction for part of a road reconstruction along Merrimack Street between South Union and Amesbury Streets. The design incorporates Complete Street elements that provide truck travel as well as separate and safe bicycle and pedestrian path along Merrimack Street, connecting to the future rail trail. The City is seeking federal funding to complete the project from Amesbury Street to Broadway Street (Route 28).

While Table 9.1 identifies all critical freight corridors in the Merrimack Valley, the last column shows those corridors that also have priority projects included in the Universe of Projects. Examples include:

- Route 114 reconstruction from I-495 to Waverly Road in Lawrence;
- Reconstruction of the Routes 108/110 intersection in Haverhill; and
- South Hunt Road from Route 150 to Buttonwood Road in Amesbury.

Table 9.8: Merrimack Valley Critical Freight Corridors

Road	Community	From/To	Est. Mi.	Transportation Project
Hunt Road	Amesbury	Route 150 to Buttonwood Road	1.71	●
Route 150	Amesbury	Route 110 to Hunt Road/I-495	0.46	●
Elm Street	Amesbury	Route 110 to Monroe Street	0.81	●
Route 110	Amesbury, Salisbury	I-495 to Rabbit Road	1.1	
Monroe Street/Main Street	Amesbury, Salisbury	Elm St. to I-95 Connector	2.2	
River Road	Andover	1776 Drive to Lawrence City Line	1.62	
Route 28	Andover	Andover Street to Merrimack Street	0.42	
Route 133	Andover	I-93 to Raytheon Driveway	0.42	
Frontage Road	Andover	Dascomb Road to Raytheon	0.85	
Dascomb Road	Andover	Tewksbury Line to I-93	0.45	●
Route 28 Bypass	Andover	Wilmington Line to Route 114	5.13	
Route 133	Georgetown, Rowley	Georgetown Square to Route 1	4.91	
Salem Street	Groveland, Haverhill	Route 125 to Route 97	3.92	
Route 125 Connector	Haverhill	I-495 to Route 125	1.17	
Route 108	Haverhill	NH State Line to Route 110	0.89	●
Route 110	Haverhill	Route 108 to I-495	1.11	
Route 125	Haverhill	NH State Line to Ginty Boulevard	3.15	
Rosemont Street	Haverhill	Route 125 to Hilldale Avenue	0.85	
Route 97	Haverhill	I-495 to Research Drive	0.37	●
Computer Drive	Haverhill	Route 110 to Research Drive	0.33	
Monument Street	Haverhill	I-495 to Hilldale Avenue	0.72	
Hilldale Ave.	Haverhill	Monument St. to NH State Line	2.24	
Route 97	Haverhill, Groveland, Georgetown	Route 125 to Georgetown Square	6.35	●
Route 125	Haverhill, North Andover	Salem Street to Sutton Street	4.91	●

Table 9.2 Merrimack Valley Critical Freight Corridors (Continued)

Road	Community	From/To	Est. Mi.	Transportation Project
Merrimack Street	Lawrence	Route 28 to I-495	1.32	●
Andover Street	Lawrence	Andover Town Line to Route 28	1.39	
Marston Street/Canal Street	Lawrence	I-495 to Union Street	0.85	
Route 114	Lawrence, North Andover	I-495 to Willow Avenue	2.74	●
Route 213	Methuen	I-495 to I-93	3.64	
Aegean Drive	Methuen	Pelham St. to end	0.28	
Danton Drive	Methuen	Pelham St. to end	0.91	
Pelham Street	Methuen	Mystic Street to Danton Drive	0.92	
Route 28	Methuen	Rte. 213 to NH State Line	0.79	●
Pleasant Valley Street/Pleasant Street	Methuen	Oak Street to Route 213 EB Ramps	1.01	
Route 110	Methuen	I-93 to Griffin Brook Industrial Park	1.86	
Route 113	Methuen	I-93 to Dracut Town Line	1.9	
Scotland Road	Newbury, Newburyport	I-95 to Graf Road	2.17	
Route 113	Newburyport	I-95 to Low Street	0.44	
Low Street	Newburyport	Storey Avenue to Route 1	1.94	
Graf Road	Newburyport	Low Street to Scotland Road	1.11	
Sutton Street	North Andover	I-495 to Route 125	1.26	
Route 1	Rowley	Wethersfield St. to Ipswich Town Line	2.9	
I-95 Connector	Salisbury	Main St. to NH State Line	0.95	
Rabbit Road	Salisbury	Route 110 to Main Street	1.84	

Photo: The beaches in Salisbury and on Plum Island attract over a million visitors every year.

Objective 4.3: Improve/Increase Multi-Modal Transportation Options for Tourism

The tourist industry is an important regional economic engine. The Merrimack Valley is home to a varied landscape that is noted not only for the Merrimack River, but for the beaches, the Great Marsh and numerous recreational and hospitality associated business. Our cities host myriad festivals throughout the year. And, the Merrimack Valley is part of the Essex County National Heritage Area, which promotes the rich history and culture of our communities.

Needless to say, Merrimack Valley communities capitalize on their assets and seek to make traveling to and within their communities easier as well as experiential. For example, the City of Haverhill has investigated the possibility of Merrimack River boat transportation. Salisbury and Lawrence are interested in bike share opportunities. The region is also participating in a wider Essex County Art and Cultural planning process with the Essex County Community Foundation (ECCF) and MAPC. Transportation that allows people to get to arts and cultural activities was noted as a need and gap during the first round of outreach meetings.

The MVMPO works with our member communities to address transportation for tourism by:

- Supporting the development of trail networks. Specifically, the Coastal Trails Network will create a non-motorized transportation system that will connect communities that suffer from seasonal traffic congestions. For more information on trail development see Chapter 8.
- Funding in the TIP to pay for bike racks on the MVRTA fixed route buses as well as at transportation facilities (as included by the MVMPO in 2019).

Projects funded in the RTP that address tourism needs include:

- Newburyport's Route 1 Rotary redesign, which will create a safe connection between the commuter rail station and the Clipper City Rail Trail Phase II;
- Border to Boston Trail Network, Bradford trail, Groveland Community Trail and Lawrence Rail Trail;
- Reconstruction of Water Street in Haverhill that includes enhanced bicycle and pedestrian access along the Merrimack River;
- Intersection of Merrimac Street and the Route 1 ramps in Newburyport; and
- The Route 133/Route 1 intersection project in Rowley as an important cross-regional connection.

Transportation strategies to enhance visitor experiences include:

- Working with communities and partners to create additional wayfinding signage geared toward cyclists and pedestrians;
- Working with the MVRTA to enhance the connections between transit and popular destinations as well as bicycle transportation options;
- Supporting Complete Street projects that further improve destinations, such as reconstruction of Route 1A in Salisbury; and
- Continuing to participate in the ECCF Creative County Initiative.

Strategies for Success

- **Complete multi-modal network.**
- **Work with partners to identify transportation programs and projects to address gaps and needs.**
- **Work with MVRTA to create more intermodal connections for visitors.**

Objective 4.4: Congestion Management

FHWA Congestion Performance Measures for Roadways

The Federally defined Performance Measures related to congestion are Level of Travel Time Reliability (LOTTR), Truck Travel Time Reliability (TTTR), Peak Hour Excessive Delay (PHED), and percentage of Non-Single Occupant Vehicle (SOV) Travel. The first two of these must be reported on the Statewide level and the final two on the Urbanized Area (UZA) level for the Boston UZA, which includes parts of New Hampshire and Rhode Island.

MassDOT followed FHWA regulation in measuring Level of Travel Time Reliability (LOTTR) on both the Interstate and non-Interstate NHS as well as Truck Travel Time Reliability (TTTR) on the Interstate system using the National Performance Management Research Dataset (NPMRDS) provided by FHWA.

The MVCMP supports projects that could contribute to meeting these performance targets adopted by the MVMPO and measured at the Statewide and UZA level.

PM3: System Performance/ Freight/ CMAQ Performance Measures:

- Percent of the Person-Miles Traveled on the Interstate that are Reliable
- Percent of the Person-Miles Traveled on the non-Interstate NHS that are Reliable
- Truck Travel Time Reliability (TTTR) Index on the Interstate System
- Annual Hours of Peak Hour Excessive Delay Per Capita
- Percent of Non-SOV Travel on the NHS System
- Total Emission Reduction of all projects funded with CMAQ in areas designated as nonattainment or maintenance for ozone (O_3), carbon monoxide (CO), or particulate matter (PM_{10} and $PM_{2.5}$)

Targets are set by examining historic trends in the data and considering future plans for potential improvements.

In October 2018, the MVMPO voted to adopt the Targets set by MassDOT, illustrated in the following table. Only five of the measures/targets described above are included in this table since the MVMPO region is in attainment under the current air quality standards.

Table 9.3: MassDOT Congestion Performance Measures/ Targets Adopted by MVMPO Summary Table

Performance Measure Category	Performance Measure	Recent Data	Targets
PM3: System Performance/ Freight/ CMAQ	Percent of Person-Miles Traveled on the Interstate that are Reliable Statewide	68 % in CY 2017	CY 2020 Target = 68% CY 2022 Target = 68%
PM3: System Performance/ Freight/ CMAQ	Percent of Person-Miles Traveled on the Non-Interstate NHS that are Reliable Statewide	80% in CY 2017	CY 2020 Target = 80% CY 2022 Target = 80%
PM3: System Performance/ Freight/ CMAQ	Truck Travel Time Reliability (TTTR) Index on the Interstate System Statewide	TTTR index in CY 2017 = 1.85	CY 2020 Target = 1.85 CY 2022 Target = 1.85
PM3: System Performance/ Freight/ CMAQ	Annual Hours of Peak Hour Excessive Delay (PHED) per Capita in the UZA	PHED per capita in CY 2017 = 18.31 hours per person in the UZA	2018-2019 Target = 18.3 2018-2021 Target = 18.3
PM3: System Performance/ Freight/ CMAQ	Percent of Non-SOV Travel on the NHS System in the UZA	CY 2016 Non-SOV Travel on the NHS in the UZA = 33.6%	CY 2020 Target = 34.5% CY 2022 Target = 35.1%

The performance measures are incorporated into the Transportation Improvement Program (TIP) Transportation Evaluation Criteria (TEC) in the scoring categories as indicated in the TEC Scoring Criteria Chart in Section A.3. of the TIP.

Referring to the Roadway and Bridge Funding Available to the Merrimack Valley MPO 2020 to 2040 table in Chapter 4 projects that will contribute to reliability on the Interstates and Truck Travel Time Reliability on the Interstates include Interstate paving projects totaling $132,594,893 which will be selected by the State. Some of the $192,886,876 Bridge Funding in the region will be for Interstate and Non-Interstate NHS bridges. These projects will be chosen by the State, and will contribute to reliability on the Interstates, Truck Travel Time reliability on the Interstates and Non-Interstate NHS roadway reliability.

Specific projects currently included in the 2020 to 2024 TIP in the above Interstate categories are Haverhill Bridge Replacement of H-12-039, I-495 over the Merrimack River; Haverhill Bridge Replacement of H-12-040, I-495 over the Merrimack River; and Andover Bridge Rehabilitation of I-495 over Route 28 and over B&M and MBTA railroad tracks.

Specific projects currently included in the 2020 to 2024 TIP in the Non-Interstate NHS category are Haverhill Intersection Improvements at Rt 110/ Rt 108; and North Andover Corridor Improvements on Route 114, which should also contribute to reducing the Annual Hours of Peak Hour Excessive Delay Per Capita.

Specific projects programmed for 2025 to 2040 in this RTP that should increase the reliability of the Non-Interstate NHS and reduce the Annual Hours of Peak Hour Excessive Delay Per Capita are Rt. 133 in Andover; Rt. 97 in Georgetown; Rt. 114 in Lawrence and North Andover; Water St. in Haverhill; and Rt. 110 in Lawrence;

Regional Congestion Performance Measures for Roadways

The FHWA Performance Measures consider the overall performance of the region's roadways, on the more local level the MVMPO needs to also consider individual segments of roadways in its Congestion Management Process to identify specific roadways that may need improvement.

Like MassDOT, the MVMPO also uses the NPMRDS data to calculate congestion measures to screen for the most congested roadways in the region. The MVCMP screens for roadway congestion by considering the morning peak period from 6:30 AM to 8:45 AM and the evening peak period from 3:30 PM to 5:45 PM using NPMRDS data for weekdays in the months of September and October of 2017 and April and May of 2018.

The data is for all National Highway System (NHS) roadways. This includes all Interstates, as well as all of Routes 28, 114, 125, 213, and sections of other major roadways such as Sutton Street in North Andover,

Groveland Street in Haverhill, and selected sections of Routes 1, 1A, 97, 110, 113 and 133.

There are many ways to measure congestion. Previous MVCMPs used volume-to-capacity (V/C) ratio from the regional transportation model to measure congestion, this measures the intensity of the congestion.

Now that actual speeds and travel times are available, intensity can be measured by the actual average speeds. Another measure of congestion to consider is the duration of congestion and for this the MVCMP calculates which roadway segments are congested for the longest amount of time in the peak periods. The extent of congestion, which measures the number of vehicles affected by the congestion, considers the volume, or Average Annual Daily Traffic AADT, traveling along the segments.

The variability of the congestion, considers different congestion conditions occurring on varying days and times of day, measuring the reliability of the system. This measure requires data from many time periods and days throughout a period of time, such as, a year. For this measure the MVCMP uses the Level of Travel Time Reliability (LOTTR) calculated for the MVMPO by MassDOT as required by the Performance Measures. The statewide metric is the percent of person-miles traveled that are reliable. The results for the Merrimack Valley MPO System Level of Travel Time Reliability are that 78.2 % of the Interstate mileage is reliable and 86.5 % of the Non-Interstate NHS mileage is reliable.

Interstates

AM Peak

Tables and show the 12 interstate roadway segments in the region with the lowest travel speeds (intensity) and congested for longest period of time (duration) during the AM Peak Period. Duration is defined as the number of 15-minute periods where the Observed Average Speed is less than 60% of the posted speed limit.

Table 9.4: Interstate Lowest Average Speeds 6:30 to 8:45 AM

Community	Route Number/ Direction	Roadway Segment	AM Peak Period Average
Andover	I-495 SB	Route. 28 to I-93	37.4
Andover	I-495 SB	Route 114 to Route 28	41.4
Andover	I-93 SB	Dascomb Rd. to Route	43.4
Andover	I-93 SB	Route 133 to Dascomb	44.2
Andover	I-93 SB	I-495 to Route 133	44.6
Andover	I-93 SB	River Road to I-495	44.9
Methuen	I-93 SB	Pelham St. to Route	45.3
Lawrence	I-495 SB	Mass. Avenue to Route	45.6
Lawrence/ North	I-495 SB	Marston St./ Merrimack St. to	48.9
Andover	I-93 SB	Route 110/113 to River	50.4
Methuen/	I-495 SB	Route 110 to Marston St.	51.0
Methuen	I-495 SB	Route 213 to Route 110	51.2

The most congested segment of interstate during the morning peak period in the region is I-495 SB from Route 28 (Exit 41) to I-93 (Exit 40) in Andover. This segment tops the congestion list for intensity and duration. In addition, it ranks worst in number of vehicles affected by congestion.

Table 9.5: Interstate - Most Number of Congested 15-minute Periods 6:30 to 8:45 AM

Community	Route Number/ Direction	Roadway Segment	# Congested 15-minute periods in AM 6:30 to 8:45
Andover	I-495 SB	Route 28 to I-93	424
Andover	I-93 SB	Dascomb Rd. to Rt.125	348
Methuen	I-93 SB	Pelham St. to Routes	321
Andover	I-495 SB	Route 114 to Route 28	318
Andover	I-93 SB	River Rd. to I-495	295
Andover	I-93 SB	Route 133 to Dascomb	293
Andover	I-93 SB	I-495 to Route 133	268
Lawrence	I-495 SB	Mass. Avenue to Route	243
Lawrence/ North	I-495 SB	Marston St./ Merrimack St. to	199
Methuen	I-495 SB	Route 213 to Route 110	190
Haverhill	I-495 SB	Route 110/113 to Route 125 Connector	175
Haverhill	I-495 SB	Route 97 to Routes 110/113	160

The segment of interstate, immediately north of that on I-495, I-495 SB from Route 114 (Exit 42) to Route 28 (Exit 41) is also in the top 4 for each of the congestion measures.

The remaining top 5 segments in each congestion measure during the morning peak period occur along I-93 SB with the southern-most segment from Dascomb Rd (Exit 42) to Route 125 (Exit 41) topping the I-93 list for intensity and duration.

PM Peak

The most congested segment of interstate during the evening peak period in the region is I-93 NB from River Road (Exit 45) to Route 110/ 113 (Exit 46) in terms of duration and extent of congestion. I-93 from I-495 (Exit 44) to River Road (Exit 45) has the lowest average speed. I-495 NB from Marston Street (Exit 45) to Route 110 (Exit 46) is third on the most congested segments for intensity and duration, I-93 NB from Route 133 (Exit 43) to I-495 (Exit 44) for extent of congestion.

Table 9.6: Interstate Lowest Average Speeds 3:30 to 5:45 PM

Community	Road/ Direction	Road Segment	PM Average Speed
Andover	I-93 NB	I-495 to River Rd.	27
Andover	I-93 NB	River Rd. to Routes	30
Lawrence/ Methuen	I-495 NB	Marston St. to Route 110	31
Andover	I-93 NB	Route 133 to I-495	35
Andover/	I-495 NB	Route 28 to Route 114	35
North	I-495 NB	Mass. Avenue to Marston	36
Lawrence/ North Andover	I-495 NB	Route 114 to Mass. Avenue	37
Andover	I-93 NB	Dascomb Rd. to Route	41
Andover/ Wilmington	I-93 NB	Route 125 to Dascomb Rd.	42
Andover	I-495 NB	I-93 to Route 28	45
Methuen	I-495 NB	Route 110 to Route 213	45
Andover/ Tewksbury	I-495 SB	I-93 to Route 133	45

Considering several segments, the worst interstate congestion in the region occurs on I-93 NB in the evening and SB in the morning between Route 125 (Exit 41) and Pelham Street (Exit 47) and on I-495 NB in the evening from Route 133 (Exit 39) to Route 213 (Exit 47) and SB in the morning from Route 97 (Exit 50) to Route 133 (Exit 39).

Table 9.7: Interstate - Most Number of Congested 15-minute Periods 3:30 to 5:45 PM

Community	Route Number/ Direction	Road Segment	# of Congested 15 minute periods in 4 months of PM 3:30 to 5:45
Andover	I-93 NB	River Rd. to Routes	630
Andover	I-93 NB	I-495 to River Rd.	594
Lawrence/ Methuen	I-495 NB	Marston St. to Route 110	574
Andover	I-93 NB	Route 133 to I-495	476
Andover/ Lawrence	I-495 NB	Route 28 to Route 114	435
Lawrence/ North Andover	I-495 NB	Route 114 to Mass. Avenue	389
North	I-495 NB	Mass. Avenue to Marston	389
Andover	I-93 NB	Dascomb Rd. to Route	323
Andover/ Wilmington	I-93 NB	Route 125 to Dascomb Rd.	320
Andover	I-495 NB	I-93 to Route 28	300
Andover/ Tewksbury	I-495 SB	I-93 to Route 133	298
Andover/ Tewksbury	I-495 NB	Route 133 to I-93	180

Also, the segment of I-93 NB (the opposite direction of the major morning traffic flow) from Route 133 (Exit 43) to I-495 (Exit 44) makes the top twelve list of most intense congestion and the greatest number of vehicles affected by congestion during the AM peak period. Likewise, the segment of I-495 SB (the opposite direction of the major evening traffic flow) from I-93 (Exit 40) to Route 133 (Exit 39) makes the top 15 list of most intense congestion and longest duration of congestion and is actually seventh on the list of the highest number of vehicles affected by congestion during the PM peak period.

The results are not unexpected, the most congested interstate segments surround the intersection of two interstate highways, I-93 and I-495. There are also major employers at the exits just north and south of this intersection on I-93, and just east and west on I-495. In addition, many commuters from southern New Hampshire that are accessing these regional employers or commuting to jobs along Route 128 and in Boston traverse this interchange.

Projects Addressing Roadway Congestion – Interstates

Interstate 93

MVPC completed a corridor study of I-93 in 2005, which recommended that the roadway be widened to four travel lanes in each direction, removing the need for the breakdown lane to be used as a travel lane during peak travel periods.

The MVPC also completed an analysis that showed that instituting Bus on Shoulder on I-93 corridor could significantly improve commuter bus travel time and reliability.

at was completed in 2005 and a corridor study of I-495 was completed in 2008, in both cases it was recommended that a lane be added in each travel direction. There is not enough funding available to add another lane to these Interstates.

Interstate 495

MassDOT completed a study of the I-495 Corridor through the Northern Middlesex and Merrimack Valley MPO region in 2008, which recommended that the roadway be expanded to four travel lanes in each direction from Westford east to Route 97 in Haverhill (Exit 50). spanning the southern parts of the Merrimack Valley region and the northern parts of the Northern Middlesex region suggested many improvements that could be made to the corridor, however there is not enough funding for these improvements.

Non-Interstate NHS Roadways

AM Peak Period

The Non-Interstate NHS roadways with congestion affecting the most number of vehicles in the morning are Route 114 EB from I-495 in Lawrence to Route 125/

Andover Street in North Andover, Route 125 SB from Plaistow Road to Rosemont Street in Haverhill, Route 125 SB from New Hampshire Stateline to Main Street in Haverhill, Route 213 WB from Route 28 to I-93 in Methuen, Route 114 EB/ Route 125 SB from Route 125/ Andover Street to Route 125 Bypass in North Andover.

Table 9.8: Non-Interstate Lowest Average Speed 6:30 to 8:45 AM

Community	Route Number/ Direction	Road Segment	AM Peak Period Average Speed
Lawrence	Route 28 SB	Route 110 to Salem Street	12
Haverhill	Route 110 EB	Merrimack Street to	14
Lawrence	Route 28 NB	Salem Street to Route 110	14
Haverhill	Route 125 SB	NH Stateline to Main	14
Haverhill	Route 125 SB	Plaistow Rd. to Rosemont	14
North Andover	Route 125 SB (Andover St.)	Peters St. to Routes 125/133/114	14
North Andover	Route 133 SB (Peters St.)	Route 125 to Routes 125/133/114	15
Haverhill	Route 110	Winter St. to Merrimack St.	15
Lawrence/ North Andover	Route 114 EB	I-495 to Routes 125/114/	16
Haverhill	Route 113 EB	Emerson Street to Route	16
Haverhill	Route 125 SB	Kenoza Ave. to Winter St.	16
Methuen/ Lawrence	Route 28 SB	Route 213 to Route 110 (Haverhill Street)	16

Table 9.9: Non-Interstate - Most Number of Congested 15-minute periods 6:30 to 8:45 AM

Community	Route Number/ Direction	Road Segment	# Congested 15 minute periods in AM 6:30 to 8:45
Methuen	Route 110 WB	Elm St. to Routes 110/ 113/I-93	637
Haverhill	Route 125 SB	Plaistow Rd. to Rosemont St.	596
Lawrence/ North Andover	Route 114 EB	I-495 to Routes 125/114/ Andover Street	574
North Andover	Route 125 SB (Andover St.)	Peters St. to Routes 125/133/114	574
Amesbury	Route 110 EB	I-495 to I-95	485
Haverhill	Route 125 SB	NH Stateline to Main St.	472
Andover	Route 28 NB	Williams St. to I-495	427
Andover	Route 28 SB	I-495 to Hidden Rd.	417
North Andover	Route 125 SB	Route 133 (Great Pond Rd.) To Route 114	384
North Andover	Mass. Ave EB	Route 125 to Andover St./ Great Pond Rd.	372
Methuen	Route 113 WB	Woodburn Dr. to I-93	346
Lawrence	Route 28 SB	South St. to I-495	344
Groveland/ Georgetown	Route 97 SB	Route 113 to Route 133	324

9.10: Non-Interstate Lowest Average Speed 3:30 to 5:45 PM

Community	Route Number/ Direction	Road Segment	PM Average Speed
Lawrence	Route 28 NB	Salem St. to Route 110	8
Lawrence	Route 28 SB	Route 110 to Salem St.	9
Georgetown	Route 97 NB	Route 133 to Georgetown Sq.	10
Haverhill	Route 125 NB	I-495 to Rosemont St.	10
Lawrence	Route 114 WB	Salem St. to Route 28	11
Haverhill	Route 110 WB	Winter St. to Merrimack St.	12
Haverhill	Route 113 EB	Emerson St. to Route 125	13
Haverhill	Route 110 EB	Merrimack St. to Winter St.	12
Haverhill	Route 125 SB	Kenoza Ave. to Winter St.	13
Haverhill	Route 97 SB	Winter St. to Bailey Blvd.	13
Lawrence/ North Andover	Route 114 EB	I-495 to Routes 125/133 Andover Street	14
Methuen/ Lawrence	Route 28 SB	Route 213 to Route 110 (Haverhill Street)	14
Lawrence/ Methuen	Route 28 NB	Route 110 (Haverhill Street) To Route 213	14
Haverhill	Route 125 SB	Kenoza Ave. to Merrimack St.	14
North Andover	Peters St. NB	Route 114 to Route 125	14

PM Peak Period

The Non-Interstate NHS roadway with the lowest travel speed is Route 28 in Lawrence between Salem Street and Route 110 (Haverhill St.). What is notable here is that northbound and southbound directions are the two slowest PM Peak Period road segments. These speeds are affected by the number of traffic signals and the amount of traffic and pedestrian activity. Further north in the Route 28 Corridor, a similar situation exists between Haverhill St. and Route 213 in Methuen where travel speeds in both directions are 14 MPH. Other low-speed road segments include Route 125 in Haverhill north of I-495, Route 97 NB in Georgetown Square.

9.11: Non-Interstate - Most Number of Congested 15 minute periods 3:30 to 5:45 PM

Community	Route Number/ Direction	Road Segment	# Congested 15 minute periods in PM 3:30 to 5:45
Haverhill	Route 125 NB	I-495 to Rosemont St.	692
Lawrence/ North Andover	Route 114 EB	I-495 to Route 125 (Andover Street)	652
Andover	Route 28 NB	Williams St. to I-495	639
North Andover/ Lawrence	Route 114 WB	Route 125 (Andover Street) To I-495	602
North Andover	Route 114 WB/ Route 125 NB	Route 125 (Andover Bypass) to Route 125 (Andover Street)	590
North Andover	Route 125 NB	Route 114 to Route 133 (Great Pond Road)	574
Lawrence	Route 28 NB	Salem St. to Route 110	550
Amesbury	Route 110 WB	I-95 to I-495	516
Methuen	Route 110 WB	I-93 to Dracut Town line	509
North Andover	Route 114 WB	Boston St. to Route 125 (Andover Bypass)	483
Lawrence	Route 114 WB	Salem St. to Route 28	453
Haverhill	Route 125 NB	Route 125 Connector to Route 113/ 97/ Merrimack St,	450

Route 125 NB in Haverhill has the highest number (692) of congested 15-minute periods during the four months of PM Peak Period traffic data analyzed. Route 114 in each direction between Andover St. and I-495 has more than 600 congested 15-minute periods. Salem Street to Route 110 (Haverhill Street) in Lawrence, Route 114 WB/ Route 125 NB from Route 125 Bypass to Andover Street

Projects Addressing Roadway Congestion – Non-Interstates

Route 114

Corridor Improvements on Route 114 between Route 125 (Andover Street) & Stop & Shop Driveway in North Andover is programmed in the 2020 to 2024 time-frame of the RTP and TIP.

Corridor Improvements on Route 114 between I-495 in Lawrence and Route 125 (Andover Street) in North Andover is programmed in the RTP for the 2030 to 2034 time-period.

Route 125 from I-495 to Rosemont Street in Haverhill

Route 125 northbound from I-495 to Rosemont Street in Haverhill ranks as the non-interstate NHS roadway with congestion affecting the greatest number of vehicles in the evening. Route 125 southbound from Plaistow Road to Rosemont Street in Haverhill ranks as the non-interstate NHS roadway with congestion

affecting the second highest number of vehicles in the morning. Numerous studies of Route 125 from I-495 to the New Hampshire Stateline have been conducted to recommend a way to relieve congestion here, including the construction of a bypass.

In recent years, significant commercial development has occurred along Route 125 in Haverhill north of Rosemont Street. The City of Haverhill recently upgraded the traffic signal equipment at the Route 125/Rosemont Street intersection and installed a new traffic signal at the Route 125/Cushing Avenue intersection located at the New Hampshire State Line.

North Avenue in Haverhill runs parallel to Route 125 from I-495 to the New Hampshire border and is used as an alternate route to the very congested Route 125, reconstruction of North Avenue is programmed in the 2020 to 2024 time-frame of the RTP and TIP.

Route 28 from Salem Street to Route 110 (Haverhill Street) in Lawrence

Route 28 northbound from Salem Street to Route 110 (Haverhill Street) ranks third as the non-interstate NHS roadway with congestion affecting the largest number of vehicles in the evening, Route 28 southbound in this same section from Route 110 (Haverhill Street) to Salem Street ranks seventh in the evening.

This section is in the urban downtown of Lawrence, where there are many traffic signals, numerous businesses, significant pedestrian activity and where posted speed limits are lower.

Road Safety Audits have been conducted at the following intersections along this section of Route 28:

- Water/Canal Streets
- Essex Street
- Haverhill Street/Tremont Street

The Lawrence-Manchester Rail Corridor Rail Trail programmed in the 2020 to 2024 time-frame of the RTP and TIP also runs parallel to part of this section of Route 28. It is anticipated that this trail will eliminate some automobile trips from Route 28 as well as remove a significant number of pedestrians and bicyclists from the roadway, allowing traffic to run more smoothly. This project will address some of the issues identified in the RSAs conducted at the Water St, Essex St. and Haverhill St. intersections

Amesbury Street corridor improvements that would-return this roadway to two-way operation is programmed in the 2030 to 2034 time-frame of the RTP and could help ease congestion along Route 28, as it runs parallel to it and diverts traffic to Route 28 in its current configuration.

Route 213 westbound from Route 28 (Exit 2) to I-93 (Exit 1) in Methuen

Route 213 westbound from Route 28 (Exit 2) to I-93 (Exit 1) ranks fourth as the non-interstate NHS roadway with congestion affecting the highest number of vehicles in

Table 9.12 Merrimack Valley Crash Cluster Intersections

Merrimack Valley Crash Cluster Intersections with EPDO Scores of 200 or More+ 2014-2016 Crash Data

Community	Intersection Location	#Crashes	Fatal/ Serious	Non-Serious/ Possible Injury	Property Damage Only	EPDO Score
Rowley	Route 1/Route 133	30	1	11	18	270
North	Route 125/Mass. Ave.	29	2	10	17	269
Lawrence	Park St./Spruce St.	16	2	10	4	256
Lawrence	Bennington St./Park St.	16	2	10	4	256
Haverhill	Route 125 Connector/Shelley Rd.	36	0	11	25	256
Salisbury	Main St./Toll Road	33	1	10	22	253
Haverhill	Winter St./White St./Emerson St.	29	2	8	19	229
North	Peters St./Route 114	25	1	9	15	225
Lawrence	Route 28/Lowell St.	25	1	8	16	205
Lawrence	Route 28/Essex St.	24	1	8	15	204
Methuen	Burnham St./Haverhill St.	22	0	9	13	202
Haverhill	Route 125/Winter St.	41	0	8	33	201

Source:
https://gis.massdot.state.ma.us/topcrashlocations/

the morning.

The MVMPO is currently conducting a study that includes this section and extends to the merge of the I-93 SB collector/distributor roadway with I-93 SB just south of Pelham Street.

Congestion/ Performance for Intersections

As part of qualifying projects for Highway Safety Improvement Program (HSIP) Funding, MassDOT identifies "Crash Clusters" at intersections by calculating Equivalent Property Damage Only (EPDO) scores. These scores quantify accident severity as follows: for each location, a crash where there was either a fatality, injury (serious or non-serious) or possible injury is given a value

of 21 points while a crash involving property damage only is given a value of one point. The EPDO score for the location is the sum of all values for the crashes that occurred during the period.

These "Crash Cluster" locations can be used to identify intersections where non-recurring incident-caused congestion occurs more often. The intersections in the region with the highest EPDO scores for the three-year period from 2014 to 2016 are shown in Table 9.12

Only two of these locations have not either recently been improved, have projects that are under construction, appear in the TIP or been the subject of a traffic study:

- Park St./Spruce Street in Lawrence
- Main St./Toll Road in Salisbury

Congestion/ Performance for Transit

Commuter Rail

There are two Massachusetts Bay Transportation Authority (MBTA) commuter rail lines in the MVMPO region, the Haverhill line and the Newburyport line. Keolis Commuter Services, operator and maintainer of the MBTA's Commuter Rail System, is required to report On-Time Performance (OTP) to the MBTA and MassDOT as a measure of service reliability. A train is considered to be "on-time" for this MBTA defined metric if it arrives at its final destination within less than 5 minutes of its scheduled arrival time. The MBTA's Fiscal and Management Control Board provides this data to the public on its MBTA Performance Dashboard www.mbtabackontrack.com. The MBTA's target is for 90% of trains to be "On-Time".

**9.12: Haverhill Commuter Rail Monthly Average Percent Reliability*
Peak, Off-Peak and Combined (All day period), 2015, 2016, 2017**

Month	2015 All Day	2015 Peak Period Trains	2015 Off-Peak Period Trains	2016 All Day	2016 Peak Period Trains	2016 Off-Peak Period Trains	2017 All Day	2017 Peak Period Trains	2017 Off-Peak Period Trains
January	81%	74%	84%	87%	80%	89%	89%	86%	90%
February	28%	23%	29%	88%	83%	90%	80%	79%	81%
March	80%	68%	84%	94%	94%	94%	85%	83%	86%
April	91%	90%	91%	93%	95%	93%	92%	92%	92%
May	86%	83%	87%	89%	88%	89%	90%	92%	90%
June	85%	81%	86%	86%	87%	85%	81%	84%	79%
July	82%	81%	82%	86%	90%	84%	79%	86%	76%
August	94%	97%	93%	85%	91%	83%	89%	89%	89%
September	96%	98%	95%	79%	89%	74%	81%	86%	79%
October	96%	97%	96%	80%	82%	79%	75%	79%	72%
November	92%	92%	92%	84%	85%	83%	78%	83%	76%
December	95%	93%	95%	86%	88%	85%	87%	86%	87%
Year	**86%**	**84%**	**86%**	**87%**	**88%**	**86%**	**84%**	**85%**	**83%**

Haverhill Line

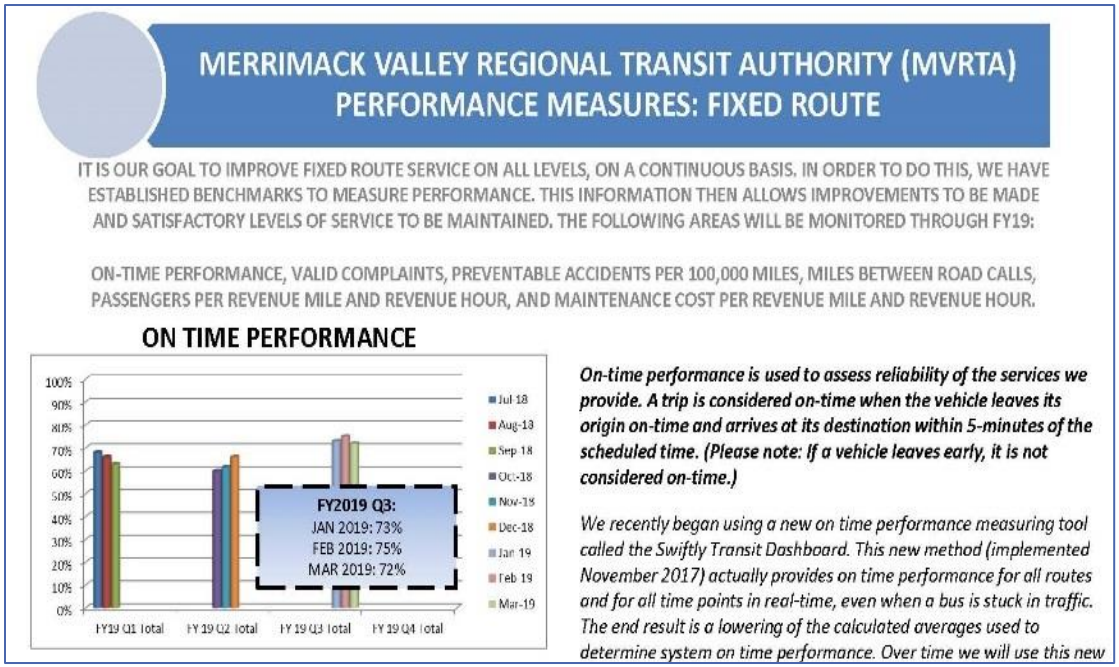
Data for the All-Day On-time Performance for the years 2015, 2016 and 2017 on the Haverhill Line show many months when the OTP was lower than the 90% target. A close look at the data shows much of this occurred during the off-peak periods when work was being conducted on the line and in January and March of 2015 when record snow and cold caused major issues along many MBTA commuter rail tracks.

**Table 9.13: Newburyport Commuter Rail Monthly Average Percent Reliability*
Peak, Off-Peak and Combined (All day period), 2015, 2016, 2017**

Month	2015 All Day	2015 Peak Period Trains	2015 Off-Peak Period Trains	2016 All Day	2016 Peak Period Trains	2016 Off-Peak Period Trains	2017 All Day	2017 Peak Period Trains	2017 Off-Peak Period Trains
January	85%	79%	88%	93%	88%	94%	90%	86%	91%
February	26%	12%	31%	91%	90%	91%	82%	72%	86%
March	88%	78%	91%	95%	95%	95%	86%	79%	89%
April	94%	92%	95%	96%	96%	96%	91%	87%	92%
May	89%	87%	90%	94%	92%	95%	94%	94%	94%
June	89%	85%	91%	93%	89%	95%	88%	87%	88%
July	90%	88%	91%	88%	85%	90%	93%	92%	93%
August	93%	95%	93%	91%	87%	93%	88%	86%	90%
September	93%	93%	94%	93%	92%	94%	86%	84%	87%
October	89%	89%	89%	86%	83%	87%	87%	84%	89%
November	90%	86%	92%	86%	82%	88%	89%	84%	91%
December	94%	92%	95%	91%	87%	93%	88%	81%	91%
Year	**86%**	**84%**	**88%**	**91%**	**89%**	**92%**	**88%**	**85%**	**90%**

Newburyport Line

Data for the All-Day On-time Performance for the years 2015, 2016 and 2017 on the Newburyport Commuter rail line operates at or above the 90% reliability target in 2015, 2016 and 2017 with the exception of February of 2015 and 2017 when very cold weather caused major delays throughout the MBTA rail system.



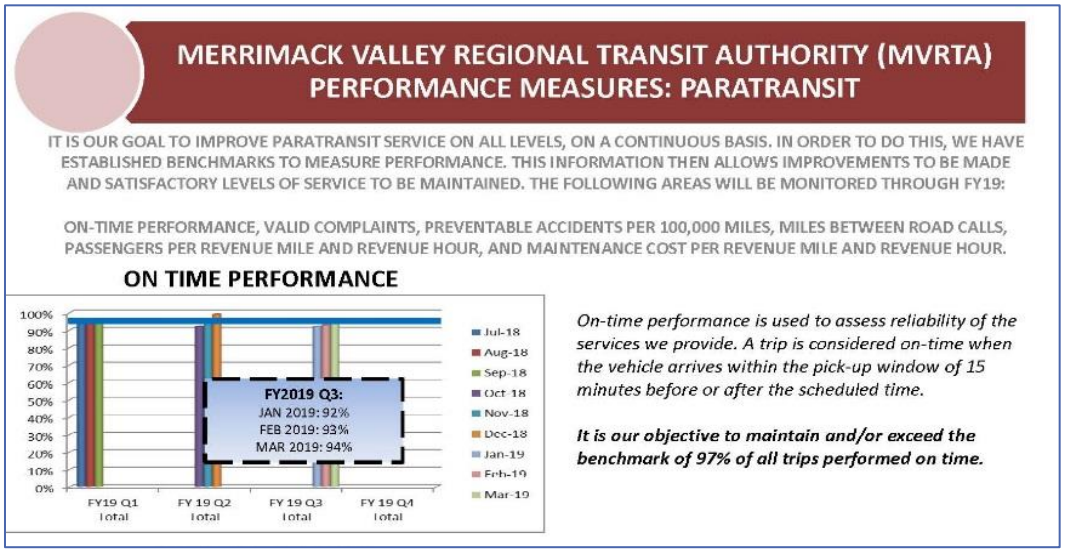
MVRTA Public Transit Service

The MVRTA uses the *Swiftly Transit Dashboard* tool to measure on-time performance which is defined as a vehicle being on-time if it arrives within 5 minutes of the scheduled time. On-time performance is a measure of the reliability of the system. The Swiftly Transit Dashboard measure of On-time Performance is different from the previous calculations of On-time Performance MVRTA used for its fixed route system and therefore the MVRTA has not yet set a benchmark for this measure but will do so as more data becomes available.

MVRTA Paratransit system On-time performance considers a trip on-time when the vehicle arrives within the pick-up window of 15 minutes before or after the scheduled pick-up time. The MVRTA has set a benchmark of 97% of all trips performed on-time. The paratransit system has reached above 90% each month in the first three quarters of FFY 2019.

Public Transportation Operations Strategies

The MVRTA has implemented several strategies in the last few years to



improve transit operations, which should make transit a more attractive alternative, all of which are congestion management strategies.

- In February of 2018 implemented real time transit location available to the public on a transit app for mobile devices.
- In FY 2015 added Sunday service and four holidays' service, but due to a reduction in State funding in FY2018, three holidays were deleted from service.
- Updated its website with a trip planner in 2018.
- IN 2012, the MVRTA system started accepting the Massachusetts Bay Transportation Authority's (MBTA's) stored value Charlie Card payment system and offers a discounted fare on the MBTA system and transfers to the MVRTA system.
- In 2012, upgraded the security cameras on board its buses and demand response vehicles.
- Monitors its transit service schedules and stop locations to make transfer connections work well in the system.

If funding were available the MVRTA could make additional improvements identified in the 2014 MVRTA Regional Transit Plan for the Fixed Route Service such as extending evening span of service to 9:00 PM on weekdays, extending evening span of service to 7:00 PM on Saturdays, increase weekend frequencies on all Haverhill based Routes to 60 minutes with clock face schedules similar to the weekday service, implementing an intra-community shuttle bus route in Newburyport, implementing all day 30-minute weekday service on all Lawrence-based routes and improving service frequency to 60 minutes on routes 51 and 54.

Public Transportation Accessibility Strategies

In FY 2019 the MVRTA will be making its buses more accessible to bicyclists by adding front of bus racks to its buses and additional bicycle racks at the Lawrence Buckley and McGovern stations with funding "Flexed" from the MVMPO region's FY 2019 to 2023 TIP STP funding to FTA.

For the communities that participated, MVPC will look at the recently completed sidewalk condition surveys to determine which ones provide access to transit stops and may need to be improved.

Congestion/Performance for Park-and-Ride Lots

Park-and-Ride lots reduce congestion, the cars parked in the lots are cars that are not on the roadways. The MVPC annually surveys park-and-ride lot usage. The following table lists the lots in the region used to park-and-ride, the ride may be via commuter rail, bus, or vanpooling/ carpooling.

There are two Park-and-Ride lots and one Commuter Rail lot in the region that are at 85% or more full, and therefore are considered over-utilized, or congested. The Newburyport Storey Avenue Park-and-Ride lot is both the largest (675 spaces) and the most intensely used lot in the region with more than 150 vehicles parked than there are marked spaces, which is a utilization rate of 123%. This utilization level is achieved through the use of valet parking at this facility. This includes the parking of vehicles at nearby satellite locations and indicates that real utilization rate is much higher than 123%. This popular lot has already undergone two major expansions.

The other two congested lots are in Andover, the Andover Commuter Rail lot on Railroad Avenue near downtown and the Dascomb Road Park-and-Ride lot located at the I-93 Interchange. These are likely the most congested because Andover is the southern-most community in the region, making the continuing trip to Boston shorter from Andover than from the other communities.

The MVMPO's monitoring of the park-and-ride lot usage as part of previous Congestion Management System data collection contributed to projects that expanded the Newburyport Storey Avenue lot twice and the Dascomb Road Andover lot.

The MVMPO will continue to program park-and-ride lot projects in the RTP and TIP when appropriate.

Demand Management Strategies

The Merrimack Valley Planning Commission is not only a voting member the MVMPO and fills the role as the transportation planning staff for the MVMPO, it is a Regional Planning Agency, is a multi-disciplinary organization which strives to assist the region's communities in the planning areas of transportation, the environment, land use, economic development and GIS mapping. MVPC collaborates with local, State and Federal officials as well as private sector businesses and individuals to ensure consensus in these endeavors. Many of the planning efforts in the disciplines outside of transportation provide an opportunity for Demand Management via Land Use and Economic Development planning. The transportation staff works with other MVPC staff in developing the Regional Land Use Plan, the Comprehensive Economic Development Plan (CEDS), the Regional Housing Plan, and the Multi-Hazard Mitigation Plan as well as working with the Stormwater Mitigation Collaborative and Evacuation Planning.

Smart Growth Land Use Planning and Transit-Oriented Development

The Merrimack Valley Priority Growth Strategy "The Regional Land Use Plan" for the Merrimack Valley Region (MVPGS) (September 2009, updated February 2015) focuses on identifying Priority Development Areas (PDAs) where communities want to encourage growth and Priority Preservation Areas (PPAs) that should be off limits

to development to preserve the character of the region and protect environmental services. In developing the MVPGS the MVPC worked with community representatives to identify PDAs as "areas of concentrated development, including a city or town center, consisting of existing and appropriately zoned commercial, industrial, and mixed-use areas suitable for high-density development".

The MVPGS was developed not only with local community input, additionally the draft was presented at forums including MVPC's Annual Regional Planning Day, MVMPO meeting, Merrimack Valley quarterly planning directors meeting, Comprehensive Economic Development (CEDS) Committee meeting and the Merrimack Valley Regional Legislative Caucus. Presentations of the Draft document were also made to community leaders, Boards of Selectmen and Planning Boards throughout the region.

The relatively dense, mixed use development realized under Smart Growth allows for fewer daily trips being made in cars, because stores, services and workplaces are close to housing and therefore people can walk, bicycle or use public transit for many types of daily trips, potentially reducing congestion.

The MVPC works with communities to develop zoning updates to encourage mixed-use developments in city and town centers and assists communities in creating Smart Growth (40R) Districts.

Transportation projects that are in, or near Priority Development Areas (PDAs), receive extra points in the Transportation Evaluation Criteria (TEC) scoring of projects used in developing the Transportation Improvement Program (TIP).

Transportation Demand Strategies included in Merrimack Valley Comprehensive Economic Development Strategy (MVCEDS)

The MVPC also develops the Merrimack Valley Comprehensive Economic Development Strategy (MVCEDS). The 2018 to 2023 MVCEDS brought together more than 100 diverse stakeholders from public and private sectors to develop an action plan for growing a regional, collaborative economy. Transportation is one of four themes contained in the CEDS committee's visioning sessions that reviewed trends, identified strengths, opportunities, aspirations, and risks and then developed strategies and an implementation plan for the next 5 years.

The MVCEDs Action Plan includes the following Transportation strategies that fall into the Demand Management category.

Support and advance Complete Streets and Active Transportation. Perform a comprehensive audit of needed connections (sidewalks) and infrastructure (bike racks), with specific emphasis on improvements to the bicycle and pedestrian infrastructure within a ½ mile of town/ city centers.

Develop a Transportation Toolkit. This is a tool for the Priority Development Areas (PDAs) that identifies ideal transportation elements that should be included in a PDA and coordinate required mapping and planning.

Increase collaboration with employers in the region. to better understand their transportation needs, work with local employers to collect actual data vs. anecdotes to provide solutions to getting employees to work.

Expand and enhance marketing of transit to increase ridership.

Develop a Bike Share program. This would start with a pilot to determine the best model for a Bike Share Program and how it could be replicated on a regional scale

Expand, connect and market local and regional multi-use trail networks, including along the Merrimack River. Provide and market a viable alternative mode of transportation that connects all the communities along the Merrimack River.

Land Use and Economic Development is a category in the Transportation Evaluation Criteria (TEC) scoring of projects used in developing the Transportation Improvement Program (TIP) under which projects can receive positive or negative points in 4 areas:

1. Degree of effect on business aspects;
2. Degree of effect on sustainable development and proximity to State and/or Regional Priority Development Areas (PDAs);
3. Degree of consistency with the Merrimack Valley PGS and CEDs;
4. Effect on job creation.

Transportation Demand Strategies included in Merrimack Valley Housing Production Plan

MVPC has just completed developing Housing Production Plans (HPPs) with 14 of the region's cities and towns with a funds awarded from the Commonwealth Community Compact Cabinet and MassHousing Programs. An HPP is a proactive strategy for planning and developing housing of all types, including affordable housing. It clearly identifies areas that the community feels are appropriate for development by conducting a housing needs assessment, developing affordable housing goals, and creating implementation strategies. There is a housing shortage in eastern Massachusetts, home prices and rents increase at a much faster rate than salaries, resulting in people moving further away for more affordable housing. This leads to greater distances travelled for jobs and more congested roadways. Establishing more affordable housing, likely shortening commutes, also contributes to less congestion.

The MVPC will continue working with communities in implementing the Housing Production Plan strategies.

Community Effects and Support is a category in the Transportation Evaluation Criteria (TEC) scoring of projects used in developing the Transportation Improvement Program (TIP) under which projects can receive positive or negative points in 5 areas: A.) Degree of effect on residential aspects; B) Degree of public and government support; C) Effect on service to minority or low-income neighborhoods (Title VI and EJ); D) Other impacts/ benefits to minority or low-income neighborhoods (Title VI and EJ); and E) Effect on development and redevelopment of housing stock.

Transportation Demand Strategies – Promoting Nonmotorized Travel -

Promoting Complete Streets

MassDOT has a Complete Streets Funding Program that requires communities to pass a Complete Streets Policy and have a Complete Streets Prioritization Plan to receive construction funding.

The MVPC will continue to assist communities in developing Complete Streets Policies and implementing Complete Streets projects. A Complete Street is one that accommodates all users and modes of transportation, including pedestrians, bicyclists, transit vehicles, and trucks. MVPC has a Regional Transportation Plan Strategy of having all communities incorporating Complete Streets into planning, design, maintenance and construction projects. Currently Groveland, Lawrence, Merrimac and Salisbury have approved Complete Street Policies and Prioritization Plans.

In support of communities implementing Complete Streets the MVPC has completed collection of sidewalk condition data in five communities (Amesbury, Georgetown, Methuen, North Andover and Salisbury) and will continue the sidewalk surveys in Andover and Lawrence. The communities can use this data to identify needs and set priorities for sidewalk repair and construction.

Promoting Development and Implementation of Multi-use Trails

The MVMPO works continually on developing and implementing multi-use trails throughout the region, many that provide connections to other trails to form networks of trails such as the Border-to-Boston Trail, the Coastal Trails Network, and the Merrimack River Trail as discussed in Chapter 7.

Condition, Mobility, and Safety and Security are three categories in the Transportation Evaluation Criteria (TEC) scoring of projects used in developing the Transportation Improvement Program (TIP) under which projects can receive positive or negative points for effects on alternative modes of transportation: In the Condition Category B) Magnitude of improvement of other infrastructure: In the Mobility Category B) Effect on travel time and connectivity/ access; and C) effect on other

modes using the facility: In the Safety and Security Category B) Effect on bicycle and pedestrian safety.

Strategies for Success:

- **Review operations (e.g. signal timings/phasing, lane configurations, etc.) at intersections located along Non-Interstate congested road segments.**
- **Initiate traffic studies/Road Safety Audits where needed at 2014-2016 Crash Cluster locations**
- **Investigate potential effectiveness of reopening Breakdown lane for AM Peak Period travel on I-93 Southbound south of Pelham Street**

Page left blank.

Photo: Heron in Great Marsh

Chapter 10

Goal 5: Promote Environmental Sustainability

Sustainable transportation means transportation that supports economic vitality and livability while continuing to reduce negative environmental impacts. For transportation, sustainability includes how we construct roads, provide fuel efficient transportation options (including transit), increase opportunities to walk and bicycle, use high efficiency lighting and more.

The Commonwealth of Massachusetts is committed to improving air and water quality. In 2010, MassDOT established three primary environmental goals:

- Reduce greenhouse gas (GHG) emissions;
- Promote the healthy transportation options of walking, bicycling and taking public transit; and
- Support smart growth development.

This chapter discusses objectives and strategies employed in the Merrimack Valley to address environmental impacts with a focus on the following three areas:

Lower Green House Gas Emissions

The Global Warming Solutions Act of 2008 requires that the Commonwealth reduce overall GHG emissions by 80% by 2050. Considering that transportation is responsible for 43% of GHG emissions in Massachusetts makes the need to promote mode change, energy efficiency and other avenues in transportation paramount.

Lower Water Pollution Due to Transportation

Massachusetts monitors the condition of waterways across the state. While not the only source, pollution from roads are identified as a source for impaired waterways.

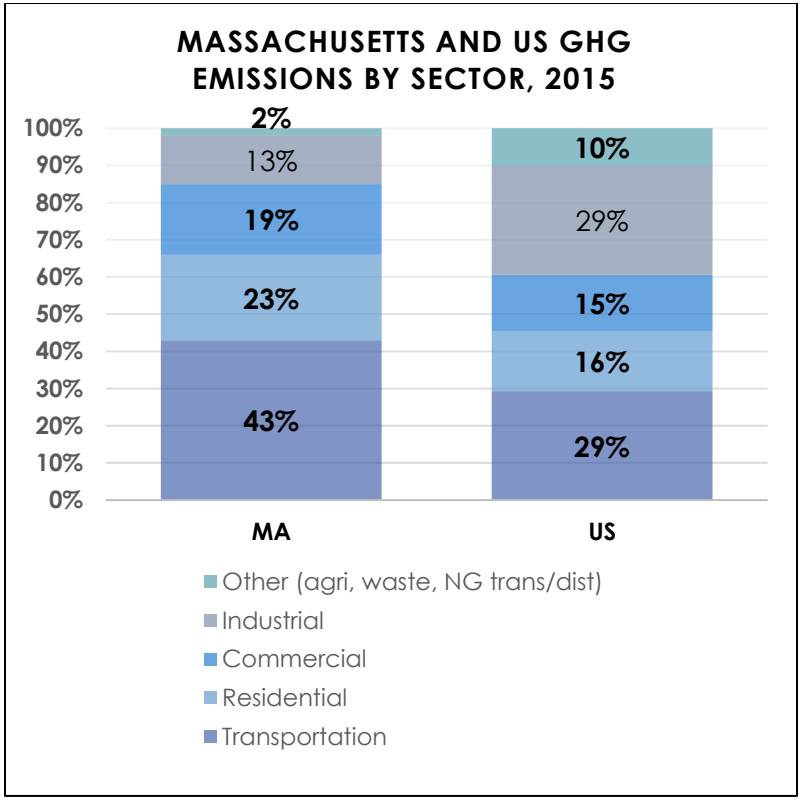


Figure 10.1 Commonwealth of Massachusetts. (2015). MA GHG Emission Trends. www.mass.gov/service-details/ma-gyg-emission-trends.

EIGHT TOWNS AND THE GREAT MARSH

Eight Towns and the Great Marsh (ETGM) is a coalition of eight communities dedicated to the protection of the coastal waters and watersheds on the upper North Shore of Massachusetts Bay. It is the region's committee for the Massachusetts Bay National Estuaries Program.

The ETGM Committee has focused significant efforts on improving climate change resiliency to protect local community infrastructure, including transportation and emergency evacuation routes. These efforts in the Great Marsh and its watersheds include work on restoring native marsh vegetation through managing and controlling spread of invasive species (i.e. Phragmites, pepperweed and green crab), establishing eelgrass beds, living shoreline assessments, dune restoration, reducing barriers to storm water flow, and community resiliency planning. The Committee is also involved in barrier beach erosion and salinity modeling to inform future restoration efforts. Other activities relate to non-point source water quality pollution identification, outreach, and remediation, including Greenscapes, Smart Growth/Low Impact Development, Open Space protection, and Stormwater Best Management Practices.

Stormwater management, Low Impact Development (LID) and other techniques are important to addressing these issues.

Resiliency

The Merrimack Valley is vulnerable to the impacts of natural hazards from storms and the rise in sea level. Impacts on road infrastructure, access to emergency shelters and emergency routes are at the root of transportation planning efforts to ensure that people are safe and communities are resilient. Assessing and replacing undersized road crossings will also result in improvements to community flood resilience.

Photo : A swale that addresses stormwater while at the same time acts as a rain garden and is visually appealing.

Objective 5.1: Implement Effective Stormwater Management

Drainage from our region's municipal stormwater systems is vulnerable to contamination—oil, grease and heavy metals from motor vehicles; pesticides, herbicides and fertilizers from lawns and gardens; silt and sediment from construction sites; and bacteria and excess nutrients from pet waste. When discharged into catch basins and roadside swales, these pollutants pose threats to local drinking water supplies and fish & wildlife habitats. According to the US Environmental Protection Agency (EPA), in Massachusetts, stormwater discharge is the cause of or contributes to at least 55% of the impairments of assessed waterways. (Final MA MS4 General Permit Presentation by Newton Tedder, EPA Region 1, https://www3.epa.gov/region1/npdes/stormwater/ma/2016-presentations/epa-ma-ms4-2016.pdf).

Communities can manage stormwater systems to minimize pollution risks. Merrimack Valley communities are updating their system infrastructure inventories, reviewing the effectiveness of local regulations, coordinating maintenance programs and putting in place best management practices in municipal stormwater design and operations.

MVMPO communities were issued updated MS4 permits in July 2018, which are issued jointly by EPA and the Massachusetts Department of Environmental Protection. As a requirement of the permit, the region's communities each must prepare a Stormwater Management Plan that describes a series of best management practices the community is committed to implementing. Each year, they are required to meet certain goals and MVPC will be able to track their progress.

In 2014, the fifteen Merrimack Valley communities created the Merrimack Valley Stormwater Collaborative supported by MVPC. The Collaborative was designed to promote efficiencies and resource sharing in stormwater management compliance. Regional efforts include public education & outreach, staff training, joint procurements, equipment sharing and regional administration & monitoring.

Low Impact Development (LID) Techniques

The idea of Low Impact Development (LID) has been around for a few decades. The purpose is to employ low-cost solutions that reduce stormwater volumes and allow on-site infiltration and treatment that ideally will reduce the impacts of stormwater on infrastructure and reduce pollutants and other impacts to community waterbodies.

There are a variety of LID techniques that could be employed by municipalities or private land owners, such as green roofs and rain gardens. Others directly relate to the road network such as:

- Low impact roadways: narrower roadways and cul-de-sac alternatives that reduce runoff
- Permeable driveways/Parking Surfaces (such as at park & ride lots)
- Vegetated Swales and Sedimentation Basins
- Deep Sump Catch Basins

MassDOT incorporates LID techniques into many of its projects, as follows:

I-495/Massachusetts Avenue Improvements. During resurfacing and associated ramp improvements at I-495 and Massachusetts Avenue in North Andover, MassDOT retrofitted existing stormwater management systems with BMPs meant to improve water quality in the Shawsheen River. These improvements include adding water quality swales at catch basin outlets and directing them to sediment forebays and infiltration basins before discharging to existing pipes connecting to the river. The BMPs were sized to retain the recommended water quality volume and groundwater recharge volume. Water quality swales included erosion mats to reduce migration of sediments and promote vegetation growth. The seed mix used to stabilize the area contained a

wildflower component to improve the visual perspective of the basin.

Deep Sump Catch Basins. These structures are being used in the following MassDOT projects in the MVMPO region:

- Elm Street Reconstruction Project in Amesbury
- Resurfacing on I-495 in Andover, Lawrence and North Andover
- Lawrence Safe Routes to School Project at Bruce Elementary School
- Improvements at Marston Street/Ferry Street/ Commonwealth Drive intersection in Lawrence

Drainage/Detention Swales. These features may be found in the following MVMPO projects:

- Amesbury/Salisbury Trail Connector at I-95
- Border to Boston Rail Trail in Salisbury

Examples of the use of other stormwater management techniques in the region include:

- Infiltration trenches with check dams in Andover for both the resurfacing of I-93 and the installation of stormwater improvements in the corridor.
- Construction of leaching basins as part of the Route 97 Reconstruction project in Haverhill.

Strategies for Progress

- **Assess Transportation Impact on Impaired Waterways. According to the Massachusetts Department of Environmental Protection, there are 63 identified impaired waterways in the Merrimack Valley. MVPC will work with communities and the DEP to further assess transportation impacts on these waterways. Testing from MS4 implementation and information from communities and DEP will also likely inform this process.**
- **Continue collaborative community outreach and training.**
- **Upgrade stormwater system as road repairs are made.**

Figure 3: Pictometry image of Route 114 during the 2006 Mother's Day flood on the Lawrence/North Andover line.

Objective 5.2: Adaptive Planning for Climate Change

Effective planning and adapting to climate change impacts on the MVMPO region's transportation network requires detailed identification and assessment of specific geographic areas—both coastal and inland—that are projected to be at risk including transportation facilities and services.

Since the 2016 RTP, all 15 Merrimack Valley communities have adopted Natural Hazard Mitigation Plans and four participated in the Great Marsh Coastal Adaptation Plan. In addition, a barries assessment was completed for the Parker-Ipswich-Essex Watersheds and priorities were chosen based on their ecological impact and infrastructure risk. A similar barrier assessment has not been undertaken for the Upper Merrimack Valley River communities.

The MVMPO has compiled a list of the projects contained in the plans mentioned above and which are also on the federal-aid road system (Appendix D). Many of these projects address culverts and 'choke points' while others identify roadways that are at risk due to elevated tides and coastal storm flow. Below are project highlights of those that are included as priorities in the RTP's universe of projects.

Bear Hill Road Culvert Replacement. On the way from New Hampshire to Lake Attitash, the Back River flows through the Town of Merrimac and intersects with Bear Hill Road. Bear Hill Road is prone to flooding, because the existing corrugated steel culvert is undersized and deteriorating. Improving drain structures is currently the highest priority of local officials and the only project in the fiscally constrained section of the RTP for the Town of Merrimac.

Daisy Street Bridge. The Daisy Street Bridge is a major constriction point along the lower Spicket River. The

bridge is functionally obsolete and has a weight limit, though it is not structurally deficient.

Route 114 Reconstruction from I-495 to Waverly Road. The reconstruction of Route 114 in the area of I-495 to Waverly Road is the highest priority project for the region for multiple reasons, including flooding. This project would replace the existing bridge with a wider bridge to better accommodate traffic flow over the Shawsheen River.

Raise Rte. 1A (Beach Road). State Route 1A (Beach Road) provides the primary evacuation route from Salisbury Beach to the rest of the Town. This route is flooded frequently by coastal storms that not only prevents evacuation of the beach, but also restricts access to the beach by fire, police and emergency personnel.

The Coastal Communities of Salisbury, Newburyport, Newbury and Rowley participated in the Great Marsh Coastal Adaptation Plan, which looked at short- and long-term strategies for adapting to the impacts of Climate Change. Among those long-term strategies includes the following transportation-related items:

- Any redesign/reconstruction of impacted roadways should take climate change into consideration and explore green design.
- Raise roadway of Route 1 in Salisbury and establish flow under the roadway to restore hydrology and increase natural resiliency of marsh.
- Monitor and redesign Plum Island Turnpike.

Strategies for Progress

- **Support the Great Marsh restoration project including invasive species management.**
- **Employ planning models to quantify impacts of climate change and sea level rise.**
- **Address choke point culverts and bridges causing flooding.**
- **Work with MassDOT to develop model design for reconstruction of roadways damaged in tidal zones and those impacted by coastal storm flow.**

Objective 5.3: Improve Regional Air Quality

This section documents the latest air quality conformity determination for the 1997 ozone National Ambient Air Quality Standards (NAAQS) in the MVMPO Region. It covers the applicable conformity requirements according to the latest regulations, regional designation status, legal considerations, and federal guidance. Further details and background information are provided below.

Introduction

The 1990 Clean Air Act Amendments (CAAA) require MPOs within nonattainment and maintenance areas to perform air quality conformity determinations prior to the approval of Long-Range Transportation Plans (LRTPs) and TIPs, and at such other times as required by regulation. Clean Air Act (CAA) section 176(c) (42 U.S.C. 7506(c)) requires that federally funded or approved highway and transit activities are consistent with ("conform to") the purpose of the State Implementation Plan (SIP). Conformity to the purpose of the SIP means that means FHWA and FTA funding and approvals are given to highway and transit activities that will not cause or contribute to new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS or any interim milestones (42 U.S.C. 7506(c)(1)). EPA's transportation conformity rules establish the criteria and procedures for determining whether LRTPs, TIPs, and federally supported highway and transit projects conform to the SIP (40 CFR Parts 51.390 and 93).

A nonattainment area is one that the U.S. EPA has designated as not meeting certain air quality standards. A maintenance area is a nonattainment area that now meets the standards and has been re-designated as maintaining the standard. A conformity determination is a demonstration that plans, programs, and projects are consistent with the SIP for attaining the air quality standards. The CAAA requirement to perform a conformity determination ensures that federal approval and funding go toward transportation activities that are consistent with air quality goals.

Legislative and Regulatory Background

The entire Commonwealth of Massachusetts was previously classified as a nonattainment area for ozone and was divided into two nonattainment areas. The Eastern Massachusetts ozone nonattainment area included Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, and Worcester counties. Berkshire, Franklin, Hampden, and Hampshire counties comprised the Western Massachusetts ozone nonattainment area. With these classifications, the CAAA required the Commonwealth to reduce its emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx), the two major precursors to ozone formation to achieve attainment of the ozone standard.

The 1970 Clean Air Act defined a one-hour national ambient air quality standard (NAAQS) for ground-level ozone. The CAAA further classified degrees of nonattainment of the one-hour standard based on the severity of the monitored levels of the pollutant. The entire Commonwealth of Massachusetts was classified as being in serious nonattainment for the one-hour ozone standard, with a required attainment date of 1999. The attainment date was later extended, first to 2003 and a second time to 2007.

In 1997, the EPA proposed a new, eight-hour ozone standard that replaced the one- hour standard, effective June 15, 2005. Scientific information had shown that ozone could affect human health at lower levels, and over longer exposure times than one hour. The new standard was challenged in court, and after a lengthy legal battle, the courts upheld it. It was finalized in June 2004. The eight-hour standard is 0.08 parts per million, averaged over eight hours and not to be exceeded more than once per year. Nonattainment areas were again further classified based on the severity of the eight-hour values. Massachusetts as a whole was classified as being in moderate nonattainment for the eight-hour standard and was separated into two nonattainment areas—Eastern Massachusetts and Western Massachusetts.

In March 2008, EPA published revisions to the eight-hour ozone NAAQS, establishing a level of 0.075 ppm (March 27, 2008; 73 FR 16483). In 2009, EPA announced it would reconsider this standard because it fell outside of the range recommended by the Clean Air Scientific Advisory Committee. However, EPA did not take final action on the re-consideration so the standard would remain at 0.075 ppm.

After reviewing data from Massachusetts monitoring stations, EPA sent a letter on December 16, 2011 proposing that only Dukes County would be designated as nonattainment for the new proposed 0.075 ozone standard. Massachusetts concurred with these findings.

On May 21, 2012, (77 FR 30088), the final rule was published in the Federal Register, defining the 2008 NAAQS at 0.075 ppm, the standard that was promulgated in March 2008. A second rule published on May 21, 2012 (77 FR 30160), revoked the 1997 ozone NAAQS to occur one year after the July 20, 2012 effective date of the 2008 NAAQS.

Also on May 21, 2012, the air quality designations areas for the 2008 NAAQS were published in the Federal Register. In this Federal Register, the only area in Massachusetts that was designated as nonattainment was Dukes County. All other Massachusetts counties were designated as attainment/unclassified for the 2008 standard. On March 6, 2015, (80 FR 12264, effective April 6, 2015) EPA published the Final Rulemaking, "Implementation of the 2008 National Ambient Air Quality Standards (NAAQS) for Ozone: State Implementation Plan Requirements; Final Rule." This

rulemaking confirmed the removal of transportation conformity to the 1997 Ozone NAAQS.

However, on February 16, 2018, the United States Court of Appeals for the District of Columbia Circuit in South Coast Air Quality Mgmt. District v. EPA ("South Coast II," 882 F.3d 1138) held that transportation conformity determinations must be made in areas that were either nonattainment or maintenance for the 1997 ozone NAAQS and attainment for the 2008 ozone NAAQS when the 1997 ozone NAAQS was revoked. These conformity determinations are required in these areas after February 16, 2019. On November 29, 2018, EPA issued a Transportation Conformity Guidance for the South Coast II Court Decision (EPA-420-B-18-050, November 2018) that addresses how transportation conformity determinations can be made in areas. According to the guidance, both Eastern and Western Massachusetts, along with several other areas across the country, are now defined as "orphan nonattainment areas" – areas that were designated as nonattainment for the 1997 ozone NAAQS at the time of its revocation (80 FR 12264, March 6, 2015) and were designated attainment for the 2008 ozone NAAQS in EPA's original designations rule for this NAAQS (77 FR 30160, May 21, 2012).

Current Conformity Determination

After February 16, 2019, as a result of the court ruling and the subsequent federal guidance, transportation conformity for the 1997 NAAQS – intended as an "anti-backsliding" measure – now applies to both of Massachusetts' orphan areas. Therefore, this conformity determination is being made for the 1997 ozone NAAQS on the MV MPO FFY 2020-2024 TIP and 2020-2040 RTP.

The transportation conformity regulation at 40 CFR 93.109 sets forth the criteria and procedures for determining conformity. The conformity criteria for TIPs and RTPs include: latest planning assumptions (93.110), latest emissions model (93.111), consultation (93.112), transportation control measures (93.113(b) and (c), and emissions budget and/or interim emissions (93.118 and/or 93.119).

For the 1997 ozone NAAQS areas, transportation conformity for TIPs and RTPs for the 1997 ozone NAAQS can be demonstrated without a regional emissions analysis, per 40 CFR 93.109(c). This provision states that the regional emissions analysis requirement applies one year after the effective date of EPA's nonattainment designation for a NAAQS and until the effective date of revocation of such NAAQS for an area. The 1997 ozone NAAQS revocation was effective on April 6, 2015, and the South Coast II court upheld the revocation. As no regional emission analysis is required for this conformity determination, there is no requirement to use the latest emissions model, or budget or interim emissions tests.

Therefore, transportation conformity for the 1997 ozone NAAQS for the MVMPO FFY 2020-2024 TIP and 2020-2040 RTP can be demonstrated by showing that remaining

requirements in Table 1 in 40 CFR 93.109 have been met. These requirements, which are laid out in Section 2.4 of EPA's guidance and addressed below, include:

- Latest planning assumptions (93.110)
- Consultation (93.112)
- Transportation Control Measures (93.113)
- Fiscal Constraint (93.108)

Latest Planning Assumptions:

The use of latest planning assumptions in 40 CFR 93.110 of the conformity rule generally apply to regional emissions analysis. In the 1997 ozone NAAQS areas, the use of latest planning assumptions requirement applies to assumptions about transportation control measures (TCMs) in an approved SIP (see following section on Timely Implementation of TCMs).

Consultation:

The consultation requirements in 40 CFR 93.112 were addressed both for interagency and public consultation. Interagency consultation was conducted with FHWA, FTA, US EPA Region 1, MassDEP and the other Massachusetts MPOs, with the most recent conformity consultation meeting held on March 6, 2019 (this most recent meeting focused on understanding the latest conformity-related court rulings and resulting federal guidance). This ongoing consultation is conducted in accordance with the following:

Massachusetts' Air Pollution Control Regulations 310 CMR 60.03 "Conformity to the State Implementation Plan of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 23 USC or the Federal Transit Act".

The Commonwealth of Massachusetts Memorandum of Understanding by and between Massachusetts Department of Environmental Protection, Massachusetts Executive Office of Transportation and Construction, Massachusetts Metropolitan Planning Organizations concerning the conduct of transportation-air quality planning in the development and implementation of the state implementation plan" (note: this MOU is currently being updated).

Public consultation was conducted consistent with planning rule requirements in 23 CFR 450.

Title 23 CFR Section 450.324 and 310 CMR 60.03(6)(h) requires that the development of the TIP, RTP, and related certification documents provide an adequate opportunity for public review and comment. Section 450.316(b) also establishes the outline for MPO public participation programs. The MVMPO's Public Participation Plan was formally adopted in 2017 (MVMPO Public Participation Plan as Amended through March 2017) and is posted on the MVPC.org website. The Public Participation Plan ensures that the public will have access to the TIP/RTP and related documents, provides for public notification of the availability of the TIP/RTP and

the public's right to review the document and comment thereon, and provides a 21-day public review and comment period prior to the adoption of the TIP/RTP and related certification documents.

The public comment period for this conformity determination for the RTP commenced on July 2, 2019. During the 21-day public comment period, any comments received were incorporated into this Plan. This allowed ample opportunity for public comment and MPO review of the draft document. The public comment period will close on July 22, 2019 and subsequently, the MVMPO is expected to endorse this air quality conformity determination before August 2019. These procedures comply with the associated federal requirements.

Timely Implementation of Transportation Control Measures:

Transportation Control Measures (TCMs) have been required in the SIP in revisions submitted to EPA in 1979 and 1982. All SIP TCMs have been accomplished through construction or through implementation of ongoing programs. All of the projects have been included in the Region's Transportation Plan (present or past) as recommended projects or projects requiring further study. These projects are:

- Extension/ Addition of Bus Routes
- Construction of Park and Ride Lots
- Intersection Improvements
- Demand Responsive Transit
- Institution of Express/Shuttle Bus Services
- Subscription Van Service
- Double peak-hour fixed route bus service in Lawrence and Haverhill

DEP submitted to EPA its strategy of programs to show Reasonable Further Progress of a 15% reduction of VOCs in 1996 and the further 9% reduction of NOx toward attainment of the National Ambient Air Quality Standards NAAQS for ozone in 1999. Within that strategy there are no specific TCM projects. The strategy does call for traffic flow improvements to reduce congestion and, therefore, improve air quality. Other transportation-related projects that have been included in the SIP control strategy are listed below:

- *Enhanced Inspection and Maintenance Program*
- *California Low Emission Vehicle Program*
- *Reformulated Gasoline for On- and Off-Road Vehicles*
- *Stage II Vapor Recovery at Gasoline Refueling Stations*
- *Tier I Federal Vehicle Standards*

Fiscal Constraint:

Transportation conformity requirements in 40 CFR 93.108 state that TIPs and RTPs must be fiscally constrained consistent with DOT's metropolitan planning regulations at 23 CFR part 450. The MVMPO 2020-2024 TIP and 2020-2040 RTP are fiscally constrained, as demonstrated in the MVMPO RTP Fiscal Constraint Chapter and in the MVMPO TIP Part C.1. Highway Program Financial Plan and Part C.2. Transit Program Financial Plan.

In summary and based upon the entire process described above, the MVMPO has prepared this conformity determination for the 1997 Ozone NAAQS in accordance with EPA's and Massachusetts' latest conformity regulations and guidance. This conformity determination process demonstrates that the FFY 2020-2024 TIP and the 2020-2040 RTP meet the Clean Air Act and Transportation Conformity Rule requirements for the 1997 Ozone NAAQS and have been prepared following all the guidelines and requirements of these rules during this time period.

Therefore, the implementation of the MVMPO's FFY 2020-2024 TIP and the 2020-2040 RTP are consistent with the air quality goals of, and in conformity with, the Massachusetts SIP.

Photo: Chargers for electric cars in North Andover.

Promoting Clean Air in the Merrimack Valley

Supporting Mode Change

Currently, just over 50% of Merrimack Valley residents also work in the region, but 76% of them drive alone to work. Making it easier for people to choose alternative transportation modes for commuting and short everyday trips will help create a shift from pollution-intensive modes, to active transportation modes such as walking, bicycling and transit. Chapter 7 goes into more detail about mode shift goals and strategies.

Going Electric

In Massachusetts, over 40% of all GHG emissions in 2015 came from transportation infrastructure and vehicles, with nearly half coming from passenger vehicles. As a result, the Commonwealth of Massachusetts has adopted an ambitious goal of reducing GHG emissions by 80% by 2050. To do so, most if not all vehicles will need to be electric vehicles by that time (*Choices for Stewardship: Recommendations to Meet the Transportation Future Volume 1, MassDOT*).

To meet this goal, regional transit authorities and MassDOT are looking at the 'when', 'how' and 'how much' of converting their bus fleets to electric vehicles. While electric vehicle technology has been advancing greatly in the last few years, the time is not quite right to include electric conversion in this Regional Transportation Plan, but may be in the near future. Here's why:

Technological advances are needed. While the battery technology has made leaps and bounds (and is expected to continue), current electric bus batteries continue to lose efficiency in cold weather. It is true that regional transit authorities across the country are converting their bus fleets to electric. While an electric bus fleet may be able to run efficiently in the mild climate of California, for example, it may not run similarly in New England. More studies are underway.

Also, current batteries need to be recharged more frequently. Even the largest battery currently cannot run for the same time period as a diesel bus without needing to be recharged. Both additional infrastructure along routes as well as a redesign of the routing network is needed in order to accommodate the new system. Redesigning a fixed route system to accommodate the new technology could certainly be accomplished.

In March 2019, MassDOT released a report "Battery Electric Bus Study – Merrimack Valley Regional Transit Authority Report", which analyzed whether current battery electric buses could complete existing bus assignments. The study assumed that the buses would only be charged overnight at the garages and there would be no change in the route schedules or fleet size. The results showed that in extreme cold, only up to half of the MVRTA fleet could be exchanged for the highest capacity battery electric buses. In moderate temperature, the efficiencies improve. Increasing the fleet size so that each bus operates fewer miles per day

would also allow for more widespread adoption of battery electric buses.[1]

The cost of electric buses is far greater than a clean diesel bus today. The MVRTA spent $475,000 for a clean diesel bus in 2019. An electric bus would have been $745,000. However, the cost of electric buses is coming down and is soon expected to be on par with diesel hybrid buses, presently priced at $675,000.

With today's technology, the MVRTA would need to maintain its current operations as well as install new infrastructure for electric buses. This will require additional land, energy sources and a plan for installing electric charging infrastructure around the region.

As transportation modes and systems in the Merrimack Valley are updated and expanded, environmental sustainability remains a primary consideration. Reducing greenhouse gasses, removing pollutants from stormwater and adapting to a changing climate are actions that not only meet regulation but ensure a quality of life for all in the Merrimack Valley. Through local coalitions and state planning efforts, the Merrimack Valley is responding to innovations in technology and the benefits of nature-based solutions. Collaborative efforts ensure that communities and state agencies incorporate environmental sustainability into all their transportation efforts, thereby ensuring the Merrimack Valley's economic vitality and livability.

Greenhouse Gas Tracking

This section documents recent progress made by MassDOT and the MPOs in working to help achieve greenhouse gas (GHG) reduction goals as outlined in state regulations applicable to Massachusetts. This "progress report" estimates future carbon dioxide (CO_2) emissions from the transportation sector as part of meeting the GHG reduction goals established through the Commonwealth's Global Warming Solutions Act (GWSA).

GWSA Transportation Status: Future Carbon Dioxide Emissions Reductions

The Global Warming Solutions Act of 2008 requires statewide reductions in greenhouse gas (CO2) emissions of 25 percent below 1990 levels by the year 2020, and 80 percent below 1990 levels by 2050.

The Commonwealth's thirteen metropolitan planning organizations (MPOs) are involved in helping to achieve greenhouse gas reductions mandated under the GWSA. The MPOs work closely with the Massachusetts Department of Transportation (MassDOT) and other involved agencies to develop common transportation

[1] WSP USA, *Battery Electric Bus Study*, (Massachusetts, MassDOT, 2019), 1.

goals, policies, and projects that would help to reduce GHG emission levels statewide, and meet the specific requirements of the GWSA regulation – *Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation (310 CMR 60.05)*. The purpose of this regulation is to assist the Commonwealth in achieving their adopted GHG emission reduction goals by:

Requiring each MPO to evaluate and report the aggregate GHG emissions and impacts of both its Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP).

Requiring each MPO, in consultation with MassDOT, to develop and utilize procedures to prioritize and select projects in its RTP and TIP based on factors that include GHG emissions and impacts.

Meeting the requirements of this regulation is being achieved through the transportation goals and policies contained in the 2020 RTPs, the major projects planned in the RTPs, and the mix of new transportation projects that are programmed and implemented through the TIPs.

The GHG evaluation and reporting processes enable the MPOs and MassDOT to identify the anticipated GHG impacts of the planned and programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects. This approach is consistent with the greenhouse gas reduction policies of promoting healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments; as well as supporting smart growth development patterns through the creation of a balanced multi-modal transportation system. All of the MPOs and MassDOT are working toward reducing greenhouse gases with "sustainable" transportation plans, actions, and strategies that include (but are not limited to):

- Reducing emissions from construction and operations
- Using more fuel-efficient fleets
- Implementing and expanding travel demand management programs
- Encouraging eco-driving
- Providing mitigation for development projects
- Improving pedestrian, bicycle, and public transit infrastructure and operations (healthy transportation)
- Investing in higher density, mixed use, and transit-oriented developments (smart growth)

Regional GHG Evaluation and Reporting in RTPs

MassDOT coordinated with MPOs and regional planning agency (RPA) staffs on the implementation of GHG evaluation and reporting in development of each MPO's 2012 and 2016 RTPs. This collaboration has continued for the MPOs' 2020 RTPs and 2020-24 TIPs. Working together, MassDOT and the MPOs have attained the following milestones:

- Modeling and long-range statewide projections for GHG emissions resulting from the transportation sector, as a supplement to the 2020 RTPs. Using the newly updated statewide travel demand model, GHG emissions have been projected for 2020 no-build (base) and build (action) conditions, and for 2040 no-build (base) and build (action) conditions (see the chart in this section for the results of this modeling).

- All of the MPOs have addressed GHG emission reduction projections in their RTPs (including the statewide estimates in the chart that follows), along with a discussion of climate change and a statement of MPO support for reducing GHG emissions from transportation as a regional goal.

MassDOT's statewide estimates of CO_2 emissions resulting from the collective list of all recommended projects in all of the Massachusetts RTPs combined are presented in the table below. Emissions estimates incorporate the latest planning assumptions including updated socio-economic projections consistent with the 2020 RTPs:

Table 10.1: Massachusetts Statewide Aggregate CO_2 Estimated Emissions Impacts from Transportation (all emissions in tons per summer day)

Year	CO_2 Action Emissions	CO_2 Base Emissions	Difference (Action – Base)
2016	86,035.6	86,035.6	n/a
2020	75,675.6	75,865.9	-190.3
2040	54,484.2	54,702.2	-218.0

This analysis includes only those larger, regionally significant projects that are included in the statewide travel demand model. Many other types of projects that cannot be accounted for in the model (such as bicycle and pedestrian facilities, shuttle services, intersection improvements, etc.), are covered in each MPO region's RTP with either "qualitative" assessments of likely CO_2 change, or actual quantitative estimates listed for each project.

As shown in Table 10.1, collectively, all the projects in the RTPs in the 2020 Action scenario provide a statewide reduction of over 190 tons of CO_2 per day compared to the base case. The 2040 Action scenario estimates a reduction of 218 tons per day of CO_2 emissions compared to the base case.

These results demonstrate that the transportation sector is expected to continue making positive progress in contributing to the achievement of GHG reduction targets consistent with the requirements of the GWSA. MassDOT and the MPOs will continue to advocate for steps needed to accomplish the Commonwealth's long-term goals for greenhouse gas reductions.

Greenhouse Gas Impacts Tracking for the MVMPO TIP

This section summarizes the greenhouse gas (GHG) impacts that are anticipated to result from the projects that are included in the FFY 2020 to 2024 timeframe of the RTP. There is not enough design detail available for projects in the future years of the RTP to be analyzed for Greenhouse Gas impacts.

The Role of MPOs

The Commonwealth's MPOs are integrally involved in supporting the GHG reductions mandated under the GWSA. The MPOs are most directly involved in helping to achieve the GHG emissions reductions through the promotion of healthy transportation modes by prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments – and assisting smart growth development patterns through the creation of a balanced multi-modal transportation system. This is realized through the transportation goals and policies espoused in the RTPs, the major projects planned in the RTPs, and the mix of new transportation projects that are programmed and implemented through the TIPs. GHG tracking and evaluation processes enable the MPOs to identify the anticipated GHG impacts of planned and programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects.

Project-Level GHG Tracking and Evaluation in TIPs

It is also important to monitor and evaluate the GHG impacts of the transportation projects that are programmed in the MPOs' TIPs. The TIPs include both the larger, regionally-significant projects from the RTPs, which are reported in the Statewide GHG report, as well as smaller projects that are not included in the RTP but that may nevertheless have impacts on GHG emissions. The primary objective of this tracking is to enable the MPOs to evaluate expected GHG impacts of different projects and to use this information as a criterion for prioritizing and programming projects.

Calculation of GHG Impacts for TIP Projects

MassDOT has adopted spreadsheets used by MPOs to determine CMAQ eligibility and that also include CO_2 impacts. The data and analysis required for these calculations is available from functional design reports that are submitted for projects that would produce a measurable GHG impact.

Projects with Quantified Impacts

RTP Projects

Major capacity expansion projects are expected to have a significant impact on GHG emissions. These projects are included in each MPO's RTP and analyzed using either the statewide model or Boston MPO's regional model, which reflect GHG impacts. As a result, no independent TIP calculations are required.

Quantified Decrease in Emissions

For those projects that are expected to produce a measurable decrease in emissions, the approach for calculating these impacts is described below. These projects are categorized in the following manner:

- Quantified Decrease in Emissions from Traffic Operational Improvement - An intersection reconstruction or signalization project that is projected to reduce delay and congestion.
- Quantified Decrease in Emissions from Pedestrian and Bicycle Infrastructure - A shared-use path that enables increased walking and biking and decreased vehicle-miles traveled (VMT).
- Quantified Decrease in Emissions from New/Additional Transit Service - A bus or shuttle service that enables increased transit ridership and decreased VMT.
- Quantified Decrease in Emissions from a Park and Ride Lot - A park-and-ride lot that enables increased transit ridership/ increased ridesharing and decreased VMT.
- Quantified Decrease in Emissions from Bus Replacement. A bus replacement that directly reduces GHG emissions generated by service.
- Quantified Decrease in Emissions from Complete Streets Improvements - Improvements to roadway networks that include the addition of bicycle and pedestrian accommodations where none were present before.
- Quantified Decrease in Emissions from Alternative Fuel Vehicle Procurements – A vehicle procurement where alternative fuel/ advanced technology vehicles replace traditional gas or diesel vehicles.
- Quantified Decrease in Emissions from Anti-idling Strategies – Implementation of policies such as limiting idling allowed, incorporating anti-idling technology into fleets and using LED lights on trucks for the purpose of illuminating worksites.
- Quantified Decrease in Emissions from Bike Share Projects – A new bike share project or capacity added to existing projects.

- Quantified Decrease in Emissions from Induced Travel Projects – A project that changes roadway capacity.
- Quantified Decrease in Emissions from Speed Reduction Programs – Programs that reduce speed to no less than 55 miles per hour.
- Quantified Decrease in Emissions from Transit Signal Priority Projects – A project that applies this technology to a signal intersection or along a corridor that impacts bus service.
- Quantified Decrease in Emissions from Truck Stop Electrification Projects – A new truck stop electrification project or capacity added to an existing project.
- Quantified Decrease in Emissions from Other Improvement.

Quantified Increase in Emissions

Projects expected to produce a measurable increase in emissions.

Projects with No Assumed Impacts

No Assumed Impact/Negligible Impact on Emissions - Projects that do not change the capacity or use of a facility (e.g. roadway median barrier or retaining wall replacement, or bridge rehabilitation/replacement that restores the bridge to its previous condition) are assumed to have no/negligible GHG impact.

Qualitative Decrease in Emissions

Projects expected to produce a minor decrease in emissions that cannot be calculated with any precision. Examples of such projects include roadway repaving, signage improvement, ITS improvement, or transit marketing/customer experience improvement.

Qualitative Increase in Emissions

Projects expected to produce a minor increase in emissions that cannot be calculated with any precision.

Regional Greenhouse Gas Impact Summary Tables for FFYs 2020 – 2024 TIP

The following tables summarize the calculated quantitative and assumed qualitative impacts of the projects included in the regional FFYs 2020 – 2024 TIP by year.

Table 10.2: 2020 Merrimack Valley Region MPO TIP
Highway Projects GHG Tracking Summary

Mass DOT/ FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr.)	GHG Impact Description	Total Cost	Additional Information
602418	Amesbury – Reconstruction of Elm Street	$7,223,053	Quantified	1,336	Quantified Decrease in Emissions from Complete Streets Project	$11,178,124	AC* yr. 2 of 2.
608027	Haverhill – Bradford Rail Trail Extension, from Route 125 to Railroad Street	$848,345	Quantified	422	Quantified Decrease in Emissions from Bicycle and Pedestrian Infrastructure	$848,345	
605306	Haverhill – Bridge Replacement, H-12-039, I-495 (NB & SB) over Merrimack River	$15,305,880	Qualitative		No assumed impact/ negligible impact on emissions	$118,786,388	AC yr. 3 of 6.

* Advance Construction (AC) is a federal funding tool in which the state pays for the project with non-Federal-aid funds to begin with and can later seek reimbursement of the Federal share of the funding category's project cost by obligating Federal-aid funding in future years. To qualify, projects must (1) the estimated Federal participating cost must exceed the total regional annual target, and (2) construction will take place during all years for which the federal funding is programmed.

Table 10.3 2021 Merrimack Valley Region MPO TIP
Highway Projects GHG Tracking Summary

Mass DOT/ FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost	Additional Information
608298	Groveland – Community Trail (Main St. to King St.)	$2,064,255	Quantified	2,710	Quantified Decrease in Emissions from Bicycle and Pedestrian Infrastructure	$2,064,255	
608095	North Andover – Corridor improvements on Rt. 114 between Rt 125 (Andover St) and Stop & Shop driveway.	$6,813,052	Qualitative		Qualitative Decrease in Emissions	$17,399,023	AC Yr. 1 of 2
607541	Georgetown/Boxford – Border to Boston Trail Georgetown Rd to West Main St. (Rt. 97)	$1,812,628	Quantified	2,667	Quantified Decrease in Emissions from Bicycle and Pedestrian Infrastructure	$1,812,628	
605306	Haverhill – Bridge replacement H-12-039, I-495 (NB & SB) over Merrimack River	$15,305,880	Qualitative		No assumed impact/ negligible impact on emissions	$118,786,388	AC Yr. 4 of 6.
608494	Newbury/Newburyport/ Salisbury – Resurfacing and related work on Rt. 1	$9,807,200	Qualitative		Qualitative Decrease in Emissions	$9,807,200	

Table 10.4 2022 Merrimack Valley Region MPO TIP
Highway Projects GHG Tracking Summary

MassDOT /FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost	Additional Information
608761	Haverhill Intersection reconstruction at Rt. 108 (Newton Rd) and Rt. 110 (Kenoza Ave. and Amesbury Rd.)	$2,099,520	Quantified	8,307	Quantified Decrease in Emissions from Traffic Operational Improvement	$2,099,520	
608095	North Andover – Corridor improvements on Rt. 114, between Rt. 125 (Andover St.) and Stop & Shop driveway	$8,684,626	Qualitative		Qualitative Decrease in Emissions	$17,399,023	AC Yr 2 of 2
605306	Haverhill – Bridge replacement H-12-039, I-495 (NB & SB) over Merrimack River	$18,203,683	Qualitative		No assumed impact/ negligible impact on emissions	$118,786,388	AC Yr 5 of 6.

Table 10.5: 2023 Merrimack Valley Region MPO TIP
Highway Projects GHG Tracking Summary

MassDOT /FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost	Additional Information
608788	Haverhill – Roadway reconstruction on North Ave., from Main St. (Rt. 125) to Plaistow, NH	$4,147,823	Qualitative		Qualitative Decrease in Emissions	$13,678,560	AC Yr 1 of 2
602202	Salisbury – Reconstruction of Rt. 1 (Lafayette Rd)	$7,090,517	Qualitative		Qualitative Decrease in Emissions	$7,090,517	
608930	Lawrence – Lawrence Manchester Rail Corridor Rail Trail	$15,950,704	Quantified	175,927	Quantified Decrease in Emissions from Bicycle and Pedestrian Infrastructure	$15,950,704	
607542	Georgetown/Newbury Border to Boston Trail (Northern Georgetown to Byfield)	$4,341,120	Quantified	15,682	Quantified Decrease in Emissions from Bicycle and Pedestrian Infrastructure	$4,341,120	
605306	Haverhill – Bridge replacement, H-12-039, I-495 (NB & SB) over Merrimack River	$15,305,880	Qualitative		No assumed impact/ negligible impact on emissions	$118,786,388	AC Yr 6 of 6.
609466	Haverhill – Bridge replacement, H-12-040, I-495 (NB & SB) over Merrimack River	$25,198,768	Qualitative		No assumed impact/ negligible impact on emissions	$96,000,000	AC Yr 1 of 3.

Table 10.6 2024 Merrimack Valley Region MPO TIP
Highway Projects GHG Tracking Summary

Mass DOT/ FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost	Additional Information
608788	Haverhill – Roadway reconstruction on North Ave., from Main St. (Rt. 125) to Plaistow, NH	$9,530,737	Qualitative		Qualitative Decrease in Emissions	$13,678,560	AC Yr 2 of 2
606522	Andover – Bridge Rehabilitation, A-09-036, I-495 OVER ST 28 (SB), A-09-037, I-495 OVER B&M AND MBTA, A-09-041, I-495 OVER ST 28 (NB)	$17,204,394	Qualitative		No assumed impact/ negligible impact on emissions	$113,386,056	AC Yr 1 of 5
605304	HAVERHILL- Bridge Replacement , H-12-007 & H-12-025, Bridge St. (SR 125) over Merrimack River and abandoned B&M RR (proposed bikeway)	$13,142,589	Qualitative		No assumed impact negligible impact on emissions	$124,938,960	AC Yr 1 of 5.
TBD	HAVERHILL- Bridge replacement, H-12-040, I-495 (NB & SB) over Merrimack River	$43,180,558	Qualitative		No assumed impact/ negligible impact on emissions	$96,000,000	AC Yr 2 of 3.

Table 10.7 2021 Merrimack Valley Region Transit Projects GHGs

MassDOT/ FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost
RTD0007684	Preventive Maintenance	$3,495,970	Qualitative		No assumed impact/ negligible impact on emissions	$3,495,970
RTD0007685	Non-Fixed Route ADA Para Serv	$1,741,065	Qualitative		No assumed impact/ negligible impact on emissions	$1,741,065
RTD0007686	Short Range Transit Planning	$100,000	Qualitative		No assumed impact/ negligible impact on emissions	$100,000
RTD0007688	Operating Assistance	$906,350	Qualitative		No assumed impact/ negligible impact on emissions	$906,350
RTD0007689	Replace 16 Model Yr 2015 vans with new vans.	$1,180,480	Quantified	32,764	Quantified Decrease in Emissions from Bus Replacement	$1,180,480
RTD0007697	SGR Replace 1 model yr 2014 supervisory vehicle	$47,900	Qualitative		No assumed impact/ negligible impact on emissions	$47,900

Table 10.8 2022 Merrimack Valley Region Transit Projects GHGs

MassDOT/ FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost
RTD0007690	Preventive Maintenance	$3,611,335	Qualitative		No assumed impact/ negligible impact on emissions	$3,611,335
RTD0007691	Non-Fixed Route ADA Paratransit Service	$1,801,630	Qualitative		No assumed impact/ negligible impact on emissions	$1,801,630
RTD0007692	Short Range Transit Planning	$100,000	Qualitative		No assumed impact/ negligible impact on emissions	$100,000
RTD0007693	Operating Assistance	$936,260	Qualitative		No assumed impact/ negligible impact on emissions	$936,260
RTD0007694	Replace Model Yr 2009 buses with delivery in 2022 (7 of 9)	$3,417,680	Quantified	19,755	Quantified Decrease in Emissions from Bus Replacement	$3,417,680
RTD0008061	Replace 2 model year 2016 supervisory vehicles	$97,740	Qualitative		No assumed impact/ negligible impact on emissions	$97,740

Table 10.9: 2023 Merrimack Valley Region Transit Projects GHGs

MassDOT/ FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost
RTD0007698	Preventive Maintenance	$3,730,510	Qualitative		No assumed impact/ negligible impact on emissions	$3,730,510
RTD0007699	Operating Assistance	$967,150	Qualitative		No assumed impact/ negligible impact on emissions	$967,150
RTD0007700	Non-Fixed Route ADA Para Serv	$1,861,090	Qualitative		No assumed impact/ negligible impact on emissions	$1,861,090
RTD0007701	Replace 2 Model Year 2009 buses with delivery in 2023	$1,005,780	Quantified	5,644	Quantified Decrease in Emissions from Bus Replacement	$1,005,780
RTD0007702	Replace 6 model Year 2017 vans with delivery in 2023	$469,620	Qualitative		Not yet enough information to calculate	$469,620
RTD0007703	Short Range Transit Planning	$100,000	Qualitative		No assumed impact/ negligible impact on emissions	$100,000

Table 10.10 2024 Merrimack Valley Regional Transit Projects GHGs.

MassDOT/ FTA Project ID	MassDOT/ FTA Project Description	Total Programmed Funds	GHG Analysis Type	GHG CO_2 Impact (kg/yr)	GHG Impact Description	Total Cost
	Preventive Maintenance	$3,853,620	Qualitative		No assumed impact/ negligible impact on emissions	$3,853,620
	Non-Fixed Route ADA Para Serv	$1,922,630	Qualitative		No assumed impact/ negligible impact on emissions	$1,922,630
	Operating Assistance	$865,320	Qualitative		No assumed impact/ negligible impact on emissions	$865,320
	Short Range Transit Planning	$100,000	Qualitative		No assumed impact/ negligible impact on emissions	$100,000
	SGR Replace 2 Model Year 2011 buses with delivery in 2024 (2 of 8)	$1,035,940	Qualitative		Not yet enough information to calculate	$1,035,940

Page left blank.

Photo: Essex Street in Lawrence.

Chapter 11

Goal 6: Transportation Equity

This RTP has been prepared in compliance with applicable statutes and policies, including:

Title VI of the Civil Rights Act of 1964 (Title VI), which prohibits discrimination based upon race, color, and national origin.

- Federal Executive Order 12898, which mandates incorporation of Environmental Justice (EJ) analyses in policies, programs, and activities, addressing how low-income and minority populations are affected;
- Federal Executive Order 13166, which mandates examination of services provided and identification of any need for services to persons with limited English proficiency (LEP), and development/implementation of a system to provide services so LEP persons can have meaningful access to the MVMPO's process and products/services;
- Commonwealth Executive Order 526, which mandates that all programs, activities, and services provided, performed, licensed, chartered, funded, regulated, or contracted for by the state shall be conducted without unlawful discrimination based on race, color, age, gender, ethnicity, sexual orientation, gender identity or expression, religion, creed, ancestry, national origin, disability, veteran's status (including Vietnam-era veterans), or background;

- USDOT Requirements for MPOs (Source: FHWA)
    - Enhance analytical capabilities to ensure that the long-range transportation plan complies with Title VI.
    - Identify residential, employment, and transportation patterns of low-income and minority populations so that their needs can be identified and addressed, and the benefits and burdens of transportation investments can be fairly distributed.
    - Evaluate and - where necessary - improve public involvement processes to eliminate participation barriers and engage minority and low-income populations in transportation decision-making.

MVMPO Actions to Advance Regional Transportation Equity

The MVMPO has expanded its Transportation Equity activities in specific ways, including:

- Public participation database expansion and refinement of targeted outreach.
- Increased attendance/participation in existing meetings in the region – specifically to discuss the RTP and generally to obtain public participation in developing related efforts (i.e. Active Transportation Plan, Coordinated Plan).
- Creation of the Equity Working Group. The group working group met in 2018 to discuss the new definition of low income for the region as well as ways to look at equity for the RTP.
- Creation of a GIS transportation project database and map tool to aid RTP and TIP Title VI and Environmental Justice analyses.

Title VI Populations

The MVMPO staff has historically defined Title VI communities as municipalities with minority populations greater than the regional average minority population.

The MVMPO follows the FTA Title VI guidelines, which define minority persons to include the following five groups:

1) American Indian and Alaskan Native,
2) Asian,
3) Black or African-American,
4) Hispanic or Latino, and
5) Native Hawaiian and Other Pacific Islander.

In addition, the MVMPO follows federal guidance to include *Other Races.*

Minority Populations in the MVMPO Region

In 2010, the region's total minority population was estimated at 94,364 and the proportion of minorities residing in the Valley was 28.66%. At that time, there were 25 Census Tracts in the MVMPO region with minority

populations above 28.66%; these tracts were located in Haverhill, Lawrence, Methuen and North Andover.

Using data from the 2013-2017 ACS, the region's minority population is now estimated at 34%. Table 11.1 shows the MVMPO communities' population distribution by race and Hispanic/ Latino Origin. Those block groups that are 34% or more minority are located in Lawrence, Haverhill and Methuen. For a visual representation see maps in Appendix C.

Limited English Proficiency and Public Participation

The MVMPO tracks languages spoken and language proficiency using decennial Census and ACS Five-Year Estimates, plus gathered information from organizations serving regional constituents who speak languages other than English. The language other than English most frequently spoken in the Merrimack Valley is Spanish.

There are many languages other than Spanish spoken in the MVMPO region as can be seen in Table 11.2. The majority of people who do not speak English well live in the greater Lawrence area with a smaller population living in Haverhill.

In order to include members of the public who do not speak English well into the transportation discussion, the MVMPO offered language assistance at RTP outreach sessions where needed and conducted a specific outreach session with Asian elders, veterans and the Spanish-speaking public. In addition, at the Lawrence Ciclovía held in August 2018, staff utilized this opportunity to interact with members of the public to learn about their transportation priorities.

Photo: Public enjoying the Ciclovía in Lawrence in 2017.

Table 11.9: Population by Race (American Community Survey 2013-2017, Table B03002)

Community	White alone	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian/ Other Pacific Islander	Some other race	Hispanic or Latino	Two or more races	% Non-White
Amesbury	15,977	134		187		27	467	426	7%
Andover	28,097	870	38	4,344		20	1,323	683	21%
Boxford	7,437			396			149	246	10%
Georgetown	7,966	50		79		29	323	122	7%
Groveland	6,359	52		15			271		5%
Haverhill	45,999	1,457	39	848		62	13,300	1,238	27%
Lawrence	12,349	1,963	36	1,856		224	62,856	213	84%
Merrimac	6,500	10		22			179	41	4%
Methuen	32,239	1,178		1,878		93	13,500	687	35%
Newbury	6,643	33		53		38	181	16	5%
Newburyport	16,598	241		393		171	356	131	7%
North Andover	24,982	774	8	1,862		52	1,806	686	17%
Rowley	6,041	37		59			30	65	3%
Salisbury	8,374	83		142	14	12	238	158	7%
West Newbury	4,427			39		4	44	31	3%
Totals	229,988	6,882	121	12,173	14	732	95,023	4,743	34%

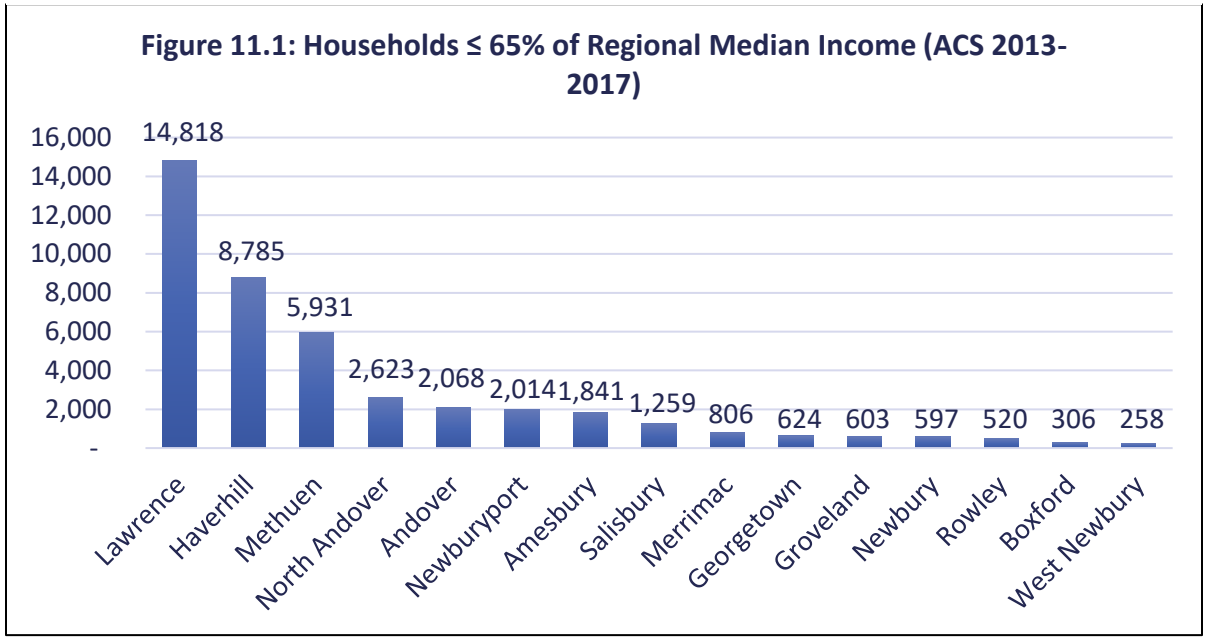
Table 11.2: Limited English Proficiency People who Speak English Less Than Very Well by Community (ACS 2011-2015; Table B16001)

Community	Spanish or Spanish Creole	Portuguese or Portuguese Creole	Chinese	Korean	Mon-Khmer, Cambodian	Vietnamese	Arabic	Other and unspecified languages	Total Speaking English Less than Very Well
Amesbury	48	10	68	0	0	0	0	87	213
Andover	289	35	630	234	0	53	39	631	1,911
Boxford	73	66	0	0	0	31	0	111	281
Georgetown	10	0	0	17	0	0	0	19	46
Groveland	16	38	0	0	0	0	0	28	82
Haverhill	3,010	129	45	195	2	29	42	611	4,063
Lawrence	25,355	173	144	33	578	388	101	379	27,151
Merrimac	0	0	0	0	0	0	0	0	0
Methuen	3,352	169	104	71	38	165	329	861	5,089
Newbury	35	0	0	0	0	0	0	61	96
Newburyport	37	99	0	12	0	0	0	64	212
North Andover	218	59	112	49	0	86	141	460	1,125
Rowley	36	0	0	0	0	0	0	10	46
Salisbury	34	0	21	0	0	8	0	7	70
West Newbury	0	0	0	0	0	0	0	16	16
Total	**32,513**	**778**	**1,124**	**611**	**618**	**760**	**652**	**4,123**	**40,401**

Low-Income Households

At the May 2019 MPO meeting, MPO members voted to approve a change to the MPO's definition of low-income. Low-income is now defined as 65% of the regional median household income. Using the 2013-2017 ACS, 65% of the regional median household income is $48,035. 34% (or 3,054 households) of all Merrimack Valley households meet this definition (Figure 10.1). For a visual representation, see maps in Appendix C.

Figure 11.1: Low Income Households



Low-income populations were present in every MVMPO community. However, 69 percent of the region's low-income residents lived in Haverhill, Lawrence and Methuen. The importance of public transportation to the region's low-income households is well documented. A 2017 MVRTA rider survey showed that:

- Approximately 60% of MVRTA riders who responded had annual incomes less than $22,000.
- 56% of the MVRTA's fixed-route bus services pass through low-income areas.

Accordingly, the MVMPO has consistently worked with the MBTA and the MVRTA to make transportation improvements benefiting low-income populations.

Households and Vehicle Availability

Transit-oriented development has the potential to reduce the need for multiple cars in one household. However, it is well understood that vehicle availability can be a concern when access to employment is an issue. The MVMPO staff reviewed ACS data for household and vehicle availability in Merrimack Valley communities.

Photo: The City of Haverhill has focused on transit-oriented development in its downtown.

The number of rental households without vehicles is far greater than owner-occupied households. The three largest cities -- Lawrence, Haverhill and Methuen -- have the largest number of rental units with no vehicles available. These three communities are the most intensively transit-served communities in the MVMPO region. It can be inferred that Haverhill and Lawrence are locations of choice for households who cannot afford to own a vehicle.

Table 11.3: Household Vehicle Availability (ACS 2013-2017; Table B25044)

Community	Number/Percentage of Households with No Vehicles Available		
	Owner Occupied (%)	Renter Occupied (%)	Renter Occupied (Number)
Lawrence	5%	32%	5,902
Haverhill	2%	22%	2,205
Methuen	2%	14%	710
North Andover	2%	17%	490
Andover	1%	16%	401
Amesbury	1%	17%	360
Newburyport	3%	15%	287
Salisbury	4%	10%	90
Georgetown	1%	13%	81
Rowley	2%	14%	50
Merrimac	2%	13%	38
Groveland	2%	4%	14
Boxford	1%	19%	13
West Newbury	1%	8%	9
Newbury	0%	0%	0
Total	2%	23%	10,650

Health Indicators

The Massachusetts Department of Public Health has a Massachusetts Environmental Public Health Tracking website at https://matracking.ehs.state.ma.us that is used by the Executive Office of Energy and Environmental Affairs (EOEEA) to review health data to characterize EJ populations to determine if they would be Vulnerable Health EJ Populations. EOEEA defines Vulnerable Health EJ Populations as those segments of the EJ Population "that have evidence of higher than average rates of environmentally-related health outcomes, including but not limited to childhood asthma, low birth weight, childhood lead poisoning and/or heart disease morbidity." EOEEA uses the following health criteria to screen EJ Populations for vulnerability, if any of the following is true the area is considered a Vulnerable Health area as presented in Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs:

- The neighborhood resides in an area with a 5-year average rate of emergency department visits for childhood (ages 5-14 years) asthmas that is greater than or equal to 110% of the state rate; or
- The neighborhood resides in an area with a 5-year average prevalence of confirmed elevated childhood blood lead levels (ages 9-47 months) that is greater than 110% of the state prevalence; or
- The neighborhood resides in an area with a 5-year average low birth weight rate that is greater than 110% of the state rate; or
- The neighborhood resides in an area with a 5-year average age-adjusted rate of hospitalizations for myocardial infarction that is greater than 110% of the state rate (Myocardial infarction is commonly known as a heart attack).

Haverhill, Lawrence and Methuen are EJ Communities in the MVMPO region. Table 11.4 shows the available statistics for the above factors for these communities.

RTP Projects

For several years, MVPC has participated in efforts in Haverhill and Lawrence around improving health outcomes. With regard to transportation, MVPC staff have participated in the Lawrence Mayor's Health Task Force and co-chair the Healthy Active Living Working Group. The focus of this group is to improve access to food and improve opportunities for physical activity. The Lawrence Ciclovía grew out of this effort, as has an increase in Safe Routes to School partnerships.

Several projects included in the RTP have a direct impact on healthy active living efforts in Merrimack Valley EJ communities. These include:

- Lawrence Rail Trail
- Safe Routes to School projects
- Bradford Rail Trail

Table 11.4 Health Indicators for Vulnerable Health EJ Populations (Source MassDOT)

Community	Percentage of kindergarten through eighth grade (K-8) children with Asthma Prevalence[2]	K-8 Asthma Prevalence over State	5-year average elevated childhood (ages 9-47 months) blood lead levels [3]	Elevated childhood lead levels over State	5-year average low birth weight rate[4]	5-year average age-adjusted rate of hospitalization for heart attacks[5]	Heart Attack Hospitalizations over State
Haverhill	15.5	1.28	26.3	1.37	NA	30.2	1.13
Lawrence	16.6	1.37	26.5	1.38	NA	36.8	1.37
Methuen	7.6	0.63	13.0	.68	NA	34.8	1.30
State	12.1		19.2			26.8	

[2] Percentage of kindergarten through eighth grade (K-8) children with Asthma Prevalence

[3] 5-year annual average rate per 1,000 from 2013 to 2017 for children age 9 months to less than 4 years with elevated blood lead level.

[4] NA- Data not available by community

[5] For adults over age 35 heart attack hospitalizations, age-adjusted rates per 10,000 people.

Table 11.5: Per Capita Project Spending by Community

Community	# Projects in RTP	Project Funding per Community	pop., 2013-2017 ACS	$ per capita, 2013-2017 ACS
Amesbury	2	$9,127,897.15	17,218	$530.14
Andover	1	$18,833,414.04	35,375	$532.39
Boxford	2	$17,036,229.41	8,228	$2,070.52
Georgetown	3	$11,891,174.05	8,569	$1,387.70
Groveland	1	$2,064,255.00	6,697	$308.24
Haverhill	4	$30,030,286.73	62,943	$477.10
Lawrence	4	$40,289,512.25	79,497	$506.81
Merrimac	1	$3,900,830.21	6,752	$577.73
Methuen	3	$11,087,420.87	49,575	$223.65
Newbury	3	$ 13,494,122.89	6,964	$1,937.70
Newburyport	2	$13,648,951.10	17,890	$762.94
North Andover	3	$35,504,656.87	30,170	$1,176.82
Rowley	3	$29,313,417.07	6,232	$4,703.69
Salisbury	2	$10,359,583.67	9,021	$1,148.39
West Newbury	0	-	4,545	-
Totals		**$246,581,751**	**337,063**	

Objective 6.1: Prioritize Transportation Planning and Investments that Eliminate Barriers for Environmental Justice Communities

The MVMPO's 2016 target spending target was that 'Not less than 33% will be spent in Title VI/EJ communities. In the 2020 RTP, 40% of the funding is allocated to projects in these communities. This amount includes all projects in Lawrence, Haverhill, Methuen and Salisbury. It also includes the Elm Street reconstruction project cost in Amesbury, because it connects directly to the low-income block group in Amesbury. Though there is one minority block group in Andover, no projects directly impact that section of town. The MVMPO examines equity in the region in two main ways:

- Geographic – to ensure that all Merrimack Valley community needs are addressed, and
- Title VI/Environmental Justice (EJ) – to ensure investment in communities where that protected populations are present.

Per Capita Spending

MVMPO staff looked at equity from per capita spending. Funding was split evenly between communities that shared a project. A few projects spanned two or more communities including:

- Georgetown/Boxford Border to Boston Trail
- Georgetown/Newbury Border to Boston Trail
- Route 114 reconstruction in Lawrence and North Andover
- Resurfacing of Route 1 in Salisbury, Newburyport and Newbury.

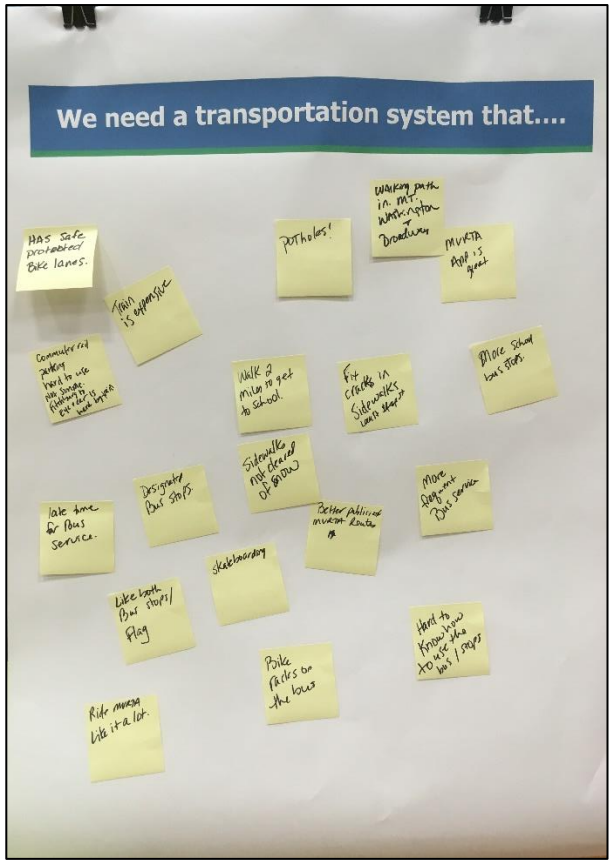


Photo: Outreach poster from Mt. Washington Alliance health fair in Haverhill.

The largest amounts of money were spent on projects in Lawrence ($40 million) and North Andover ($35 million), which is due primarily to the largest project being located in these two communities. Since the City of Lawrence has the largest community population, the per capita spending was much lower. Three projects are programmed in Rowley, one of which is quite large. Because Rowley has a relatively small population, the per capita spending is the largest in the region.

When considering the benefits and burdens of transportation projects in the region, all projects programmed in this RTP are considered to be benefits. There are no highway widening projects nor relocation of transit, rail or truck facilities. Projects located in Title VI/EJ communities provide benefits to those communities as they address traffic congestion, safety or enhance mobility. For example, three projects are programmed for the City of Lawrence. The Route 114 project will widen the roadway, but this will address traffic congestion that causes daily delay for buses providing access to the supermarket. The Lawrence Rail Trail project will transform an unused rail corridor from its use for crime and homeless encampments to a transportation corridor that can be used by all residents. The Amesbury Street project will positively impact downtown Lawrence and enhance economic development. Finally, investment in MVRTA buses will ensure that residents of this community will continue to receive high-quality transportation access.

MVPC staff also looked at the conditions of roads in low income and minority block groups and compared them to the community as a whole (Table 11.4). The 2016 regional target was to achieve 80% of the federal-aid roadways in good to excellent condition. Overall, this target was reached, but not in each community. This is

due to certain federal-aid roads being in poor condition, such as Route 1A in Salisbury. Roads in low-income and minority block groups fared better in Haverhill. Amesbury has one block group that fits the low-income criteria and only one federal-aid road in that block group. Roughly 40% of that roadway is in poor condition.

Table 11.6: Federal-Aid Roads in Good to Excellent Condition. Comparison of Low-Income and Minority Block Groups to Community Totals.

Community	Total %	Low-Income	Minority
Amesbury	72.47%	59.40%	
Andover	84.23%		77.96%
Haverhill	79.04%	83.49%	85.63%
Lawrence	72.65%	73.17%	72.40%
Methuen	92.35%	83.89%	83.07%
Salisbury	59.91%	62.08%	

Objective 6.2: Remove barriers to participation in the MVMPO process

The 2016 RTP set the following performance measure: "increase the number and quality of outreach opportunities for MVMPO region Title VI/EJ communities". The MVMPO staff looked for ways to reach out to members of the community through various planning processes. In 2018, MVPC completed the Comprehensive Economic Development Strategy, with transportation as a priority area. This process

Photo: Gentleman participating in a transportation meeting in Lawrence drawing a dangerous intersection to illustrate a traffic problem.

involved working with all Merrimack Valley communities to address transportation needs relative to the movement of goods and people. The findings of this process were incorporated into this document.

In addition, the MVMPO staff make every effort to communicate to government officials and the public about the RTP, data gathered, and projects funded as

well as use every opportunity to gather information about gaps in the transportation infrastructure and transportation needs voiced by members of the public. Attending meetings is the best way to engage officials and member so of the public. The MVMPO staff also engaged the public at the Lawrence Ciclovía to both communicate about the federal transportation process and to listen to what they think are the greatest needs. Specific meetings with robust discussions were held to reach out to people who spoke English less than very well. Table 11.7 provides an overview of the outreach undertaken for this planning process.

Conclusions

The MVMPO 2020 RTP region-wide equity analysis indicates that it (along with State and Federal Transit funding) does not have a disparate impact on EJ or Title VI communities. Funding programmed for projects shows an equitable investment in these communities.

Furthermore, the projects included in the Plan are intended to reduce congestion and vehicle hours of delay for all users of the transportation system while increasing the amount of funding available for alternative modes of transportation including transit, bicycling and walking – which benefit low-income and minority population to a greater degree.

Strategies for Progress

The MVMPO staff proposes the following work during the effective period of this RTP to advance regional transportation equity:

- Continue advancing and evaluating actions that address vulnerable populations' unmet travel needs;
- Continue investing in infrastructure and services in communities where vulnerable populations are present;
- Prioritize walking, bicycling and public transit infrastructure and service development/maintenance; and
- Increase engagement of protected populations in the MVMPO's transportation planning activities.

Table 11.7: RTP Public Outreach Opportunities

Regional Group or Organization	Date Met	Title VI/EJ Constituents Present?
MVPC Region Planning Directors Quarterly Meeting	6/4/2019	
Merrimack Valley Equity Working Group	11/19/2018	Yes
Legislative Caucus breakfast	4/6/2018	
MVPC DPW Directors Monthly Meetings	5/1/2019	
Lawrence Ciclovía	8/9/2018	Yes
Lawrence Mayors Health Task Force/Healthy Active Living Working Group	12/19/2019	Yes
MVPC Mayors and Managers Meetings (monthly)		
Newburyport Livable Communities meeting	12/4/2018	
MVPC Commissioners		
Merrimack Valley Environmental Leaders meeting	3/12/19	Yes
Listening session for Asian-language speakers	12/10/2018	Yes
Listening session for Veterans	12/10/2018	Yes
General public listening session Salisbury	6/3/2019	Yes
Presentation/discussion at Methuen Arlington Neighborhood, Inc. meeting	6/8/2019	Yes
Newburyport Traffic and Safety Committee		
Haverhill Community Adult Learning Centers English for Work Class	5/10/2018	Yes
Mt. Washington Alliance Health Fair	3/24/2018	Yes
CEDS Transportation Committee meeting	4/30/2018	
MVRTA Advisory Board meetings	Monthly	

Photo 12.1: Kayaker approaching I-93 bridge while paddling up the Merrimack River in Methuen.

Chapter 12

Summary

With this RTP, the MVMPO has set the tone for how our region will accomplish the vision and goals outlined in the Introduction. Each project chosen for funding was selected because it helps address at least one goal (see Table 12.1). Within each chapter, the MVMPO has included strategies of progress that recommend what work, studies, etc. should be completed between now and the next RTP. The information will be used in subsequent TIPs and in developing future Unified Planning Work Programs.

Thirty-one projects were identified for federal transportation funding in this Regional Transportation Plan. Of those:

- 20 addressed state of good repair
- 13 addressed safety issues
- 17 enhanced mobility choices
- 11 have a direct impact on Priority Development Areas
- 12 promote environmental sustainability or address resiliency
- 5 projects are in Environmental Justice or Title VI communities.

Overall, the projects chosen to continue to show a commitment by the MVMPO communities to increase mobility. The first five years of the plan offer a significant investment in developing the multi-use trail network. Additional projects beyond that time span will further complete the network and add additional bicycle and pedestrian mobility through Complete Street corridor design.

Three projects address flooding problems in the region: Bear Hill Road in Merrimac, the Central Street/Glen Street intersection in Rowley and Route 114 in North Andover/Lawrence.

The Route 114 project is the highest rated project in the region, because it addresses a major congestion problem, flooding and mobility needs.

Several intersection projects point to a commitment to addressing congestion and safety concerns, including Haverhill's Route 108/110, Newburyport's Merrimac Street/Route 1 ramps, the two intersection projects in Methuen, and the Route 1/Route 133 intersection in Rowley, which has the highest EPDO score of any location in the region.

With regard to transit, the RTP shows a commitment to state of good repair for the MVRTA fleet. Transit is an important component that addresses the breadth of livability; it has a direct impact on people's daily lives and personal economic security. However, the funding provided does not allow for expansion of the fleet.

Photo 12.2: Bubble girl mural on the Buckley Transportation Center in Lawrence (B. Buschur).

Table 12.10: Projects Identified for Funding in the 2020 RTP

Community	Project	State of Good Repair	Safety	Mobility	Economic Vitality	Environmental Sustainability	Equity
Amesbury	Reconstruction of South Hunt Road/Rt. 150/I-495 NB Ramps Intersection				●		
Amesbury	Elm St. Reconstruction	●			●		●
Andover	Rt. 133 (Lowell St.) Reconstruction: Lovejoy Rd. to Shawsheen Square	●	●	●	●	●	
Boxford	Rt. 133 (Washington St.) N. Andover T.L. to Main St., 1.45 miles	●	●	●		●	
Boxford	Border to Boston Rail Trail			●		●	
Georgetown	Rt. 97 from Moulton St. to Groveland T.L.	●	●	●	●	●	
Georgetown-Boxford	Border-to-Boston Rail Trail Segment from Georgetown Road in Boxford to West Main St.			●		●	
Georgetown-Newbury	Border-to-Boston Rail Trail North Segment to Byfield			●		●	
Groveland	Groveland Community Trail			●		●	
Haverhill	Bradford Rail Trail (Phase II)			●		●	
Haverhill	North Ave. from Marsh Avenue to MA/NH Boundary	●		●			
Haverhill	Rt. 108 /Rt. 110 Intersection Reconstruction	●	●		●		
Haverhill	Reconstruction of Water St. from Mill St. to Lincoln Blvd./Riverside Ave.	●	●	●	●	●	●
Lawrence	Intersection improvements at Broadway/Mt. Vernon St./McKinley St.	●	●	●	●		●
Lawrence	Amesbury St. Corridor Improvements: Merrimack River to Lawrence St. - Return to Two-Way Operation	●		●	●		●
Lawrence	M&L Branch Multi-Use Trail: Methuen Line to Merrimack St.		●	●	●	●	●
Law./N. Andover	Rt. 114 Reconstruction: I-495 to Waverly Rd.	●	●	●	●	●	●

Table 111.1 continued

Community	Project	State of Good Repair	Safety	Mobility	Economic Vitality	Environmental Sustainability	Equity
Merrimac	Resurface Bear Hill Rd. from NH Line to Old Bear Hill Rd. /Replace Culvert	●				●	
Methuen	Reconstruction of Howe St. from Marston's Corner to Washington St./Improve Howe St./Rt. 213 Ramps Intersection	●	●		●		
Methuen	Intersection Improvements at Jackson St./Pleasant St./Howe St./Pleasant Valley St.	●	●				
Methuen	Rt. 110 Reconstruction: Green St. to Woodland Rt.	●	●		●		
Newbury	B2B Rail Trail: Byfield to Scotland Road (Off Road)			●		●	
Newburyport	Intersection Improvements: Merrimac St. at Rt. 1 NB/SB ramps	●	●		●		
Newburyport	Rt. 1 Rotary Reconfiguration with improved bike/ped/trail access		●	●	●	●	
North Andover	Rt. 114 (Turnpike St.) improvements from Andover St. to Stop & Shop	●	●	●	●		
North Andover	Rt. 133/Rt. 125 Intersection Improvements		●	●			
Rowley	Rt. 133 @ Rt. 1 Intersection Improvements	●	●				
Rowley	Rt. 1 @ Central St./Glen St.	●	●			●	
Newbury/ Newburyport/ Salisbury	Resurfacing of Rt. 1	●					
Rowley	Reconstruction of Central St. & Glen St.: Main St. (Rt. 1A) to the Mill River.	●	●			●	
Salisbury	Rt. 1 Reconstruction from Salisbury Square to MA/NH line	●		●			
Regionwide	MVRTA Capital Improvements	●		●	●	●	●

Table 12.2: Unfunded Community Priorities

Community	Project	State of Good Repair	Safety	Mobility	Economic Vitality	Environmental Sustainability	Equity
Amesbury	Powwow Riverwalk and Bikeway (Phase III)			●	●	●	
Amesbury	Rt. 150 Resurfacing from I-495 to Rt. 110	●		●			
Amesbury	South Hunt Road Reconstruction from West of Rt. 150 to Buttonwood Rd.	●			●		
Amesbury	Beacon St./Rt. 150 Reconstruction from Merrimack St. to I-495	●		●			
Amesbury	Reconstruction of Market St. from Amesbury Square to NH State Line	●		●			●
Amesbury	Merrimack St. Reconstruction from Main St. to Beacon St.	●					
Andover	Shawsheen River Pedestrian Trail			●	●	●	
Andover	Bridge (A-09-001) Rt. 28 over Shawsheen River	●				●	
Andover	Reconstruction of Railroad St. from Rt. 28 to Essex St.	●		●	●		
Andover	Dascomb Road Reconstruction	●			●		
Andover/Lawrence /North Andover/ Methuen/ Haverhill	I-495 Corridor Reconstruction from Tewksbury Line to Rt. 97 in Haverhill	●	●		●		●
Boxford	Rt. 97 Resurfacing from Georgetown to Topsfield T.L. (2 miles)	●					
Boxford	Rt. 133 Resurfacing (Washington St./Willow Rd.) Main St. to Georgetown Line	●					
Georgetown	Rt. 133 (Chestnut St. to Carlton Drive)	●					
Georgetown	Rt. 133 (Clark St. to Boxford TL)	●					
Haverhill	Bradford Rail Trail (Phase III): Ferry St. to Former Paperboard site.			●		●	
Haverhill	Bradford Rail Trail (Phase IV): Former Paperboard Site to Groveland Line			●		●	
Haverhill	Merrimack Riverwalk (Phase II) between Haverhill Bank and Boardwalk behind Tap Restaurant			●	●	●	●

Community	Project	State of Good Repair	Safety	Mobility	Economic Vitality	Environmental Sustainability	Equity
Haverhill	Rt. 97, Research Drive to Computer Drive	●			●		
Haverhill	Bicycle/Pedestrian Trail from Comeau Bridge to MVRTA Railroad Avenue Facility			●		●	●
Lawrence	Reconstruction of Merrimack St. (Broadway to Amesbury St)	●		●	●	●	●
Lawrence	Replace Daisy St. Bridge over Spicket River	●				●	●
Lawrence	Replace Short St. Bridge over Spicket River	●					●
Lawrence	Bridge (L-04-025) Amesbury St over South Canal	●			●		●
Lawrence	Jackson St. Corridor Improvements	●		●	●		●
Lawrence	Marston St./East Haverhill St./Hoffman St. intersection improvements	●			●		●
Lawrence	Repair/Replace Union St. Bridge over North Canal	●					●
Lawrence	Union St. Corridor Signal Improvements	●					●
Lawrence	Reconstruction of Manchester St. / Cross St. / Washington St. intersection	●					●
Lawrence	Reconstruction of Oregon Ave./ Floral St. / Doyle St./ Hancock St./ School St. intersection	●	●	●			●
Lawrence	Salem St./Newton St. Intersection Reconstruction	●					●
Methuen	Rt. 28 (Broadway)/ Rosewood Rd. Intersection Improvements	●	●				
Methuen	Merrimack St. Reconstruction: Myona St. to Simone Farm	●		●	●		
Methuen	Rt. 110 Resurfacing from I-93 to Dracut Town Line	●					
Methuen	Rt. 28 / Rt. 213 Westbound Ramps	●	●				
Methuen	Intersection of Pleasant Valley St. (Rt. 113)/Milk St./Loop Driveway	●	●				
Methuen	Broadway/Osgood St. Intersection Improvements	●	●				
Methuen	Intersection Improvements at Railroad St./Hampshire St./Pelham St./Osgood St./Lowell St	●			●		●

Community	Project	State of Good Repair	Safety	Mobility	Economic Vitality	Environmental Sustainability	Equity
Newburyport	Bridge (N-11-002) Rt. 113 over MBTA/Clipper City Rail Trail Phase II	●					
Newburyport	Bridge (N-11-004) High St./Rt. 113/Rt. 1A over Phase II Clipper City Rail Trail	●					
Newburyport	Bridge (N-11-014) US-1A (High St.) over US-1	●					
Newburyport	Bridge (N-11-011) Rt. 1 over Merrimack River	●					
Newburyport	Bridge (N-11-015) Washington St. over U.S. Rt. 1 - and potentially whole system of retaining walls in this corridor	●					
Newburyport	Low St. bicycle and pedestrian accommodations (Hale St. to Rt. 1)	●	●	●	●		
Newburyport	High St./Rt 113/Rt 1A Traffic Calming (Allen St. to Marlboro St.)		●	●			
Newburyport	Merrimac St. Pedestrian, Bicyclist, Parking Accommodations at Lower Atkinson Common	●	●	●			
Newburyport	Intersection Reconstruction (Rt. 113-Storey Ave./Ferry Rd./Moseley Ave.)		●				
Newburyport	Hale St. Pedestrian and Bicyclist Accommodations		●	●	●		
North Andover	Rt. 125 Reconstruction	●					
North Andover	Intersection Improvements: I-495 Ramps/Massachusetts Ave.		●				●
Rowley	Rt. 133 Reconstruction from Georgetown Line to Newburyport Turnpike (US-1)	●		●			
Salisbury	Resurfacing & Sidewalks on Rt. 1A: North End Blvd. to NH Line	●	●	●		●	●
Salisbury	Rt. 110 from Merrill St. to Salisbury Square	●		●	●	●	●
Salisbury	Rt. 1 Reconstruction from Square south to Newburyport Line	●		●	●	●	
Salisbury	Raise Rte. 1A (Beach Road) at Blackwater River to eliminate flooding	●				●	●
West Newbury	Replacement of Middle St./Plummer Springs Bridge	●		●			
West Newbury	Rt. 113 Reconstruction: Garden St. to Pentucket High School	●		●			
West Newbury	Main St., South St., Moulton St. intersection Improvements	●	●				