2011 MERRIMACK VALLEY METROPOLITAN PLANNING ORGANIZATION CONGESTION MANAGEMENT SYSTEM

Merrimack Valley Planning Commission

Transportation Programs Unit

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List of Document Abbreviations

Amtrak	National Passenger Rail Corporation
ARRA	American Recovery and Reinvestment Act
CDC	Concentrated Development Center
CMS	Congestion Management System
CMAQ	Congestion Mitigation Air Quality
EOT	Executive Office of Transportation (MassDOT predecessor agency through 2009)
EOTC	Executive Office of Transportation and Construction (MassDOT predecessor agency through 2002)
EOTPW	Executive Office of Transportation and Public Works (MassDOT predecessor agency through 2007)
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	High-Occupancy Vehicle
IJR	Interchange Justification Report
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
JTMO	Junction Transportation Management Association
M&L	PanAm Railways' Manchester and Lawrence Branch right-of-way
MaineDOT	Maine Department of Transportation
MassDOT	Massachusetts Department of Transportation
MassHighway	Massachusetts Highway Department (MassDOT Highways predecessor agency through 2009)
MBTA	Massachusetts Bay Transportation Authority
MPO	Metropolitan Planning Organization
MVCMS	Merrimack Valley Metropolitan Planning Organization Congestion Management System
MVEDC	Merrimack Valley Economic Development Corporation
MVMPO	Merrimack Valley Metropolitan Planning Organization
MVTMA	Merrimack Valley Transportation Management Association
MVPC	Merrimack Valley Planning Commission
NHDOT	New Hampshire Department of Transportation
NMMPO	Northern Middlesex Metropolitan Transportation Organization
NNEPRA	Northern New England Passenger Rail Authority
RTA	Regional Transit Authority
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act of 2005 – A Legacy for Users
SGR	State of Good Repair
S.L.	State Line
SOV	Single-Occupancy Vehicle
T.L.	Town Line
TEA-21	Transportation Efficiency Act for the 21st Century
TIP	Transportation Improvement Program
TMA	Transportation Management Area
UPWP	Unified Planning Work Program
V/C	Volume / Capacity Ratio
VMT	Vehicle Miles Traveled

Executive Summary

SAFETEA-LU requires that each TMA (an urbanized area of over 200,000 people) develop a CMS. This CMS must evaluate the TMA's transportation system performance, identify actions and measures that will alleviate congestion and enhance the mobility of persons and goods.

The MVMPO region was classified as a TMA soon after ISTEA's passage in 1991. The MVPC, as the MVMPO staff, initiated development of a regional CMS or MVCMS and produced the first reports in 1995 and 1997. These reports were instrumental for the initial identification of congested transportation facilities in the TMA. MVPC has used the information contained in these documents to conduct transportation planning work tasks, such as traffic studies, to alleviate identified congestion problems. The MVMPO, pursuant to a federally-endorsed Memorandum of Understanding, works cooperatively with the Commonwealth of Massachusetts and other MPOs to implement the MVCMS to maximize mobility and environmental benefits.

The MVCMS has been updated several times. Its analyses and recommendations were incorporated into the MVMPO 1999, 2003 and 2007 RTPs. The MVPC prepared additional MVCMS updates following a 2008 MVMPO Certification Review. This 2011 MVCMS has been developed concurrent to the MVMPO 2011 RTP to inform development of that document as well as to incorporate federal transportation planning 'state of the practice' priorities including:

- Relationship of the traveler's sensitivity to congestion and mode choices;
- Context-sensitive factors, i.e. land use policies, employment and housing development;
- Evolving multimodal approach to congestion management strategy, and
- Increased emphasis on non-traditional projects and reallocation of existing infrastructure to alleviate congestion.

Congestion Monitoring and Identification

The MVPC's first task is to conduct a region-wide 'screening' for congested conditions within the region's transportation network. It continuously collects land use, transportation and other data relevant to the performance of its region's transportation network, as well as information generated by adjoining MPOs. This data is most often generated by public agencies and state Departments of Transportation. MVPC utilizes some of this information to 'run' its regional transportation model, which is used to project future traffic volumes and their effect on congestion and air quality. Several model scenarios are generated. MVPC compares the model's output with primary (i.e. traffic counts) and secondary (i.e. accident reports) data that it collects; findings of ongoing and recently completed transportation studies, and MassDOT information to develop its MVCMS recommended actions. MVPC then works with its MVMPO stakeholders to advance such actions, chiefly by programming federal transportation funds for project design and construction.

Existing and Projected Regional Trends
Since the first MVCMS was developed:

- *The region's population growth is slowing.* The region's population grew by 22.1% during 1980 – 2000, but by only 4.77% between 2000 and 2010. Going forward, the MVPC projects modest overall population growth and slightly stronger growth in numbers of households during 2010 - 2020. In the same period, the proportion of residents in age cohorts 45 and older will increase while the proportion of the region's residents in younger age cohorts will decline. The MVPC has commented on this trend in its 2012 RTP and the impact it will have upon transportation.
- *In past decades, the region's suburbs and rural areas have attracted the majority of the overall region's population and household growth.* These settings remain popular; however, since 2000 the region's traditional urban centers have gained momentum as mill conversions, housing rehabilitation and new infill development have entered the market. MVPC projects that an aging population, economic conditions, lifestyle preferences and community goals (as embodied in the MVPC's Priority Growth Strategy) will steer a larger share of the region's future growth toward urban centers.
- *The region's employment base continues to decentralize.* Employment in the MVPC region has declined slightly in recent years. Its major employment areas remain in I-93 in Andover, and I-495 in Andover / Methuen / Haverhill, although employment in the eastern sub-region is developing. Many of its employers have consolidated operations, outsourced labor to other U.S. and international employment centers – consistent with national trends. Since the onset of the national recession in 2008, several of the region's largest employers merged with other firms or were acquired. Journey-to-work data indicates that a larger share of the region's workforce is traveling to work sites outside the region. Workers in all MPO regions are traveling longer distances to reach employment. Increased suburb-to-suburb commuting, and reverse commuting adds congestion to the region's roadways, as transit services have historically served a hub-and-spoke system for employment in Greater Boston. Notably, both public and private transportation service providers have made significant progress in meeting these mobility challenges.
- *The region's employment centers are undergoing significant repositioning.* The region's industrial and commercial centers have matured in the previous decade. Sites in some older industrial parks remain undeveloped; others have been converted to mixed industrial / commercial and warehouse / retail. Projected demand for new office and industrial sites is minimal at this time, but employment in these areas (after recent declines) should stabilize and post modest increases. MVPC anticipates that continued liquidation of industrial / commercial real estate, increased flexible work and telework practices, and other global business trends will lead to further disaggregation of employees and employers in many information-based industries. Some of this disaggregation will reduce transportation congestion; however, the MVMPO and transportation stakeholders will be compelled to continue managing congestion by: 1) maintaining the existing network first, and 2) investing in new transportation, subject to available funds.
- *Vehicle Miles Traveled (VMT) trends are changing.* MVPC will report out on this trend using historic count data that it collects at fixed locations. Recent research indicates that VMT is declining nationwide. However, relevant to congestion management, increased percentages of trucks on the region's roads likely consumes some of this 'unused' capacity.

- *Public transportation ridership*, particularly on the MVRTA system, the MBTA's Commuter Rail and Amtrak's Downeaster, has increased overall and is projected to continue increasing. However, mode share as a percentage of all trips taken has not varied significantly.

The MVMPO Congestion Management System approach

The 2011 MVCMS is a region-wide effort, consistent with prior MVCMS documents. However, MVPC finds that there are population, employment, land use and transportation infrastructure conditions that are specific to sub-areas of its region. Accordingly, the MVPC has organized some of the 2011 MVCMS background information, congestion issue identification and recommended activities as follows:

- Coastal sub-region: Amesbury, Newbury, Newburyport, Rowley and Salisbury
- Greater Haverhill sub-region: Boxford, Georgetown, Groveland, Haverhill, Merrimac, West Newbury
- Greater Lawrence sub-region: Andover, Lawrence, Methuen, North Andover.

Roadway Corridor Congestion

The MVMPO uses its regional traffic model as a screening tool to identify congested segments of the federal aid roadway network. Roadway segments with modeled volume to capacity ratios of greater than .65 are considered to be congested and these are shown on the following page:

Table E-1
Existing Roadway Congestion

TOWN	STREET	LOCATION	Highest V/C for segment
Haverhill	MA-125 (Main Street)	South of Rosemont St.	**1.16**
Andover	INTERSTATE 495	NB North of I-93	**0.91**
Haverhill	INTERSTATE 495	SB North of Rt 125 C	**0.89**
Haverhill	INTERSTATE 495	NB North of Rt 125 C	**0.82**
Methuen	INTERSTATE 495	SB North of Rt 213	**0.81**
Methuen	INTERSTATE 495	NB North of Rt 213	**0.80**
Andover	INTERSTATE 93	NB North of Rt 125	**0.80**
Andover	INTERSTATE 495	SB north of I-93	**0.76**
Methuen	ROUTE 213 (Albert Slack Hwy)	EB East of Rt 28	**0.74**
Lawrence	INTERSTATE 495	SB North of Marston	**0.72**
Andover	INTERSTATE 93	SB North of Rt 125	**0.71**
Amesbury	MA-110 (Macy Street)	E of I-495	**0.70**
Andover	INTERSTATE 93	NB North of Dascomb	**0.70**
Lawrence	INTERSTATE 495	NB North of Marston	**0.70**
Haverhill	INTERSTATE 495	SB North of Rt 125 C	**0.69**
Methuen	ROUTE 213 (Albert Slack Hwy)	EB West of Rt 28	**0.68**
Lawrence	INTERSTATE 495	SB North of Marston	**0.68**
North Andover	MA-114 (Turnpike Street)	SE of Hillside	**0.67**
Andover	INTERSTATE 495	SB North of Rt 28	**0.66**
Andover	INTERSTATE 93	NB North of Rt 133	**0.66**
Lawrence	INTERSTATE 495	NB North of Rt 114	**0.66**
Andover	INTERSTATE 93	NB North of I-495	**0.66**
Lawrence	INTERSTATE 495	NB North of Marston	**0.66**
Andover	INTERSTATE 495	SB North of Rt 28	**0.65**
Haverhill	INTERSTATE 495	SB North of Rt 97	**0.65**
Andover	INTERSTATE 495	NB North of Rt 28	**0.65**

In addition to the road segments identified through the regional traffic model screening process, staff has identified a number of other roadway segments as being congested based on staff knowledge of peak period travel conditions. These are:

- Route 28 in Methuen: From Route 213 to Hampshire Street in Salem, New Hampshire
- Route 286 in Salisbury: From Route 1 east to Washington Street in Seabrook, NH

The following pages detail the studies undertaken in the region's most congested roadway corridors.

I-93 in Andover and Methuen

In 2004 the MVPC completed the I-93 Corridor Traffic Study in Andover and Methuen. The MVPC recommended that I-93 be widened to include four travel lanes and a breakdown lane in each direction between the current lane drop in Tewksbury (MA) and the NH state line where it would match the NHDOT's I-93 cross section from the MA state line to I-293 in Manchester. Also recommended was the installation of a second track along the MBTA Haverhill Line between Reading and Andover to facilitate commuter rail service improvement between the MVMPO region and downtown Boston. As of FFY 2011, double-track installations are underway in Andover and Lawrence. To MVPC's knowledge, there are no active plans to double-track the Line in its Reading, MA segment.

Another recommendation of the MVPC Corridor Traffic Study was to further investigate the feasibility of constructing an I-93 interchange at "Lowell Junction", an area near the Andover/Wilmington/Tewksbury town lines. Subsequent MVPC analyses performed on behalf of the MVMPO reviewed the traffic impacts, costs and benefits of building an interchange at this location. This review informed preparation of an IJR that was submitted to the FHWA by (then) EOTPW in Summer 2006. The FHWA granted a preliminary approval in March 2007, which allowed the EOTPW to continue project development work, including performing environmental analyses and preliminary design. When completed, the DEIR/DEIS will enable the FHWA to make a final decision as to whether construction of the interchange, and the associated widening of I-93, should be approved. A consultant team was selected to complete a Draft Environmental Impact Report / Environmental Impact Study (DEIR / DEIS) for the construction of the Lowell Junction interchange and the associated widening of I-93 up to I-495. The scope of the project was subsequently revised to examine the impacts of widening of I-93 throughout the Merrimack Valley region (Wilmington town line to the New Hampshire state line).

I-495 in Andover, North Andover, Lawrence, Methuen, and Haverhill

The western segment of the I-495 corridor straddles the MVMPO and NMMPO regions, and has been identified in prior analyses as one of the most congested roadways in both regions. In response to these findings and local officials' heightened concerns, the (then) EOTPW in 2008 initiated an I-495 corridor analysis between Exit 31 (MA-225 in Westford, NMMPO region) and Exit 55 (I-95 in Salisbury). The EOTPW consultant conducted the analysis with the active participation of MVMPO and NMMPO staff.

The consultant reviewed existing traffic and safety conditions in this segment of I-495 including its twenty-four interchanges; forecasted land use in the corridor, and forecast the traffic volumes that would result in the year 2030 from projected development. The consultant then developed a series of short, intermediate and long-term corridor improvements. Short and intermediate improvements included the restriping of acceleration and deceleration lanes at certain interchanges, revising the signal phasing/timing at the intersections of ramps and local streets and arterials, and the installation of traffic signals at some interchanges. The long term recommendation was to widen I-495 to provide four travel lanes in each direction between Exit 31in Westford and Exit 49 in Haverhill. The MVMPO supports the short term improvements and commits to working with MassDOT to implement them. At this time, the MVMPO finds that the proposed long-term improvements are financially infeasible.

Route 114 in Lawrence and North Andover

MA-114 between I-495 in Lawrence and Willow Street in North Andover is a very congested corridor with several different individual problem areas. For example, MA-114 near I-495 narrows from two lanes in each direction to one lane in each direction because it must cross a narrow, structurally deficient bridge over the Shawsheen River. Further south on MA-114, traffic congestion during peak travel periods occurs between the entrance to the North Andover Mall and the MA-125 Bypass due to heavy conflicting traffic volumes in the corridor, and especially at the MA-125 /MA-114 and MA-114 / Peters Street intersections. Commercial and industrial development along MA-114 south of the MA-125 Bypass to Willow Street has also created pockets of congestion. Southeast of the MA-125 Bypass, on the section of roadway identified in the CMS, the roadway narrows again to one travel lane in each direction, thereby creating another choke point.

The 2010 MVPC MA-114 Corridor Study analyzed a segment from the roadway's intersection with South Union Street in Lawrence to the Middleton T.L. This study details existing and projected levels of service for all intersections and roadway segments within the defined corridor. Projections include how the roadway will function with the completion of planned and proposed development projects (i.e., projects that could be built over the next five years). The study then identifies a program of transit and roadway improvements that will address the long-term corridor travel demands.

Congested Intersections

While the MVPC chiefly identifies congested roadways through use of its regional traffic model, it identifies congested intersections using other information sources including traffic studies, input from local officials and residents, and the MVPC transportation staff's knowledge of the area. The table below identifies the MVMPO region's congested intersections.

Table E-2
Existing Congested Intersections

Community	Intersection
Andover	MA-28 (Main Street) at Elm Street (Elm Square)
Andover	MA-28 (Main Street) at MA-133 (Shawsheen Square)
Georgetown	MA-97 West Main St) at MA-133 (Central Street) Georgetown Square
Haverhill	Main Street at 3 locations (Winter St; Ginty Blvd; Water St)
Lawrence	MA-28 (Broadway) at MA-110 (Haverhill Street)
Lawrence	MA-28 (South Broadway at Andover Street
Lawrence	I-495 Ramps at Massachusetts Avenue
Methuen	Howe Street at Jackson St (Marston Corners)
Methuen	Howe Street at Route 213 Ramps
Newburyport	MA-113 (Storey Avenue) at Low Street
North Andover	I-495 Ramps at Massachusetts Avenue
North Andover	MA-125 (Chickering Road) at Massachusetts Avenue
Rowley	US-1 at MA-133
Salisbury	US-1 at MA-110 and Beach Road (Salisbury Square)

Region-wide Congestion Management System Issues

Amtrak Downeaster Intercity Rail

The New England Passenger Rail Authority (NNEPRA) reports that the Downeaster is periodically congested. As a result, NNEPRA is advancing plans to increase service from five to seven daily round trips. Work tasks will include rights-of-way upgrades and additional rolling stock.

Commuter Rail

The MVMPO 2007 Regional Transportation Plan advised of congestion problems on the region's MBTA Commuter Rail services. Long-term ridership has grown, subject to periodic short-term declines. MBTA data indicates overcrowding on certain trains, particularly on the Haverhill Line. It is reported that there are standees in weekday morning inbound and weekday evening outbound trips. The lack of rolling stock in the system also serves to limit ridership during peak periods. There is also congestion along the Haverhill Line attributable to its shared use by Amtrak, the MBTA, and PanAm Railways which has caused service delays and discouraged adding additional service.

Rail Freight

While specific data is unavailable from PanAm Railways (the region's freight rail service provider), the MBTA and NNEPRA have reported that rail traffic congestion is occurring along the MBTA Haverhill and Lowell Lines, which impacts freight movements to a degree. Notably, freight movements are more flexible than for passenger rail, which must adhere to a strict schedule.

Ridesharing Services

MassRIDES, New Hampshire Rideshare and GoMaine are the three publicly-sponsored commuter options programs that can provide services to / from the MVMPO region. Within the MVMPO region, the Merrimack Valley Transportation Management Association (MVTMA) and the Junction Transportation Management Organization (JTMO) are private non-profit organizations providing members with a range of alternative transportation services including ridesharing.

Social-networking websites are increasing in popularity, providing additional ridesharing options. Sample sites include:

1.http://www.erideshare.com/ - carpooling and ridesharing website;
2. http://www.gishigo.com/ - a ride share network;
3. http://www.goloco.org/ - An easy way to share trips with friends;
4. http://www.nuride.com/ - offered by several commuter options programs; including MassRIDES – provides financial incentives and rewards;
5. http://www.pickuppal.com/ - driver and passenger matching system;
6. http://www.ridester.com/ - a ride share service, and
7. http://zimride.com/ - social ridesharing and carpool matching.

In Massachusetts as of 2004, 7.2% of all workers 16 years of age or older carpooled to work (source: Statemaster, www.statemaster.com). A MassRIDES 2009 vanpool passenger survey reported: 58 vanpools, 638 commuters, 183 respondents: 60% Boston-bound, 40% to suburban MA locations. 74% of respondents commuted to same location, 39% formerly driving alone; 21% were bus, and 23% formerly commuter rail customers.

This ratio might be higher in specific regions where few transportation options exist. The MVPC assumes that ridesharing would be attractive for commuters with origins and destinations not linked by other public transportation options – in the MVMPO region, that might include NH commuters to River Road (Andover), or MVMPO commuters working in Hillsborough, Rockingham or other NH counties.

Another factor influencing ridesharing could be the increasing distances between residence and employment are growing, and suburbanizing – some locations may lend themselves to ridesharing, but others are increasingly dispersed. Further, the Massachusetts economy involves a large segment of information-based jobs, which are portable and to an extent employees can telework, thus lowering travel demand. Land use and population densities in the MVMPO's urban centers also encourage walking and bicycling.

Parking Facilities

Table 1, below shows the usage at the seven MBTA commuter rail parking lots and the five MassDOT park and ride lots in the region as observed in 2008 and 2010. Severe parking congestion (more than 1.0 vehicles per space) existed in 2008 at the MassDOT park-and-ride lots in Andover (Dascomb Road near I-93) and in Newburyport (Storey Avenue, near I-95). The MBTA's Commuter Rail lots in Haverhill, Andover and Ballardvale in 2008 were also often utilized to near capacity. In response, the MassDOT expanded the Dascomb Road lot from 75 to 155 spaces and added 106 spaces at Newburyport.

In November 2010 the MVPC found that parking utilization at most of the region's MBTA Commuter Rail and park-and-ride lots had declined. MVPC attributed this decline to several factors: 1) the economic downturn that commenced in late 2008; 2) increased

MBTA parking fees; 3) increased telework and other flexible employee work arrangements, and 4) fewer traditional 'hub and spoke' Boston-bound commuters.

Table E-3: Commuter Rail / Park and Ride Lot Utilization

City/Town	Location	Type	Spaces	Cars	Spaces	Cars
			2008	2008	2010	2010
Andover	Railroad Ave.	Com. Rail	152	161	146	88
Andover	Ballardvale	Com. Rail	120	107	115	73
Haverhill	Bradford	Com. Rail	303	149	303	65
Haverhill	Railroad Square	Com. Rail	159	119	159	74
Lawrence	Merrimack St	Com. Rail	400*	371	400	375
Newburyport	Rte.1	Com. Rail	801	312	814	269
Rowley	Railroad Ave.	Com. Rail	282	70	282	42
Andover	Dascomb Road	Park&Ride	75	91	155	43
Georgetown	Rte. 133 / Main St.	Park&Ride	100	59	100	54
Haverhill	Rivers Edge Plaza	Park&Ride	40	0	0	0
Methuen	Pelham Street	Park&Ride	177	99	177	86
Newburyport	Storey Ave.	Park&Ride	460	608	489	600

* 400 spaces set aside for commuter rail; 848 total spaces in facility

Priority Growth Strategy

In 2009, the Merrimack Valley Planning Commission completed the Merrimack Valley Priority Growth Strategy, the Regional Land Use Plan for the region. The PGS identifies 57 concentrated Development Centers (CDCs) throughout the Valley where local officials are seeking to target growth rather than allow 'sprawl" to take place in potentially environmentally sensitive areas and/or in low-density developments.

This CMS considers how traffic and transit congestion impacts these CDCs. The Merrimack Valley has been broken into three subregions that were identified in the PGS; Coastal, Greater Haverhill and Greater Lawrence. Roadway and intersection congestion issues and how they impact CDCs in these subregions are then reviewed.

Summary

The MVCMS is continuously implemented and annually updated. CMS facilities will continue to be monitored to determine where congestion or mobility problems exist. Listings and work plans are intended to be flexible, in order to best address currently congested facilities and locations, and to develop as many feasible alternatives as possible. The MVPC invites the input of individuals and public groups, like the Merrimack Valley Transportation Committee, as part of a pro-active public participation program for the MVCMS. Future recommendations in the MVCMS will be based on: 1) the previous years' findings, and 2) current analyses, resulting in a full range of projects and strategies for effective congestion management.

End of Executive Summary

SECTION I

INTRODUCTION

Beginning with the passage of ISTEA in 1991 and the subsequent passage of TEA-21 in 1998 and SAFETEA-LU in 2005, MPOs nationwide that are located in larger urbanized areas (i.e. greater than 200,000 people) are designated as Transportation Management Areas (TMAs) and are required to develop and maintain a congestion management process to improve travel mobility within their region. The MVMPO Congestion Management Process (MVCMP) was established as one of the six management systems originally mandated by ISTEA. It is defined as "a systematic process that provides information on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods. A CMP includes methods to monitor and evaluate performance, identify alternative actions, assess and implement cost-effective actions, and evaluate the effectiveness of implemented actions."

Regulatory Framework of the Congestion Management System

In Massachusetts, all MPOs that are TMAs (and the Commonwealth as well) are required by SAFETEA-LU to develop a congestion management process. The intent of the regulations is to make congestion management an important, continuous component of the overall transportation planning process. The Final Rule on Statewide and Metropolitan Planning (Federal Register, 2/14/2007) requires that the planning process consider the following:

"(a) The transportation planning process in a TMA shall address congestion management through a process that provides for safe and effective integrated management and operation of the multimodal transportation system…

(b) The development of a congestion management process should result in multimodal system performance measures and strategies that can be reflected in the metropolitan transportation plan and TIP:

consideration should be given to strategies that manage demand, reduce single occupancy vehicle (SOV) travel, and improve transportation system management and operations. Where the addition of general purpose lanes is determined to be an appropriate congestion management strategy, explicit consideration is to be given to the incorporation of appropriate features into the SOV project to facilitate future demand management strategies and operational improvements that will maintain the functional integrity and safety of those lanes."

(c) Congestion management process shall be part of metropolitan planning process and shall include:

(1) "Methods to monitor and evaluate the performance of the multimodal transportation system, identify the causes of recurring and non-recurring congestion, identify and evaluate alternative strategies, provide information supporting the implementation of actions, and evaluate the effectiveness of implemented actions;

(2) Definition of congestion management objectives and appropriate performance measures to access the extent of congestion and support the

evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement of people and goods."
These measures can and will vary between regions and communities and therefore should be established cooperatively by the State, MPO and local officials in consultation with the operators of the major modes of transportation in the coverage area.

(3) "Establishment of a coordinated program for data collection and system performance monitoring to define the extent and duration of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions…"

(4) "Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies that will contribute to the more effective use and improved safety of existing and future transportation systems based on the established performance measures." The following are examples of strategies that should be considered:

(i) "Demand management measures, including growth management and congestion pricing;
(ii) Traffic operational improvements;
(iii) Public transportation improvements;
(iv) ITS technologies as related to the regional ITS architecture; and
(v) Where necessary, additional system capacity."

(5) Identify implementation schedule, responsibilities, etc;

(6) "Implementation of a process for periodic assessment of the effectiveness of implemented strategies, in terms of the area's established performance measures. The results of this evaluation shall be provided to decision makers and the public to provide guidance on selection of effective strategies for future implementation."

(d) In TMAs designated as non-attainment for ozone or carbon monoxide, Federal funds may not be programmed for any project that will result in a significant increase in carrying capacity for single occupant vehicles (a new general purpose highway on a new location or adding general purpose lanes, with the exception of safety improvements or the elimination of bottlenecks) unless the project results from a congestion management system.

(e) In TMAs designated as non-attainment for ozone or carbon monoxide, the congestion management process shall provide an appropriate analysis of reasonable (including multimodal) travel demand reduction strategies for the corridor in which a project that will result in a significant increase in capacity for SOVs is proposed to be advanced with Federal funds.

In accordance with these requirements, the MVMPO uses its MVCMP to develop its RTPs and TIPs. In particular, the MVCMP has served as the framework used to identify transportation system deficiencies in the MVMPO's 1997, 2000, 2003 and 2007 RTPs, and is now being used by the MVMPO to develop the 2012 RTP. Deficiencies identified in each CMS are then addressed by various traffic corridor and intersection studies programmed in

the annual MVMPO UPWP. The MVCMS is particularly important for documentation of planning 'due diligence' – particularly in cases which the MVMPO must obtain federal endorsement for expanding roadway capacity.

The initial MVCMS (1995) recommended corridor studies for the three "Most Severe" congestion problems at that time: I-93 in Andover and Methuen; MA-125 from I-495 to the NH state line in Haverhill, and the MA-110 / 113 rotary at I-93 in Methuen. All three of these locations were subsequently analyzed through corridor studies undertaken by the MVMPO and/or MassDOT. As a result, project development activities have been undertaken by MassDOT for the Route 110/113 rotary at I-93 and for the construction of an interchange at Lowell Junction and the widening of I-93 in Andover and Methuen.

The 2012 MVMPO RTP addresses the most recently identified congested roadways and intersections in the region.

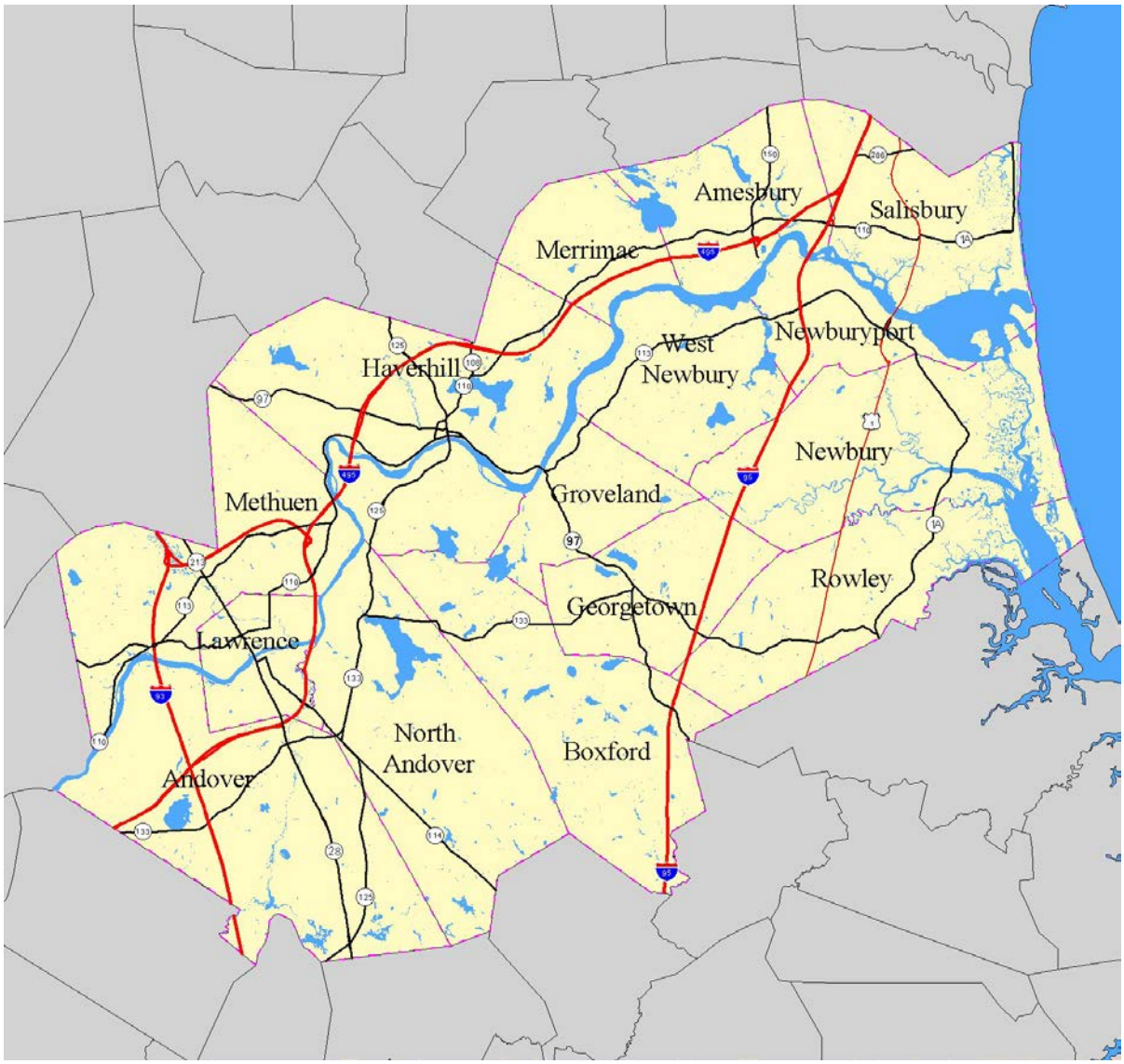
MVCMS Components

The MVCMS is designed to consider the mobility of all person trips on all modes and facilities within the region, as well as considering additional needs for the movement of goods. Freight and passenger transportation share both roadways and railways in the MVMPO region, and are each affected by congestion. This 2011 MVCMS groups transportation facilities into five major categories:

- Roadway Facilities
- Transit Facilities
- Parking Facilities
- Freight Facilities
- Rail Facilities

These facilities have been and will continue to be monitored to determine where congestion or mobility problems exist. Facility listings are also intended to be flexible, so congested locations may be added or deleted in future years as additional information is collected or as improvements are made.

Map I-1
Map of the Region (insert new map with new MVPC logo)



The MVPC Regional Traffic Model is the primary tool used by the MVMPO to monitor congestion issues along its federal aid roadways. It has been configured to include all functionally classified (i.e. non-local) roadways in the region ranging from collector roadways up to and including our interstate highways in the Valley. As such, it also contains all roads traveled by bus routes, roadways with interchanges to freeways, and roads with heavy volumes of truck traffic are included, as are roads used as alternatives to already congested routes.

The MVCMS incorporates transit facilities, which includes all regularly scheduled services provided by the Merrimack Valley Regional Transit Authority (MVRTA). MBTA inter-regional commuter rail services are also included. Amtrak intercity rail service (the Downeaster), which provides service at Haverhill, is proposed for inclusion in this Update.

Commuter parking facilities within the MVPC region that are included in the MVCMS are of three types: MassDOT-owned park-and-ride lots; commuter parking allowed on private lots, and MBTA or RTA-owned lots located at the MBTA commuter rail stations. Existing lot capacity and use, plus proposals for new or expanded lots is incorporated.

MVCMS freight facilities include roads as well as rail infrastructure, i.e. rights-of-way, and PanAm Railways' Lawrence Yard. Conditions for trucks are evaluated according to the size, weight and maneuverability of freight trucks that use the region's roads. For rail freight, the MVPC collects data for rail rights-of-way and infrastructure which rail operators and customers utilize. For example, the Lawrence Yard is a 'classification' facility where individual rail car shipments are collected and distributed to customers. This facility serves the MVMPO region, and much of northeastern Massachusetts.

SECTION II
CONGESTION IDENTIFICATION

PART A – ROADWAYS AND INTERSECTIONS

Congestion Screening - Roadways

Roadway congestion is a function of traffic volume, plus the *capacity* of the roadways to handle that volume. The 2000 Highway Capacity Manual defines roadway capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." The capacity of a given section of roadway is influenced by a number of factors, including: number of lanes, design speed, shoulder width, presence of on-street parking, and the directional distribution of traffic.

In the MVCMS, screening to identify congested roadways involves using calculated volume-to-capacity (V/C) ratios from the output of the Regional Traffic Model. When the V/C ratio for a section of roadway equals one, that roadway is said to be at capacity. It should be noted that when V/C ratios approach a value of one, severe roadway congestion is often present. V/C ratios provide an *approximation* of actual congestion, due to the wide variety of factors that affect roadway capacity. Nevertheless, they are a very useful measure in screening for congested roadway facilities. Over the years, the MVCMS has used a V/C ratio of .65 in identifying roadways experiencing congestion.

Table II-1 shows the results of the initial screening of roadway congestion problems in the MVPC region, based largely on the V/C ratio screening. Other factors that helped determine rankings included the importance of the facility to the regional economy, volume and type of traffic, and scheduled improvements. The observations and professional judgment of the MVPC Transportation Staff, along with public input at various stages of the process, determined any additions and deletions of roadways, as well as various other changes, resulting in the final listing.

Changes from the V/C ratios shown in the previous version of the CMS may be explained by differences in the way that the current model defines roadway capacity and changes in traffic volumes. For this analysis, it is assumed that each lane on an interstate roadway can carry 2,200 vehicles per lane per hour. Local roadways are assumed to have a capacity of 1,600 vehicles / lane. V/C ratios were calculated based on assumed loadings for an average weekday.

Again, it should be kept in mind that this is a screening tool to help the MVPC identify congested roadway segments in the region. It should also be noted that the model is being used to identify congested *roadway links* on the regional transportation network. A discussion of the congested intersections in the region is included later in this section.

The MVMPO first published its roadway screening analysis in its 2007 RTP. It identified thirty-seven roadway segments with V/C ratios of .65 or greater during at least one peak travel hour daily.

It should be noted that prior MVCMS updates included the congested sections of MA-97 in Haverhill approaching Lafayette Square. MVPC finds that the Square's reconstruction has reduced congestion at this location.

Various idiosyncrasies of traffic simulation modeling allow MVPC to remove some roadway segments from the MVCMS despite the model showing link V/C ratios of .65 or more. While the traffic model screens traffic segments based on projected peak hour traffic volumes, several segments have been removed because major employers nearby, such as hospitals or manufacturing firms, operate more than one work shift per day, which eliminates the large morning peak hour. The model as calibrated would show having more workers than are actually traveling at that time. Such segments include Groveland Street in Haverhill (Merrimack Valley Hospital), Canal Street and Marston Street in Lawrence (Lawrence General Hospital), Main Street west of Willow Ave. in Salisbury, MA-28 south of Ballardvale Road in Andover and Haverhill Street east of Lowell Ave. in Methuen. Further, in some cases the model recognizes only one travel lane per direction in a given roadway segment when in fact the roadway operates as two, or more, lanes. This is the case for South Broadway and South Union Streets in Lawrence at the Andover town line, and on Bridge Street in Haverhill as the roadway approaches its intersection with Water Street where there are several approach lanes for the vehicles to occupy.

Table II-1 shows the now shorter list of congested roadways in the region. A description of these congested facilities is provided in CMS Strategies.

Congestion Screening - Intersections

While the MVPC chiefly identifies congested roadways through use of its regional traffic model, it identifies congested intersections using other information sources including traffic studies, input from local officials and residents, and the MVPC transportation staff's knowledge of the area. Table II-2 below identifies the MVMPO region's congested intersections. A brief summary of the intersections and traffic congestion issues at these locations is provided in the discussion of each subregion's roadway congestion issues.

Table II-1
Existing Roadway Congestion

TOWN	STREET	LOCATION	Highest V/C for segment
Haverhill	MA-125 (Main Street)	South of Rosemont St.	**1.16**
Andover	INTERSTATE 495	NB North of I-93	**0.91**
Haverhill	INTERSTATE 495	SB North of Rt 125 C	**0.89**
Haverhill	INTERSTATE 495	NB North of Rt 125 C	**0.82**
Methuen	INTERSTATE 495	SB North of Rt 213	**0.81**
Methuen	INTERSTATE 495	NB North of Rt 213	**0.80**
Andover	INTERSTATE 93	NB North of Rt 125	**0.80**
Andover	INTERSTATE 495	SB north of I-93	**0.76**
Methuen	ROUTE 213 (Albert Slack Hwy)	EB East of Rt 28	**0.74**
Lawrence	INTERSTATE 495	SB North of Marston	**0.72**
Andover	INTERSTATE 93	SB North of Rt 125	**0.71**
Amesbury	MA-110 (Macy Street)	E of I-495	**0.70**
Andover	INTERSTATE 93	NB North of Dascomb	**0.70**
Lawrence	INTERSTATE 495	NB North of Marston	**0.70**
Haverhill	INTERSTATE 495	SB North of Rt 125 C	**0.69**
Methuen	ROUTE 213 (Albert Slack Hwy)	EB West of Rt 28	**0.68**
Lawrence	INTERSTATE 495	SB North of Marston	**0.68**
North Andover	MA-114 (Turnpike Street)	SE of Hillside	**0.67**
Andover	INTERSTATE 495	SB North of Rt 28	**0.66**
Andover	INTERSTATE 93	NB North of Rt 133	**0.66**
Lawrence	INTERSTATE 495	NB North of Rt 114	**0.66**
Andover	INTERSTATE 93	NB North of I-495	**0.66**
Lawrence	INTERSTATE 495	NB North of Marston	**0.66**
Andover	INTERSTATE 495	SB North of Rt 28	**0.65**
Haverhill	INTERSTATE 495	SB North of Rt 97	**0.65**
Andover	INTERSTATE 495	NB North of Rt 28	**0.65**

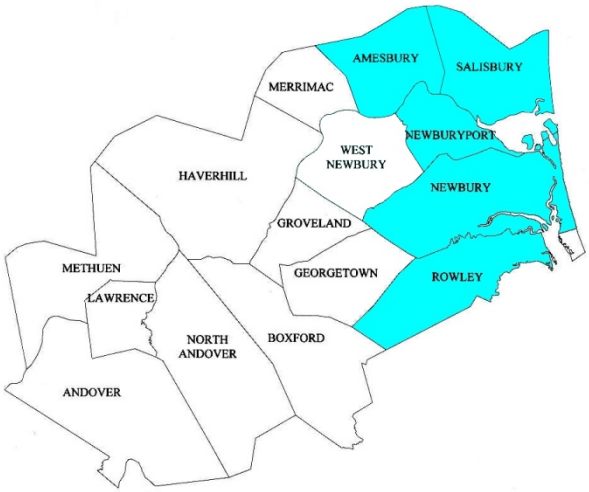
Table II-2
Existing Congested Intersections

Community	Intersection
Andover	MA-28 (Main Street) at Elm Street (Elm Square)
Andover	MA-28 (Main Street) at MA-133 (Shawsheen Square)
Georgetown	MA-97 West Main St) at MA-133 (Central Street) Georgetown Square
Haverhill	Main Street at 3 locations (Winter St; Ginty Blvd; Water St)
Lawrence	MA-28 (Broadway) at MA-110 (Haverhill Street)
Lawrence	MA-28 (South Broadway at Andover Street
Lawrence	I-495 Ramps at Massachusetts Avenue
Methuen	Howe Street at Jackson St (Marston Corners)
Methuen	Howe Street at Route 213 Ramps
Newburyport	MA-113 (Storey Avenue) at Low Street
North Andover	I-495 Ramps at Massachusetts Avenue
North Andover	MA-125 (Chickering Road) at Massachusetts Avenue
Rowley	US-1 at MA-133
Salisbury	US-1 at MA-110 and Beach Road (Salisbury Square)


Merrimack Valley
Priority Growth Strategy Sub-Region
Coastal Region
Amesbury
Merrimac
Salisbury
Newburyport
Haverhill
West Newbury
Newbury
Groveland
Georgetown
Rowley
Legend
Municipal Boundary
Interstate
Major Roads
Local Roads
Existing Trail
Proposed Trail
Commuter Rail
Train Stations
Bus Stations
Bus Routes (804 ft Buffer)
High Priority Transportation Projects
Hydrographic Features
Streams
Development Areas
Priority Development Site
Concentrated Development Center
Village Center
Open Space
Permanently Protected Open Space
Priority Open Space Acquisitions

Coastal Sub-region

Comprised of the four coastal communities and Amesbury, this sub-region hosts nineteen Concentrated Development Centers:



Amesbury	*Newbury*
Cedar Street	*Little River*
Lower Millyard	*Wayside Avenue*
I-495 / Hunt Road	*Central Street*
Gateway Village	*Byfield Village*
Golden Triangle	
Village Center	

Newburyport	*Rowley*
Downtown	*Route 1*
Industrial Park	*Rowley Village*

Salisbury
Business Park
Redevelopment Zone
Salisbury Beach
Salisbury Village

Coastal Sub-region Congestion Overview

The coastal sub-region's transportation network experiences modest congestion except during summer months and / or when special events are scheduled. The majority of this congestion is attributed to seasonal residents, tourism and day visitors, and to an extent is generated by commercial and retail activity along MA-110 in Amesbury and Salisbury and MA-113 in Newburyport.

However, there is year-round congestion in a few locations, such as at the intersection of US-1 and MA-133 in Rowley, and along Route 110 between Routes 495 and I-95 in Amesbury. There is also a significant amount of travel from / to retail and commercial development on US-1 in southern New Hampshire, which presents a management challenge for the MassDOT, the MVMPO, Rockingham MPO, and NHDOT. Portions of the sub region remain rural; however, incremental residential development throughout the sub region, coupled with increased low-density retail and commercial development on major roadways has contributed to a progressive rise in traffic volumes. More commuters are traveling to and through the region on work trips as well.

The coastal sub-region's public transportation services have traditionally been limited. However, the MVPC and the MVRTA are establishing a new fixed-route service in Salisbury, Amesbury and Newburyport that begins operation in July 2011, and are pursuing grant funding to create a 'Coastal Communities Corridor' that would bring more fixed-route transit service to the MA and NH coastal 'border' communities including Seabrook and Hampton Beach.

Notably, the Newburyport Park-and-Ride facility on MA-113 remains at capacity, despite the recent addition of 106 parking spaces. Yet, ample commuter parking capacity exists at other facilities such as the Newburyport and Rowley MBTA stations.

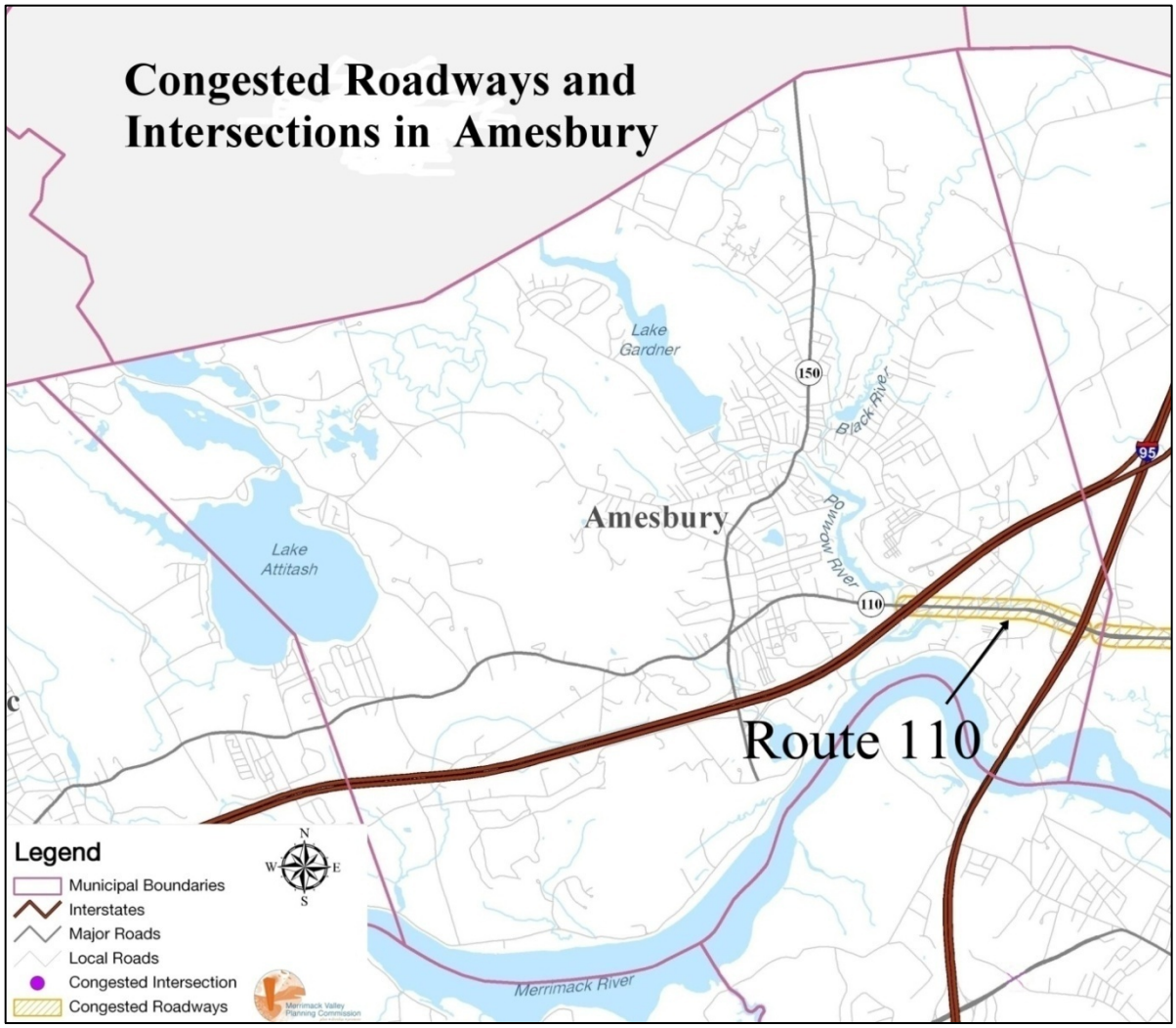
Bicycling and pedestrian facilities are most extensively developed and used in Newburyport, and least developed in the sub-region's rural communities. This sub region is particularly active in developing rail-trail projects; pedestrian improvements have been made in Salisbury Village and in Newburyport, and the planned Border-to-Boston Bikepath will add additional transportation capacity to these two communities as well as to the Byfield Village section of Newbury. Also, the coastal sub-region will be the first in the MVMPO region to create a new bicycling / walking facility as part of an interstate bridge reconstruction project, the replacement of the Whittier Bridge which carries Interstate 95 over the Merrimack River between Amesbury and Newburyport.

CMS Projects in Construction/Recently Completed or Under study

- Newburyport: Storey Avenue Park-and-Ride Facility Expansion. This 460-space facility was expanded by 106 spaces. Work was completed in FFY 2011.
- Rowley: US-1 / MA-133 intersection analysis, completed in FFY 2010. Recommended improvements include minor roadway / median / curb cut modifications, pavement marking and signage changes, reset of signal equipment, and signal phasing changes.

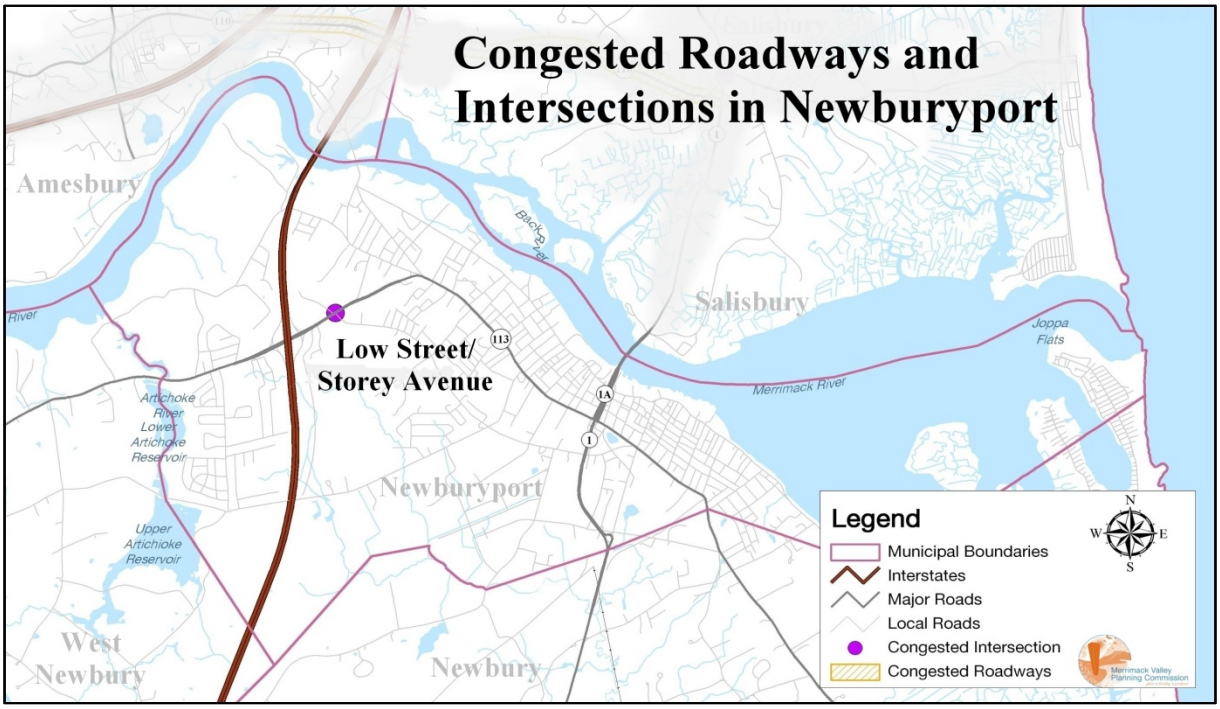
CMS Projects in development

- Amesbury / Newburyport / Salisbury: I-95 Whittier Bridge Reconstruction Project. This project will expand roadway capacity while adding new bicyclist and pedestrian facilities in a previously un-served location;
- Newburyport / Salisbury: investigate feasibility of a seasonal passenger water taxi or ferry service between these communities;



MA-110 in Amesbury from I-495 to I-95

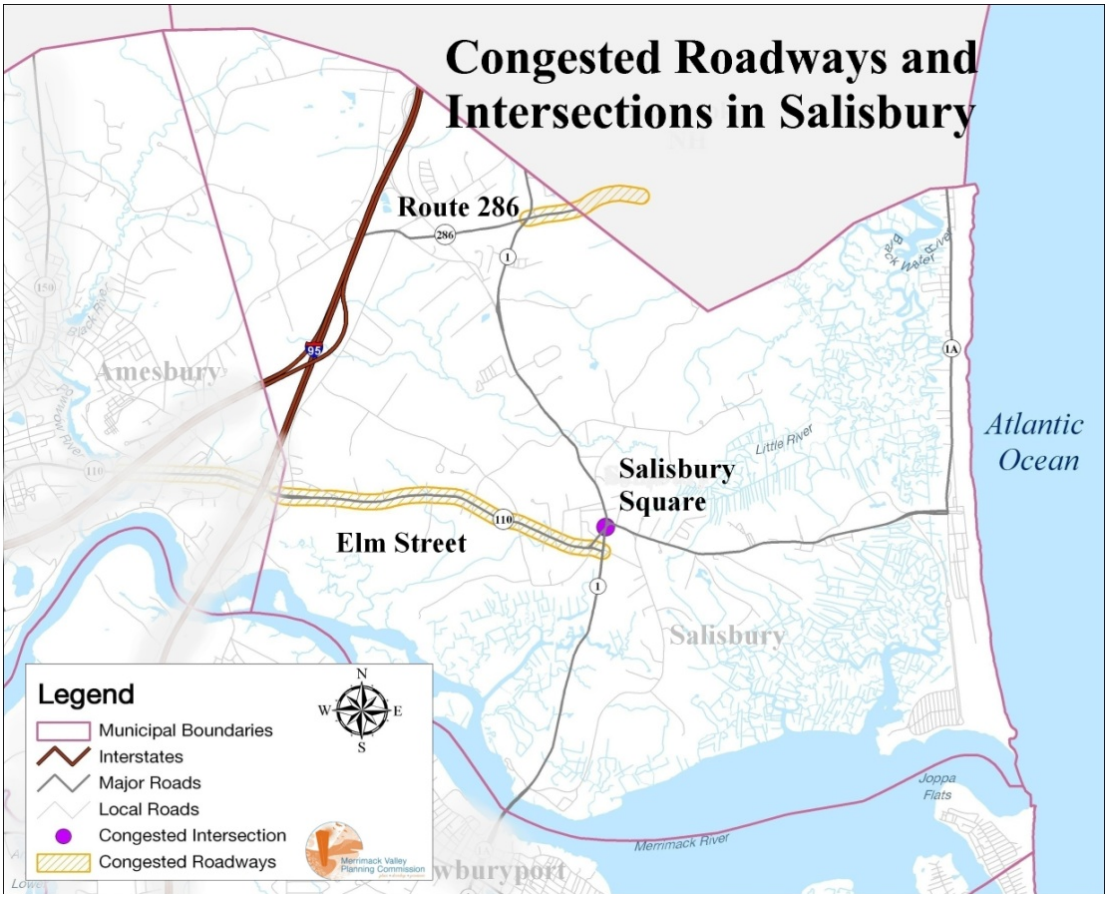
Traffic volumes along this segment of MA-110 increase markedly during the summer as travelers use I-495 to reach Salisbury Beach. There is also year-round congestion in this segment due to: a) limited roadway capacity along MA-110 just east of its intersection with Route I-495, and b) several business curb cuts which introduce traffic into a roadway with one lane in each direction and few left turn lanes. Reconstruction of this segment, including widening of the roadway, began in FFY 2011 and should be completed in FFY 2012. The new roadway cross section for this section of the highway will provide two travel lanes in each direction with left turn lanes from Route 110 eastbound at the signalized intersections with the Carriagetown Marketplace Driveway and at Elm Street. Left turn pockets will also be provided from Route 110 eastbound at selected driveway entrances.



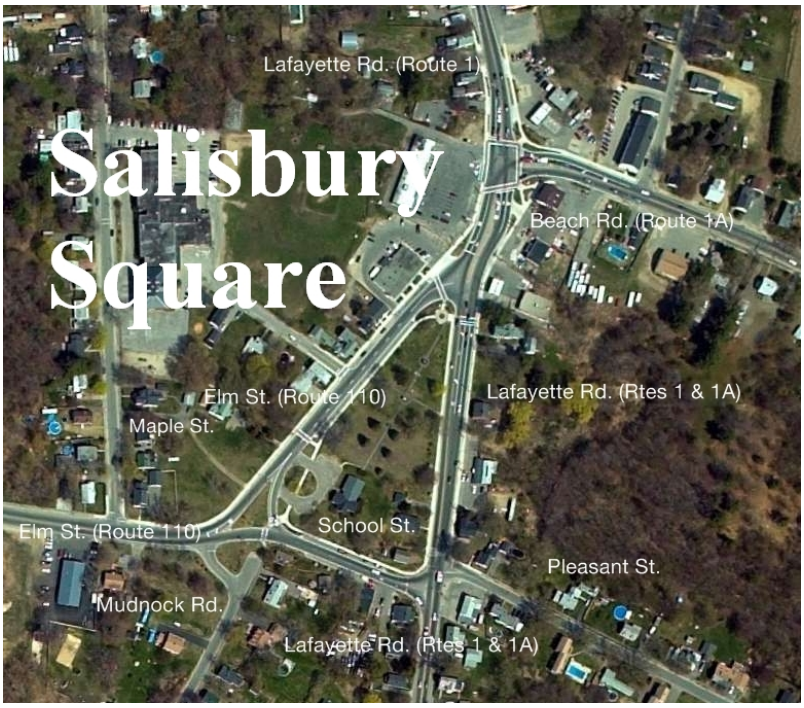
MA-113 (Storey Avenue) at Low Street, Newburyport

Low Street Westbound at Storey Avenue

Severe capacity restrictions on the Low Street approach to its intersection with Storey Avenue, coupled with heavy traffic generated by workers traveling home from the industrial parks in the area, have contributed to congestion at this location during the PM peak hour. In 2007, MassDOT implemented a number of improvements to this intersection, which contributed to a significant reduction in overall intersection delay. These included providing additional turning and travel lanes on the Route 113 eastbound and Low Street northbound approaches to the intersection.



US-1 at MA-110 and Route 1A (Beach Road) in Salisbury (Salisbury Square)



This intersection is at the crossroads of two routes that lead to US-1A (Beach Road), a two-mile roadway that is the primary means of access to Salisbury Beach. As with MA-286, traffic congestion at this location is largely seasonal. However, some congestion occurs during traditional weekday peak hour periods. MVPC anticipates that this congestion will increase as Salisbury Beach redevelops and adds more residences.

In 2000, the EOTC completed a beach area access study that included an analysis of this intersection and identified four possible improvement

options. In particular, Alternative 2 involved construction of a MA-110 bypass road along a parallel, abandoned railroad right of way, and Alternative 3 involved widening existing roadways leading to Salisbury Square. These two options were considered to be the most feasible.

Since the study was completed, the railroad right-of-way proposed for conversion to a roadway in Alternative 2 has been converted into the Salisbury Point Ghost Trail, and is no longer available. In addition, EOTC noted in 2000 that Alternative 3 would have limited impact in relieving congestion due to Salisbury Square's roadway capacity limits. No actions are pending as of FFY 2011.

In 2008, a barge destined for Amesbury struck an abutment of the Hines Bridge connecting Newburyport and Salisbury. The resulting damage resulted in the bridge's temporary closure, during which much of the traffic that used the Hines Bridge was diverted to US-1 and Salisbury Square. This increase in traffic volumes headed to the Square generated additional demand for left turns from US-1 northbound to MA-110 westbound, as well as additional congestion. Congestion was reduced following a temporary re-opening of the Hines Bridge to automobile traffic, and again increased in November 2010 as the bridge was again closed. The Hines Bridge is now being replaced with a new structure that should be complete in FFY 2013. Its construction contractor implemented a traffic mitigation plan that included consideration of traffic operations at intersections along MA-110 in Salisbury and Amesbury.

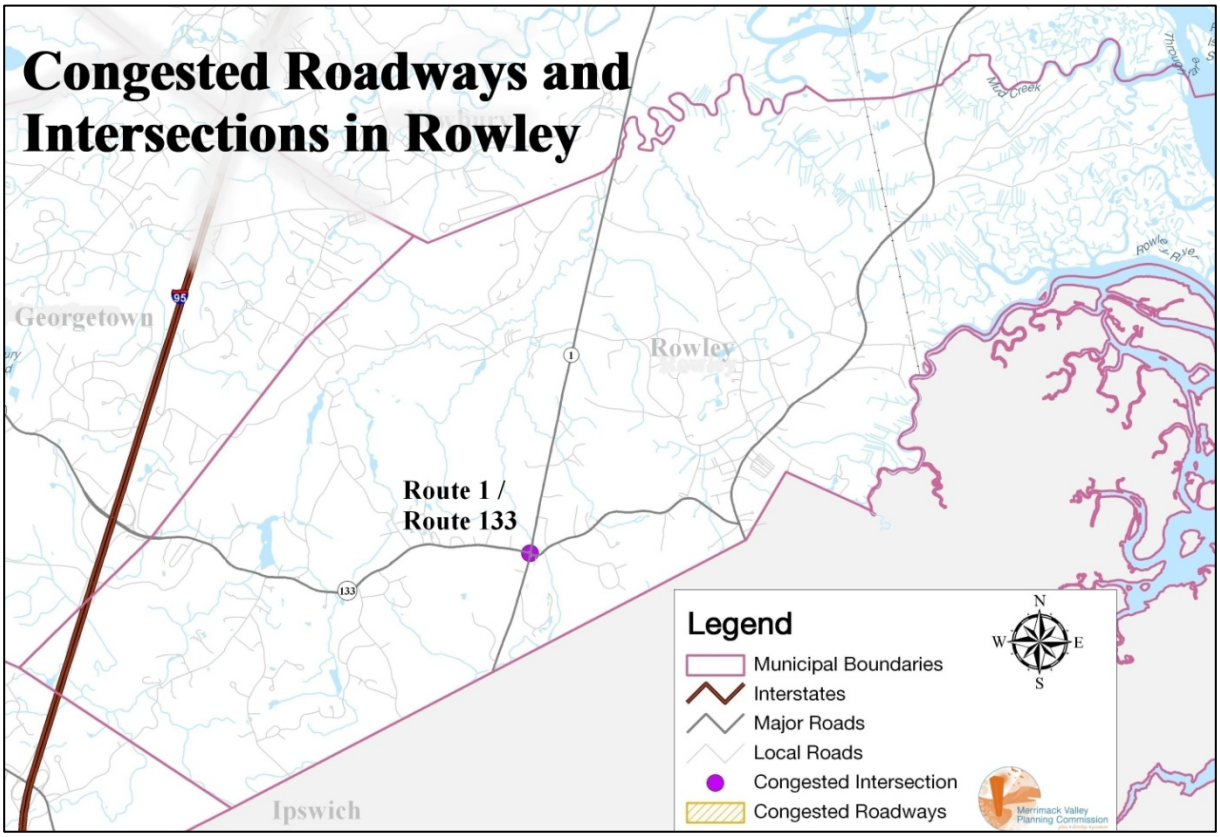
MA-286 in Salisbury east of US-1 to Washington Street in Seabrook, NH (seasonal)

Congestion along MA-286 in Salisbury is almost entirely a seasonal problem as this roadway serves as a major access point to the beaches in Salisbury, MA and those in Seabrook and Hampton Beach, NH. PM peak congestion is especially problematic during weekends as traffic leaves the beach areas and attempts to access I-95. MVPC concluded a study of the signalized intersections along MA-286 in Seabrook and Salisbury which suggested some changes to intersection geometry and in the phasing and timing that might improve traffic flow during these afternoon peak periods during summer weekends. MassDOT has also developed a project to update the signal equipment at these four intersections and, in some cases, adding left turn lanes to reduce the seasonal congestion.

Route 286 Traffic Leaving Beaches

MA-110 in Salisbury from I-95 to Salisbury Square (seasonal)

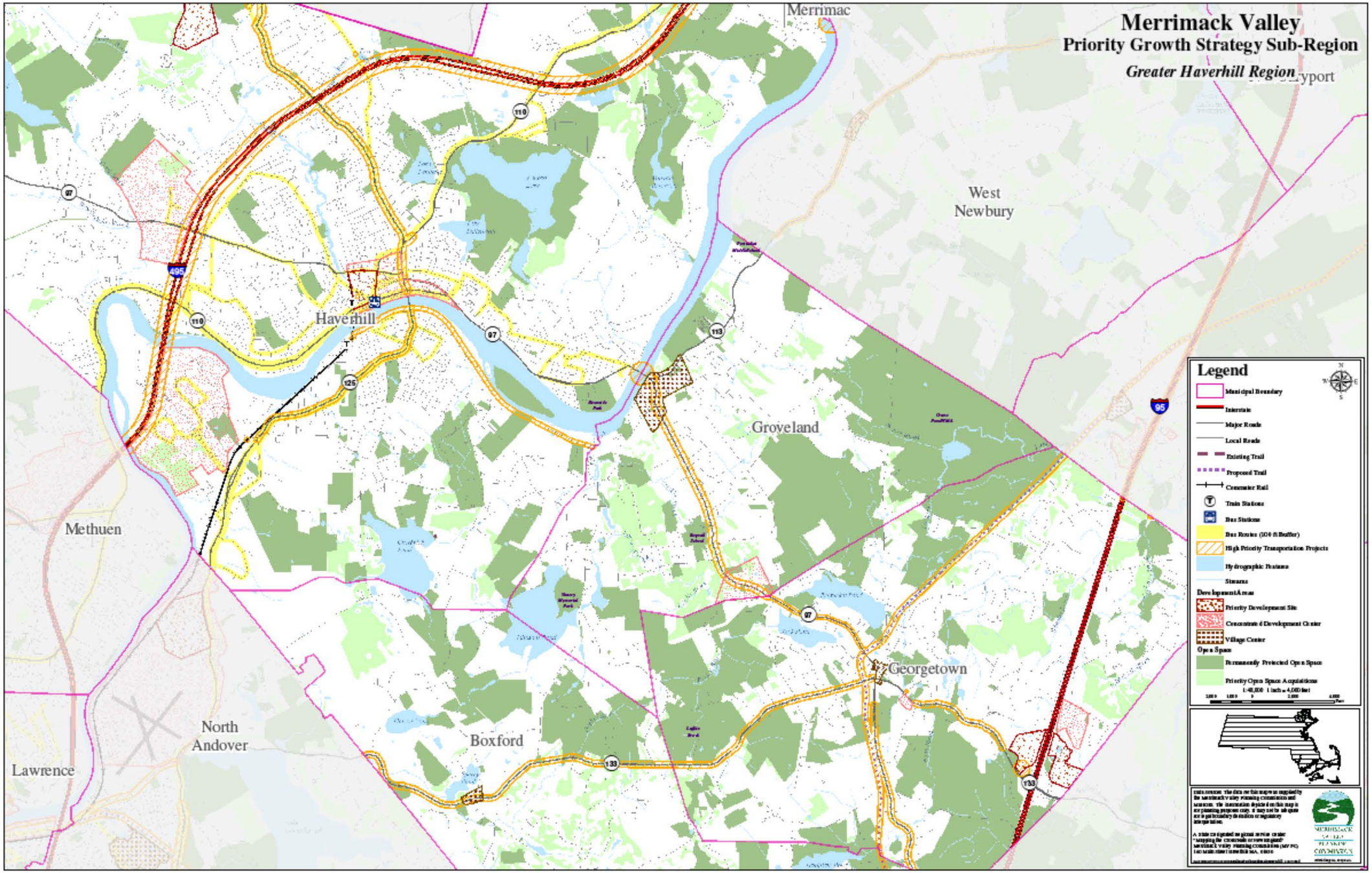
Congestion along MA-110 in Salisbury is almost entirely a seasonal problem as this roadway is a principal access route to the beaches located off Route 1A in Salisbury, MA and Seabrook, NH. AM Peak period traffic within season is exacerbated by the fact that Route 110 transitions from a five lane profile at the intersection of Route 110 and Rabbit Road to a three lane profile (one travel lane eastbound and westbound and one shared turning lane) from that point east to its intersection with Harrison Avenue. Route 110 is a two lane roadway between Harrison Avenue and Salisbury Square. PM peak congestion is especially problematic during weekends as traffic leaves the beach areas bound for I-95 and I-495.



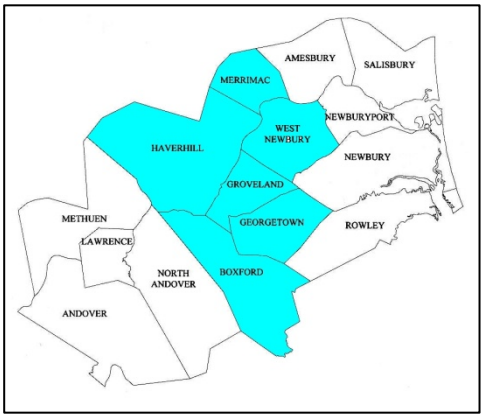
US-1 and MA-133 Intersection, Rowley

Route 133 Westbound at Route 1

MVPC staff analyzed this intersection's operations as part of its work on the transportation element of the town's Master Plan. Staff also MVPC staff found that some of the intersection approaches experienced delays, in particular the eastbound approach, but the intersection functioned at an acceptable overall level of service. In 2010, the Merrimack Valley MPO reviewed the traffic and safety operations at this intersection. The intersection was found to operate at LOS D during the morning peak and LOS E during the evening peak. The study report recommended removing the traffic island on the Route 133 eastbound approach to provide an exclusive left turn lane and modifying the signal timing to improve traffic operations, which would improve LOS during both peak travel periods and reduce the high crash rate at this location.


Merrimack Valley
Priority Growth Strategy Sub-Region
Greater Haverhill Region
Merrimac
West Newbury
Haverhill
Groveland
Methuen
North Andover
Boxford
Georgetown
Lawrence
Legend
Municipal Boundary
Interstate
Major Roads
Local Roads
Existing Trail
Proposed Trail
Commuter Rail
Train Stations
Bus Stations
Bus Routes (1/4 ft Buffer)
High Priority Transportation Projects
Hydrographic Features
Streams
Development Areas
Priority Development Site
Concentrated Development Center
Village Center
Open Space
Permanently Protected Open Space
Priority Open Space Acquisitions

Greater Haverhill Sub-region



This sub-region in the center of the Valley hosts 15 Concentrated Development Centers identified in the Priority Growth Strategy:

<u>Boxford</u>
Old Village Center
West Boxford Village Center

<u>Haverhill</u>
Downtown
Upper Hilldale
Lifestyle Center
Ward Hill

<u>Georgetown</u>
Village Center
National Avenue Norino Way
Route 133/Chestnut Street

<u>Merrimac</u>
Town Center
Route 110

<u>Groveland</u>
Village Center
Route 97

<u>West Newbury</u>
Village Center

CMS Projects in Construction/Recently Completed or Under Study

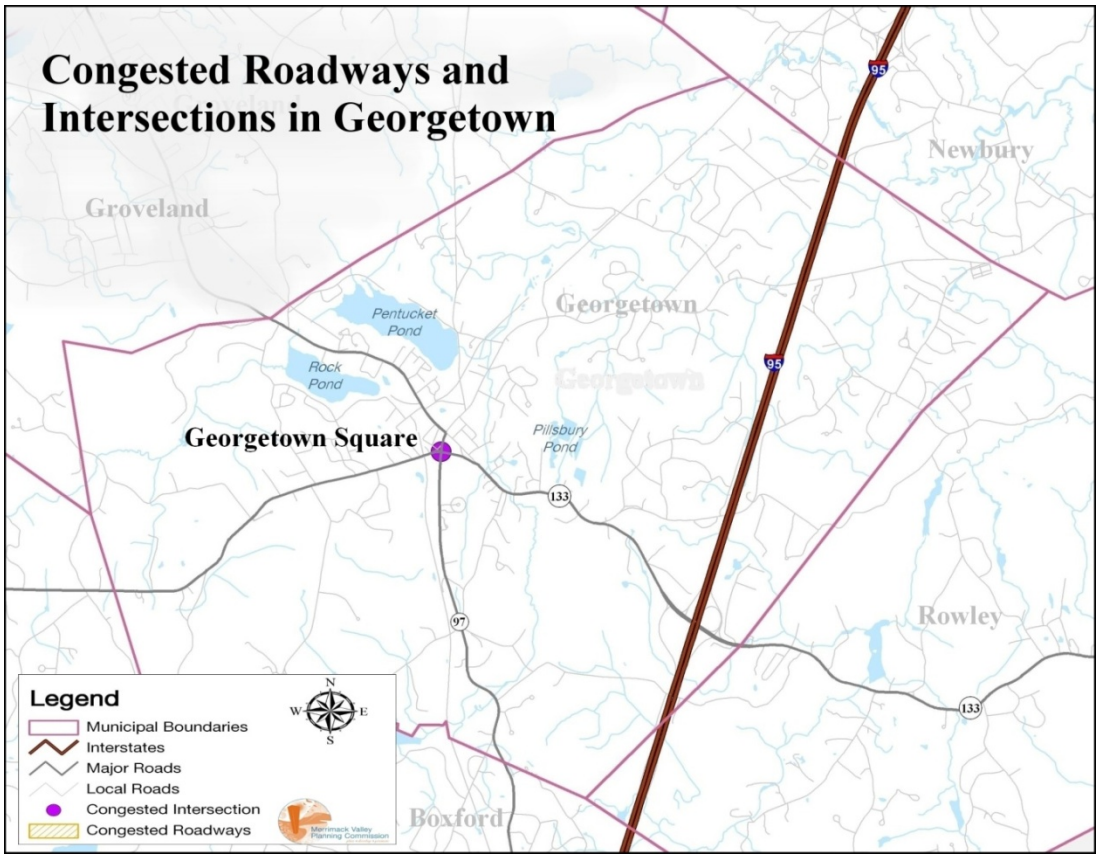
- Georgetown Square: MVPC analyzed and prepared a traffic report in FFY 2010 recommending signal phasing and timing changes, plus consideration of eliminating certain traffic movements to improve Level of Service both in the Square and at the Central Street/Library Street intersection, which is located approximately 700 feet south of it.
- Georgetown: National Way/Access Road: This new roadway, which connects Route 133 just east of Exit 55 with Norino Way, was completed in 2007. The roadway enables commuter and freight traffic that is now generated by the industrial establishments situated on Norino Way, Searle Street, and Tenney Street to avoid traveling through the narrow section of Tenney Street that serves the residentially-developed area located east of Route 95. This new roadway will greatly facilitate the development of the Norino Way and National Avenue CDCs.
- Georgetown: Route 133 and Tenney Street Intersection. The town has recently reconstructed this intersection in an effort to improve safety. Even with the completion of the Access Road connector east of I-95, it is likely that truck and commuter traffic destined for the industries along Norino Way and Searle Street from the Square, Haverhill and Groveland will continue to use this intersection.
- Haverhill: MA-125 (South Main Street) Reconstruction Project commenced construction in FFY 2011. Reconfigured intersections, new signal equipment, curbing, sidewalks and pavement markings will aid congestion management, particularly at the northern end approaching the Basiliere Bridge where congestion frequently occurs as a result of poorly defined travel lanes, numerous curb cuts, substandard intersection approaches and on-street parking. Project to be completed in FFY 2014.
- Haverhill: a new MVRTA parking facility adjacent to the MBTA Haverhill Station and downtown Haverhill is under construction. It will be completed in the 4th quarter of FFY 2011 and will add 315 parking spaces.
- Haverhill: Hilldale Avenue has been widened and reconstructed from Fondi Drive South north to the New Hampshire state line. The improved roadway contains a wider travel

way, improved drainage and is now more suitable for the truck and vehicular traffic that will use the roadway as this CDC develops.

- Haverhill: Ward Hill Connector/Ferry Road. MassDOT completed a connection between the Route 125 Connector and Ferry Road that will allow commuter and truck traffic to more efficiently access the industrial parcels along the northern half of Ferry Road without having to travel the narrow, winding segment of the roadway that runs through the residential areas along the roadway.

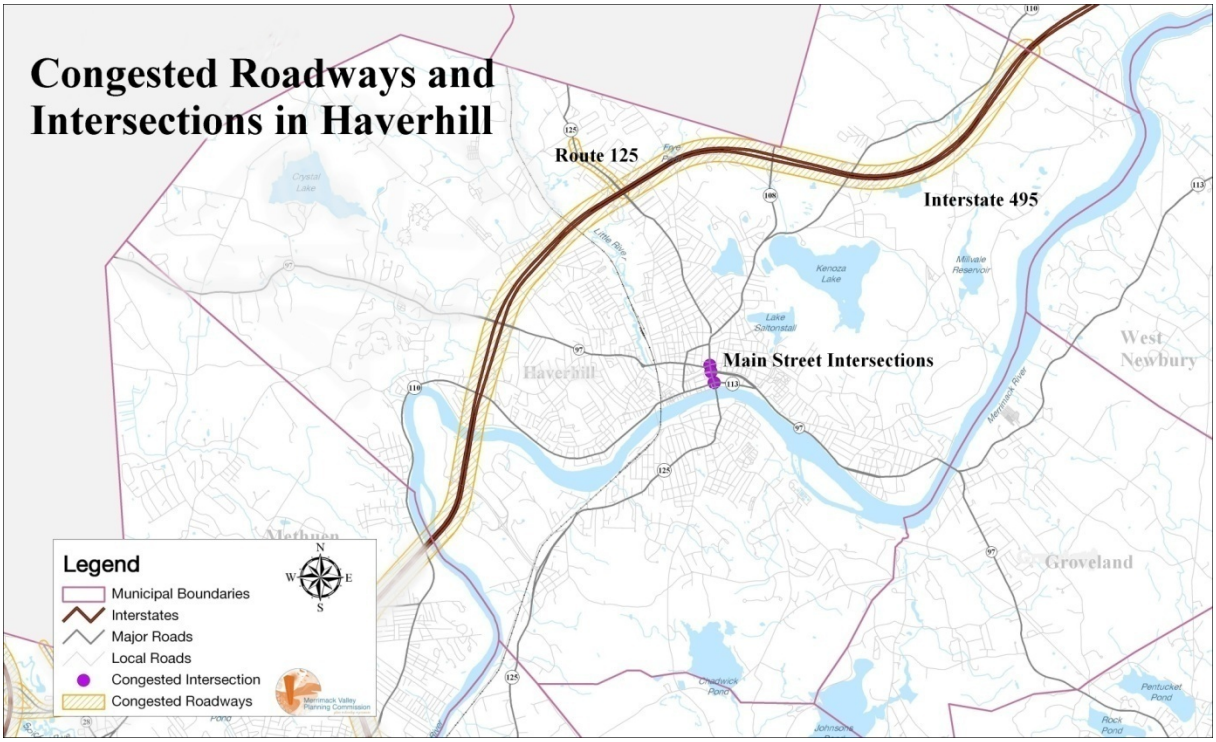
CMS projects in planning / development

- Georgetown: the MassDOT has initiated design of a new park-and-ride lot for a parcel in Georgetown, just west of Exit 55 on I-95. This project has been approved by MassDOT's Project Review Committee and is in preliminary design. The project is expected to begin construction in FFY 2015.
- Groveland, Elm Square: new intersection of MA-97 and MA-113 at eastern approach to the reconstructed Bates Bridge. The new intersection will contain an improved (i.e. straighter) alignment for Route 97 and the signalization of Main Street (Route 113) and Elm Park (Routes 97 & 133).
- Groveland, Route 97: The town has initiated two projects to reconstruct/resurface Route 97 between the Georgetown/Groveland town line and Gardner Street, which is located just south of Elm Park and the soon to be reconstructed Groveland Center (see 'Elm Square' above). Included in these two projects are plans to modify the Salem Street/School Street (Routes 97 & 133) intersection for future signalization
- Haverhill: MA-97, MA-110, MA-113 at intersections with MA-125. The MassDOT, the MVPC and the City of Haverhill have completed a federal Highway Safety Improvement Program–funded analysis to address congestion and safety issues at these three intersections. In FFY 2011, MassDOT and local officials have developed a preferred design alternative for the corridor.
- Haverhill: new intersection of MA-97 and MA-113 at western approach to the reconstructed Bates Bridge. This intersection will be reconfigured and signalized as part of the Bates Bridge replacement project.
- West Newbury: Rocks Village Bridge Reconstruction After years of deterioration, MassDOT will soon begin work on the rehabilitation of this historic structure which connects the town with the Rocks Village neighborhood in Haverhill and River Street in Merrimac. Once completed these improvements will likely result in a small increase in medium truck traffic entering West Newbury Village Center as the weight restrictions on the bridge will be reduced.



MA-133 and MA-97 in Georgetown (Georgetown Square)

Drivers experience long delays on virtually all approaches to this intersection during AM and PM peak periods. AM peak congestion is severe on the MA-97 eastbound approach, while the northbound (MA-97) and westbound (MA-133) approaches back up during the evenings. Much of the AM peak traffic traveling through this intersection is commuter traffic from Haverhill, Groveland and southern NH, headed for I-95. The MVPC has previously assisted the Town of Georgetown on this issue by suggesting changes to the intersection's timing and reviewing the Synchronization of that signal with the Library / Central Streets signal located near Town Hall. In 2007, the Town modified the signal timing at this location to improve traffic flow. In 2010, MVPC transportation staff reviewed the operation of the traffic signals both in the Square and at the Library Street/Central Street intersection that is located approximately 700 feet south of the Square. This study recommended a series of short-term improvements that could be made including the elimination of the left turn lane from Central Street northbound onto Library Street However, the magnitude of travel demand at this location, available rights-of-way and the limited number of lanes at each major approach make it difficult to develop effective solutions to this problem.



Main Street (MA-125) in Haverhill: Three Locations

Route 125 Southbound at Winter Street

While it could be considered a traffic corridor, congestion on this section of MA-125, located on the eastern end of the downtown area, is governed by three signalized intersections:

- MA-125 at Summer/Winter streets;
- MA-125 at Bailey/Ginty boulevards;
- MA-125 at Merrimack/ Water streets.

Congestion is primarily caused by capacity constraints at the MA-125 and Water Street intersection and the heavy volume of pedestrian traffic that travels through the area. Issues include:

- Signals at the three intersections are interconnected and maintaining coordination becomes problematic when pedestrian call buttons are pushed during peak travel periods.
- Short green times for side streets, particularly Bailey and Ginty Boulevards, cause back-ups.
- Existing signal equipment does not conform to current design standards, and its technology is obsolete. In addition, while the intersections can be remotely monitored, the City cannot adjust the signals in real-time – and that capability would be a great help toward maximizing traffic safety and efficiency.
- Some of the lanes at particular intersection approaches do not align with the corresponding lanes leading to the next intersection, causing merging conflicts.
- Certain left turns are difficult to execute given traffic volumes and sight distances.

The MVMPO in FFY 2011 programmed federal Highway Safety Improvement Program (HSIP) funding for the MVPC, the MassDOT and the City of Haverhill to jointly conduct a safety audit of these intersections. The MVPC and the MassDOT consultant, in conjunction with City officials, have completed this audit and held a public information session in April 2011 to discuss two design concepts. During the remainder of FFY 2011, the MassDOT will be advancing these concepts toward selection of a preferred alternative for preparation of plans, specifications and cost estimates.

MA-125 South of Rosemont Street to I-495 in Haverhill

Route 125 Northbound at Northwood Terrace

MA-125 is a principal north/south arterial roadway in the MVPC region and has been designated NHS roadway for its entire length in the Merrimack Valley region. It is the most heavily traveled arterial roadway in Haverhill, and serves as the main travel route between Haverhill and Plaistow, NH. Most of the roadway consists of one lane in each direction. Traffic volumes are highest on MA-125 in the segment between Rosemont Street and I-495.

While MA and NH residents use MA-125 to access numerous adjacent commercial and retail areas, particularly in Plaistow, this section of the roadway is most heavily used by NH residents who commute to work in MA, as it intersects I-495 approximately 1.2 miles south of the NH-MA state line. Consequently, MA-125 between I-495 and the NH state line is the

most heavily congested segment. Average daily traffic on the segment south of Rosemont Street in May 2007 was 37,640 vehicles. Traffic congestion generated by commuters, shoppers and other travelers has caused many drivers to use alternate routes in neighborhoods that are more residential in character. Two key alternate routes are: 1) Hilldale Avenue, and 2) Marsh Avenue to North Avenue, none of which are intended to function as major arterial roadways.

The MVPC, the MassDOT and its predecessor agencies have completed important traffic studies in this corridor.

1989

In response to the MA-125 congestion problems between I-495 and the NH state line, the MVPC, at the request of the City of Haverhill, conducted a corridor study of this particular roadway segment in 1989, titled: "Route 125 Haverhill Traffic Study." This study covered the congestion problems for this road segment in great detail, and discussed a number of mitigating actions that could be undertaken. Congestion problems that existed in 1989 are still prevalent today. The study's level of service (LOS) analysis for the corridor found the following:

- A morning LOS of F on MA-125 southbound at Hanscom Street during peak hours.
- A morning LOS of F at NH-121 southbound during peak hours.
- Morning and afternoon peak period LOS F on MA-125 northbound at Rosemont.
- Peak period LOS F on several side streets: Primrose, NH-121A, Cushing Avenue.
- LOS F on I-495 northbound ramps during evening peak hours.
- Congestion on side roads to neighborhood routes: Concord and Gile Streets.

The study's short-term recommendations included the following:

- Signalization of the intersection of MA-125, NH-121A and Cushing Avenue;
- Add striping at the intersection of MA-125 and Marsh Avenue, creating two lanes for vehicles at each approach (partially implemented, it has been striped for two lanes southbound on MA-125);
- Add a stop sign to the Merrill Street approach to the intersection of NH-121, Merrill Street, and Cushing Avenue (Merrill Street has since been made one-way southbound; therefore, vehicles no longer approach NH-121 from Merrill Street northbound);
- Change the isolated signal timing at each signalized intersection to allow more green time to the MA-125 approaches. (Signal improvements have been made at MA-125 / Main Street intersection);
- Coordinate traffic signals along MA-125 (progressive signal timing);
- Restripe MA-125 to three total lanes, providing two lanes northbound, or two lanes southbound, and
- Implement a minor reconstruction of MA-125 to create four lanes (two lanes in each direction).

The study also examined the following large-scale improvements outside of MA-125, which would require substantial new construction:

- Construct an interchange at I-495 and NH-108.
- Extend Hilldale Avenue to NH-121 (*Note: Subsequently Completed by City*).
- Construct one of various MA-125 Bypass roads.
- One or more of the options above combined with improvements to MA-125.

The MVPC study found that the construction of a new interchange on Route I-495 at NH-108 would not divert enough traffic from the MA-125 Corridor to significantly improve traffic congestion on MA-125.

1994
The Town of Plaistow, NH hired VHB to conduct a study of MA-125 between the MA / NH state line and its intersection with Westville Road. VHB recommended certain roadway and intersection improvements including signalization of the MA-125 / Cushing Road intersection at the MA / NH state line.

1995
The City of Haverhill City Council requested the MVPC's assistance with development of a MA-125 corridor bypass roadway. As noted earlier, the 1989 MVPC study did conclude that a bypass would be necessary to reduce congestion on a long-term basis, and that simply widening MA-125 to four travel lanes would only afford short-term relief. However, to be effective, a bypass road must be situated as close to the existing roadway as possible. The location of commuters residences' in southern NH and the abundance of commercial and retail activities in this corridor rendered those alternative alignments located further from the existing corridor less effective.

1998
The City of Haverhill completed work on a Public Works Economic Development-funded project to reconstruct Hilldale Avenue from its intersection with Vale Street to Fondi Drive. Soon thereafter, the City paved the section of Hilldale Avenue from Fondi Drive north to the New Hampshire state line. This latter project, coupled with the decision to make Merrill Avenue one-way southbound between Main Street and Rosemont Street has resulted in a large increase in the amount of traffic using Hilldale Avenue as a bypass to MA-125.

2000 – 2001
Work on prior studies continued. After a thorough analysis and public meeting conducted on June 8, 2000 and March 22, 2001 the Bypass alternative was recommended as the best option as it would provide additional travel lanes and have the least effect on businesses and residential properties in the corridor. However, its environmental impacts were greater than the alternative which proposed expansion of the existing roadway.

2002
In March of 2002 MassHighway hired the Louis Berger Group to prepare a MA-125 Bypass Location Study. This study analyzed a corridor segment from I-495 in MA to the NH state line, and considered two options: 1) construction of a new interchange and bypass road, or 2) upgrading existing roadways to accommodate projected travel demand. Seven interchange concepts were developed. Bypass Alternative 3, which consisted of a) a new access to Route I-495 just west of the existing interchange with MA-125 and b) a new roadway connect to Rosemont Street, was recommended as the preferred alternative.

2008
MVPC completes a traffic study of the MA-125 corridor in the vicinity of the state line in response to a request received from officials from the City of Haverhill and the Town of Plaistow to identify improvements necessary to improve traffic congestion and safety conditions in both communities. The officials' request was prompted by their concern for traffic impacts generated by increased commercial development along MA-125 and Cushing

Avenue in Haverhill, the impending redevelopment of the State Line Plaza in Plaistow and the worsening congestion at the intersection of Cushing Avenue and MA-125.

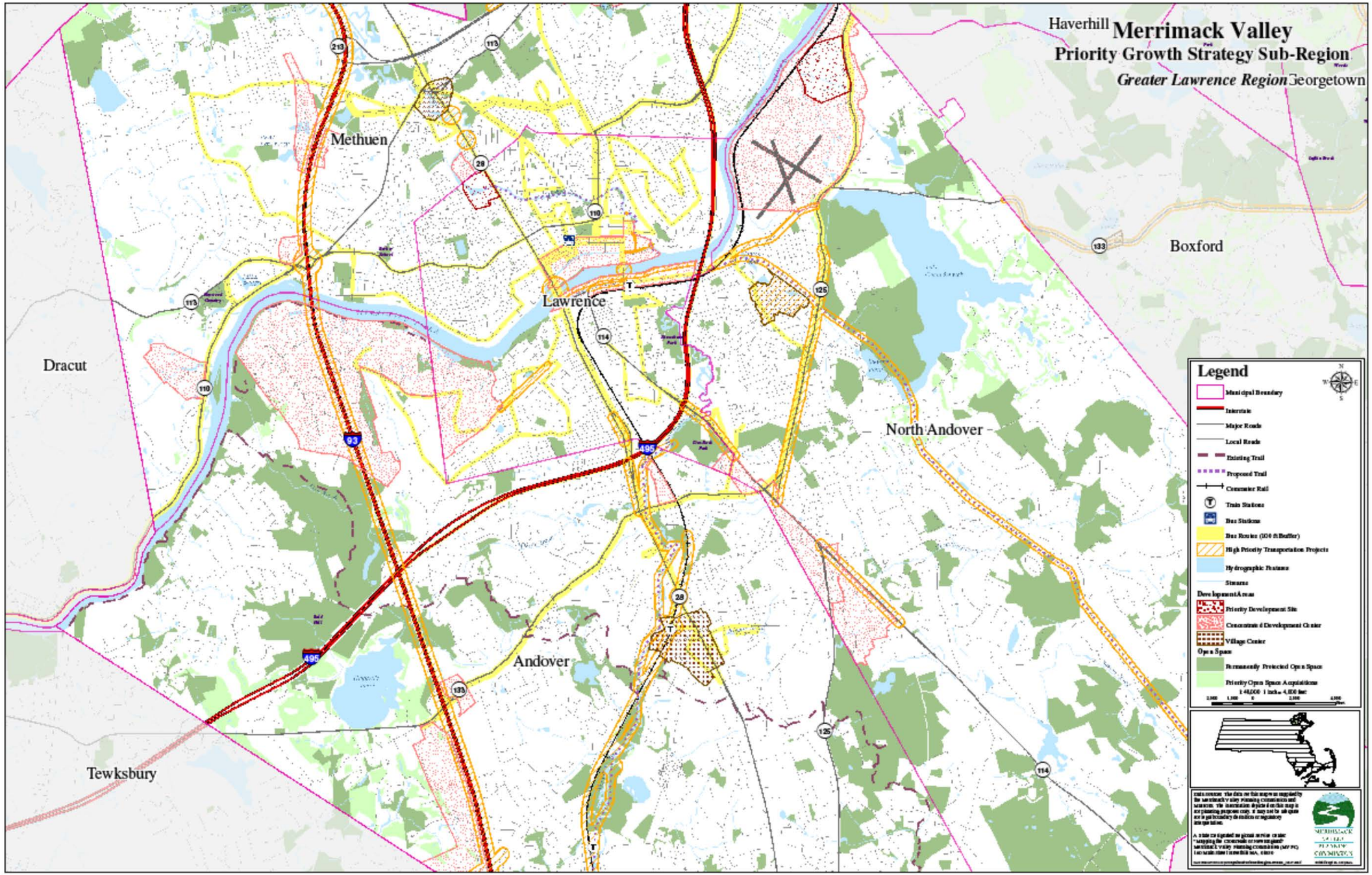
MVPC staff, local officials and property owners examined eight improvement alternatives. It was agreed to implement Alternative 5, which calls for the minor widening of MA-125 from the State Line Plaza driveway south into MA, signalization of the MA-125 intersection with Haseltine Street, and a new driveway to State Line Plaza. Widening of the northern section of Plaistow Road (MA-125) in Haverhill would also allow for a future traffic signal installation at its intersection with Cushing Avenue. Until this intersection is signalized, Haverhill and Plaistow community officials agreed to make the NH-121A approach to MA-125 a right turn in/right turn out intersection.

2009
A MassDOT-sponsored I-495 Corridor Study recommended:

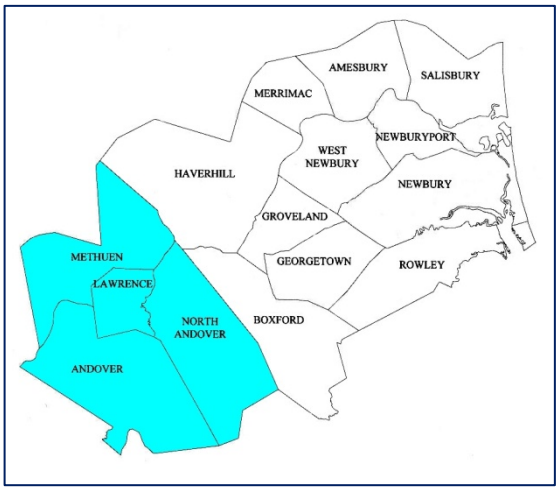
- Restriping of MA-125 between I-495 and the NH state line to provide three travel lanes (two northbound, one southbound)
- Construction of a bypass roadway as a long-term congestion management measure

These recommendations dovetail with elements of prior studies discussed above.

2010
The City of Haverhill installed utilities and reconstructed the section of Hilldale Avenue between Fondi Drive and the New Hampshire state line, which is located 460 feet south of Hilldale Avenue's northern terminus at Route 121 in Atkinson, NH.


Haverhill
Merrimack Valley
Priority Growth Strategy Sub-Region
Greater Lawrence Region
Georgetown
Methuen
Lawrence
Boxford
Dracut
North Andover
Andover
Tewksbury
Legend
Municipal Boundary
Interstate
Major Roads
Local Roads
Existing Trail
Proposed Trail
Commuter Rail
Train Stations
Bus Stations
Bus Routes (1/4 ft Buffer)
High Priority Transportation Projects
Hydrographic Features
Streams
Development Areas
Priority Development Site
Concentrated Development Center
Village Center
Open Space
Permanently Protected Open Space
Priority Open Space Acquisitions

Greater Lawrence Sub-region



This sub-region contains the Greater Lawrence communities of Andover, Lawrence, Methuen and North Andover. Nineteen (19) Concentrated Development Centers are identified in the Priority Growth Strategy:

<u>Andover</u>

Downtown	Rolling Green
Brickstone Square	I-93/Osgood St.
Lowell Junction	River Road

<u>Lawrence</u>

Malden Mills	Lawrence Industrial Park
Merrimack Street	Gateway/Downtown

<u>Methuen</u>

Aegean Park	Branch Street
Downtown	Griffin Brook Industrial Park
Lindbergh Avenue	The Loop

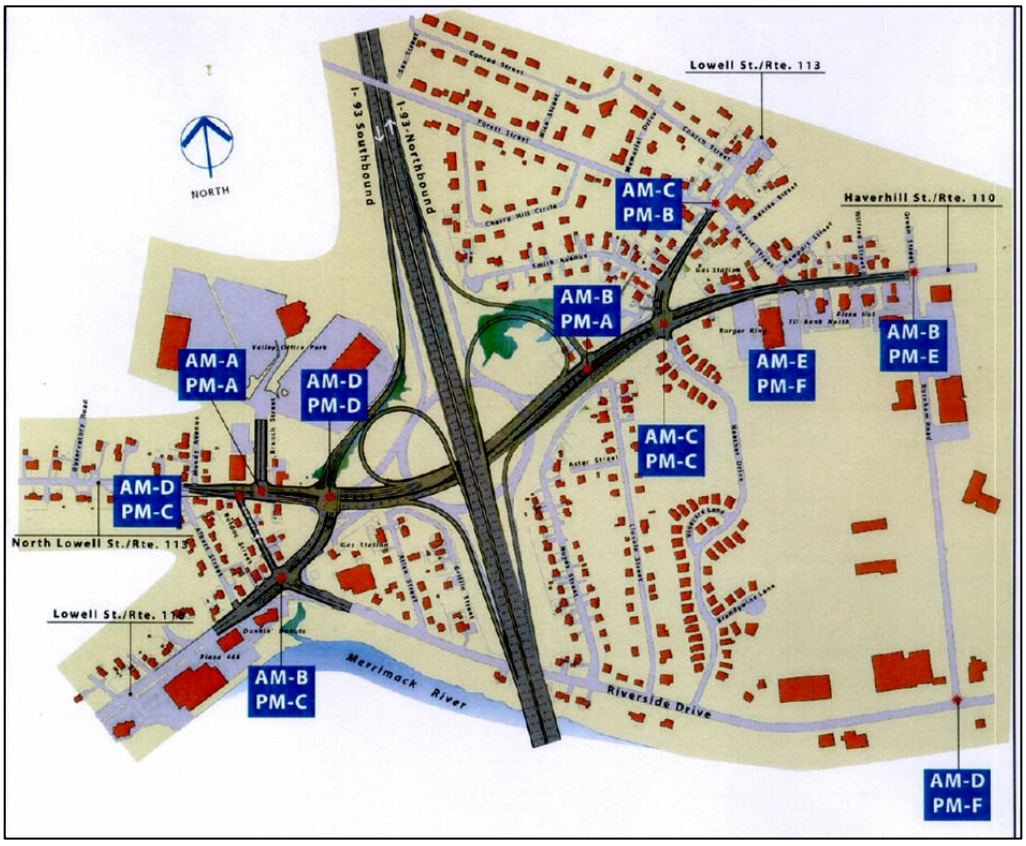
<u>North Andover</u>

Osgood Landing	Route 114 Corridor
Machine Shop Village	

Western Subregion Overview

<u>MA-110 / MA-113 Rotary, Methuen</u>

The MA-110 / MA-113 Rotary at I-93 joins these three major roadways just north of the Merrimack River in Methuen. It forms part of the I-93 Exit 46 interchange. MA-110 and MA-113 combine to form a single approach (Lowell Street) from the east with one lane in each direction. On the west side, MA-113 branches off as North Lowell Street (one lane each direction), and MA-110 continues as Lowell Street with two lanes in each direction. Four ramps to and from I-93 also feed into this rotary, creating numerous weaving movements throughout it. During evening peak hours, this one-lane rotary experiences substantial congestion that, when at its peak, causes traffic on the I-93 northbound off-ramp to back up onto I-93.



The MVPC analyzed this rotary's operation as part of its 2004 I-93 Corridor Study. It developed and evaluated three 'low-cost' improvement scenarios and four more extensive scenarios. In 2007, MassDOT conducted a more detailed traffic and safety study of the area, and developed preferred short-term and long-term Rotary transportation improvements including: 1) cutting back vegetation to improve sight-distances; 2) revising lane striping / usage in the rotary; 3) erecting signals at adjoining intersections, and 4) building new ramps between the rotary and I-93. The MassDOT also developed a preferred long-term strategy for this interchange that included eliminating the rotary and dramatically reduce congestion / delay in the area. The complete project is valued at $75 million (2013 dollars). The Commonwealth secured a SAFETEA-LU earmark that is being used to make short term improvements in and around the rotary including a new signal at the MA-110 / Riverside Drive intersection. **The MVMPO has included this project in the 2016-2020 timeframe for the 2012 Regional Transportation Plan.**

The FEIR / FEIS for the long-term improvements is complete and MassDOT is working on the 75% design plans for the project.

I-93 in Andover and Methuen

I-93 is a north / south interstate highway that traverses the western part of the MVPC region. It is heavily used by NH residents to access jobs in eastern MA and by MA residents traveling to recreational destinations in NH and Vermont. In particular, I-93 provides access to the Boston metropolitan area, with its abundance of employment, educational, and cultural opportunities. Within the MVPC region, I-93 intersects I-495, a circumferential highway that intersects every major state highway in eastern MA. I-93 is of vital importance to the MVMPO region's economy.

I-93 in Methuen

I-93 is congested during both the morning (southbound) and evening (northbound) weekday peak periods. This is due mainly to the large volumes of commuter traffic that are generated by employers throughout metropolitan Boston. In the western half of the MVPC region, where I-93 traverses roughly 11 miles through Methuen and Andover, many of these employment sites are located adjacent to the highway interchanges. Major employers at interchanges include:

- Exit 41 (MA-125): Pfizer (formerly Wyeth Pharmaceuticals), Proctor & Gamble / Gillette, Charles River Laboratories, and many others in the Lowell Junction Industrial Area;
- Exit 42: Hewlett-Packard; VICOR, and Smith and Nephew at Dascomb Road;
- Exit 43: Internal Revenue Service and Raytheon at MA-133;
- Exit 45: Philips Electronics and Putnam Investments, in addition to other office centers, three hotels and a few restaurants at River Road, and
- Exit 46: a shopping plaza, fast food establishments, and a health care center at MA-110 / MA-113.

Congestion is often present for longer periods than those classified as single peak hours, and is influenced by the shift times of the major employers in the area. The large volumes of peak period traffic exacerbate congestion created by accidents, construction, and bad weather which creates extreme delays for motorists.

The first MVCMS labeled I-93 as one of three "severely congested" roadways in the region, and so it remains as of the writing of the 2011 MVCMS. Accordingly, many traffic studies have been undertaken to determine the causes of its congestion and identify potential improvements. The following describes the studies, and recommendations derived from the studies, that have been conducted along the I-93 corridor.

1998
MassHighway explored use of the I-93 breakdown lanes in Andover and Methuen as a travel lane during peak travel periods in the peak direction of travel (i.e., northbound in the afternoon, southbound in the morning). This project was implemented, and as intended it expanded roadway capacity roadway during these periods while lowering roadway V/C ratios and improving corridor travel times. Use of the I-93 breakdown lanes in this manner continues today.

2001
The MVMPO authorized an I-93 Corridor Study in the communities of Andover and Methuen. This study was undertaken by VHB under the supervision of the MVPC, the MassHighway and the MVRTA. It revealed numerous problems, including:

- insufficient weave areas at certain interchanges;
- insufficient roadway capacity at key ramps and along the I-93 mainline;
- MBTA Haverhill Line and MassDOT parking facility capacity constraints, and
- safety problems at the MA-110/113 Rotary and the I-93/I-495 interchange.

The study final draft report was released in October 2003. It suggests several different alternatives to eliminate congestion on I-93 for present and future traffic conditions by improving some of the intersections adjacent to I-93 ramps, and improvement of I-93 ramps. Below are VHB's recommended actions:

Mainline:
- Widen I-93 to four lanes in each direction

Interchanges:
- Initiate an environmental study of improvements to Exit 46 (MA-110 / 113)
- At Exit 43 (MA-133 or Lowell Street) replace the MA-133 westbound to I-93 southbound loop on-ramp with a left turn from MA-133 westbound to existing I-93 southbound on-ramp from MA-133 eastbound
- At Exits 47 / 48 (Pelham Street / MA-213) eliminate the weave between the southbound off-ramps from I-93 and MA-213 by grade separating the ramps
- Initiate an environmental study of improvements to Exit 44 (I-495) based on the results of the I-495 Corridor Study
- Continue consideration of adding a new interchange at Lowell Junction. (The MVMPO has since completed the I-93 Lowell Junction Interchange Justification Study, and the MassDOT submitted an IJR to the FHWA in FFY 2011.)

Intersections:
- Signalize and make minor geometric improvements to several intersections
- Monitor the following intersections for possible signal timing changes:

    - River Road at Minuteman (Exit 45)
    - River Road at I-93 Southbound ramps (Exit 45)
    - River Road at I-93 Northbound ramps (Exit 45)
    - River Road at Federal Street Road (Exit 45)
    - Pelham Street at I-93 Northbound ramps (Exit 47)
    - Pelham Street at I-93 Southbound ramps (Exit 47)

Rail:

- Double track the MBTA Haverhill Commuter Rail Line between Reading and Lawrence. The MBTA Program for Mass Transportation (PMT) identified this project as a medium priority. *Note: double tracking of the Line segment between the Wildcat Branch and Lawrence was funded in the ARRA (FFY 2010), and additional track upgrades between Wilmington and Haverhill were funded in FFY 2011 through the federal HSIPR Program.* Construction of some of these improvements is underway and may be complete in FFY 2013.
- Participate in ongoing joint planning efforts with NH officials to evaluate and recommend transit improvements to serve the Manchester, NH to Boston, MA corridor. In 2010, *the MVPC, RPC and SNHPC collaborated on a federal TIGER II funding application to obtain funds for new Bus on Shoulder service along I-93. While unsuccessful, the MVPC is prepared to again collaborate with RPC and SNHPC on an FFY 2011 application at such time as a Notice of Funding Availability (NOFA) is released.*
- Further evaluate potential for instituting valet parking services at commuter rail stations to increase parking capacity.

Bus:

- Initiate experimental bus service improvements in and along the I-93 corridor
- Monitor parking use at Anderson Regional Transportation Center in Woburn and implement express bus shuttles to rail stations when and where appropriate

Transportation Demand Management:

- Encourage and support transportation demand management measures within the I- 93 corridor and surrounding areas

The MVMPO endorsed these actions in 2003, some of which have been implemented.

2005

The MassDOT undertook a study of I-93 at Exit 46 (MA-110 / 113 Rotary) in Methuen. The rotary connects several roadways and has had long-standing congestion and safety issues. The study was completed in 2010, and aided project stakeholders in selecting a preferred improvement alternative for the rotary and adjacent roadways.

2006

The MVMPO completed the I-93 Lowell Junction Interchange Justification Study. This study analyzed the possible traffic, land-use, environmental, economic and other impacts of nine possible interchange alternatives. It found that an interchange at this location was feasible and recommended three interchange alternatives for further analysis. This study was forwarded to the EOT; in turn, EOT submitted an IJR to the FHWA for review and approval.

2008

The NHDOT and the EOTPW completed the I-93 Transit Investment Study (Study). The Study analysts evaluated the feasibility and potential benefits of a number of possible I-93 corridor transit service options between Manchester, NH and Boston, MA including various bus, light rail and commuter rail technologies. This evaluation also considered the land-use impacts/benefits of the various transit options. The MVPC served on the Study Advisory Committee and participated in the development, review, and evaluation of proposed transit options.

The study proposed implementation of two transit options. The first is the so-called "Bus on Shoulder" option that would allow commuter buses to operate in the breakdown lane on I-93 from park and ride lots and downtown locations located near interchanges in NH, MA and Boston. The study found that such a service would be attractive to commuters since travel times to / from Boston would be significantly lower than driving.

The second recommended transit operation would be reinstatement of commuter rail service along the Manchester and Lawrence (M&L) Branch of the former Boston & Maine Railroad between I-93 Exit 5 in NH and Boston, MA. This service would connect with the existing commuter rail service on the MBTA Haverhill Line just west of Lawrence Station. While more expensive to implement and operate than the Bus on Shoulder service, commuter rail service along the M&L Branch would generate slightly more ridership than the bus and significantly greater land use benefits to communities located along the route.

2011
The Merrimack Valley Metropolitan Planning Organization's FFY 2012 Unified Planning Work Program contains a task to complete a feasibility study for both expanding the existing HOV lane on I-93 and for introducing "Bus on Shoulder" transit service along this corridor from New Hampshire to Somerville. When complete, this study will facilitate a cost/benefit analysis for MassDOT and the Merrimack Valley MPO to consider for each of these options.

Interstate 495 - Andover, North Andover, Lawrence, Methuen, and Haverhill

I-495 traverses the MVMPO region in a west-to-east arc roughly parallel to the Merrimack River. I-495 connects with I-93 and I-95 in the region, providing extensive access to / from points north and northwest. I-495 is a six-lane roadway (i.e. three lanes in each direction) for virtually all its length in the region. Eight of the region's fifteen communities host at least one I-495 interchange. Given the number of communities that are directly served, it is arguably the most important roadway in the regional highway network. It also serves as a critical route in the nation's freight network as a great deal of truck traffic generated in or destined to Maine and eastern Canada uses I-495 to access western New England and the rest of the country.

Traffic volumes in excess of 115,000 VPD have been counted along I-495 segments in Andover, Lawrence, Methuen, and Haverhill as previously noted. The combination of high traffic volumes in the MVMPO western sub region, I-495's heavy use by trucks, and its limited number of travel lanes cause it to appear in the screening analysis.

In 2008 MassDOT completed a corridor study of the roadway from Westford in the Northern Middlesex MPO region to its northern terminus at I-95 in Salisbury. This study includes a number of findings and recommendations. One important finding is that much of the existing congestion on I-495 is a result of deficiencies at many of the interchanges including insufficient weaving distances between ramps and substandard merge/acceleration lanes. A series of low-cost, short-term improvements were developed to address these issues. They include signalizing some of the on/off ramps from the highway, updating the timing and phasing at intersections that are already signalized.

The major long-term improvement recommended in the study was to widen I-495 to four travel lanes in each direction from Westford to MA-110 (Exit 49) in Haverhill. This additional capacity is needed to accommodate the traffic demand forecasted for the horizon year of 2030.

MA-114 in North Andover and Lawrence

The MVMPO 2007 RTP's Congestion Management section identified MA-114 southeast of Hillside Road as a locus of traffic congestion. However, continued development and redevelopment of the northern end of the MA-114 corridor in North Andover and Lawrence prompted the MVPC to expand its analysis in order to eliminate existing traffic and safety problems, and develop a corridor development plan to preserve the roadway's future capacity.

The section of MA-114 studied extends from its intersection with South Union Street in Lawrence southeast to the North Andover / Middleton T.L. This section is one of the most heavily traveled roadways in the MVMPO region with the section located near Merrimack College in North Andover carrying more than 40,000 vpd. This roadway intersects Route I-495, at an interchange located near the Lawrence / North Andover T.L. as well as MA-125, the Route 125 Bypass and MA-133 in North Andover.

MA-114 between I-495 in Lawrence and Willow Street in North Andover is a very congested corridor with several different individual problem areas. For example, MA-114 near I-495 narrows from two lanes in each direction to one lane in each direction because it must cross a narrow, structurally deficient bridge over the Shawsheen River. Further south on MA-114, traffic congestion during peak travel periods occurs between the entrance to the North Andover Mall and the MA-125 Bypass due to heavy conflicting traffic volumes in the corridor, and especially at the MA-125 /MA-114 and MA-114 / Peters Street intersections. Commercial and industrial development along MA-114 south of the MA-125 Bypass to Willow Street has also created pockets of congestion. Southeast of the MA-125 Bypass, on the section of roadway identified in the CMS, the roadway narrows again to one travel lane in each direction, thereby creating another choke point.

The 2010 MVPC MA-114 Corridor Study analyzed a segment from the roadway's intersection with South Union Street in Lawrence to the Middleton T.L. This study details existing and projected levels of service for all intersections and roadway segments within the defined corridor. Projections include how the roadway will function with the completion of planned and proposed development projects (i.e., projects that could be built over the next five years). The study then identifies a program of transit and roadway improvements that will address the long-term corridor travel demands. These include widening the highway between Waverly Road and I-495 to provide a consistent four lane cross section plus turning lanes at signalized intersections and improving pedestrian facilities on both sides of the roadway.

Commuter Bus

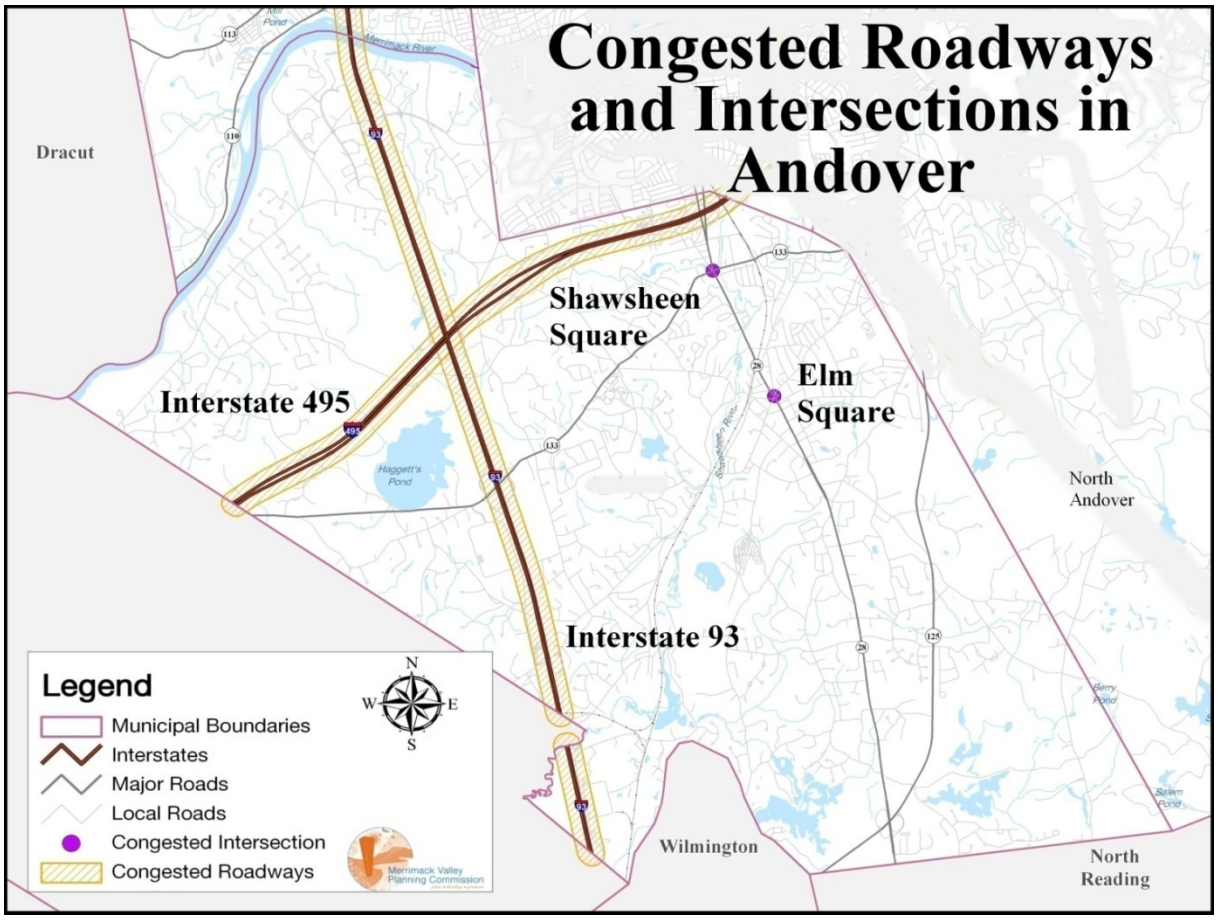
The MVRTA's Boston Commuter Bus Service continues to be popular. Ridership has grown 80% from 25,019 (FY 2004) to 45,052 (FY 2010). Ridership in the first three quarters of FY 2011 (35,463) equaled 78.6% of FY 2010's ridership (45,062) The MVRTA has reported that there are standees on the Authority's three inbound and three outbound buses to / from downtown Boston. The Authority is exploring options for providing a fourth daily inbound and outbound trip.

CMS Projects in Construction or Recently Completed

- Andover: Dascomb Road Park-and-Ride Facility. The MassDOT expanded this 73-space lot to 140 spaces in 2010
- Lawrence: The Gateway parking facility, with 865 new parking spaces, was opened in October 2011.
- Lawrence / North Andover: the MVPC completed its MA-114 Corridor Study, which recommended a series of roadway improvements including potential roadway widening near the North Andover Mall and near Willow Street, and various intersection improvements, and the construction of sidewalks where none currently exist.

CMS Projects in Planning / development

- Andover / Methuen, I-93: Lowell Junction Interchange, lane addition, A consultant team is preparing a Draft Environmental Impact Report/Environmental Impact Study (DEIR/DEIS) for the construction of the Lowell Junction interchange and the associated widening of I-93 up to I-495.
- Andover / Lawrence / Methuen / North Andover, I-495: interchange improvements – pavement markings and signal timing revisions recommended in the MassDOT's 2009 I-495 Corridor Study.
- Lawrence: Merrimack Street redesign and reconstruction as a multimodal roadway.
- Lawrence / Methuen, MA-28: MVPC is reviewing the level of congestion in this corridor subsequent to improvements to the roadway that have been made by the developer of the Lowe's Home Improvement Center, which is located at the Massachusetts/New Hampshire state line, and the reconstruction of the Route 28/Lawrence Road intersection that was recently completed by NHDOT.
- Lawrence – North Andover: for MA-114, decide upon specific recommendations made in the Corridor Study and advance through the design process
- Methuen: MA-110 and 113 / I-93 interchange design. MassDOT has recently completed the Final EIR/EIS for the long-term improvements proposed for this location, and is signalizing the MA-110/Riverside Drive intersection, which is located just southwest of the existing rotary.
- Haverhill; MA-125: MassDOT is completing design of improvements to the Route 125 Corridor between Winter Street and Merrimack Street. This section of the roadway includes three intersections that experience significant peak period congestion problems in addition to being included on MassDOT's latest listing of the 200 highest crash locations in the Commonwealth. The reconstruction of this segment of Route 125 is included in the 2012 MVMPO Regional Transportation Plan.



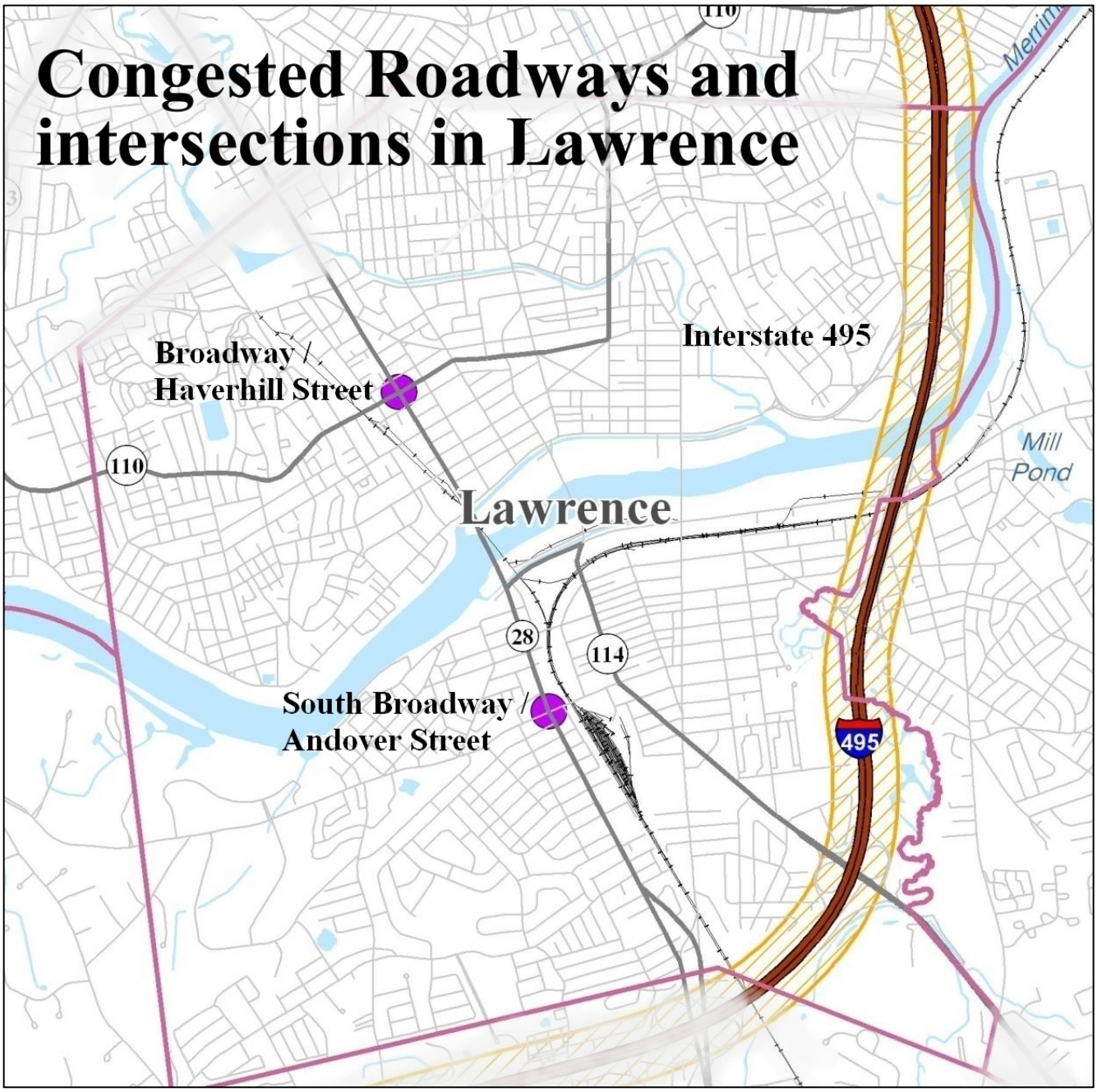
MA-28 at Elm Street (Elm Square), Andover

Elm Square in Andover Center is formed by the intersection of MA-28 (Main Street), Elm, and Central Streets. An earlier MVPC congestion screening showed that only the Main Street northbound approach was periodically congested, and that the congestion was attributable to the intersection's signal system. Modification of the intersection's signal timing was recommended. A project to improve MA-28 between Wheeler Street and the Shawsheen River, which includes this roadway segment, was completed in FFY 2010. Among the many improvements contained in this project were the provision of additional approach lanes from Elm Street at the Square, and creation of another shared travel lane on MA-28. The MVPC will continue to monitor this intersection's performance.

MA-28 at MA-133 (Shawsheen Square), Andover

Traffic Turning from Route 125 Southbound to Route 133 Eastbound

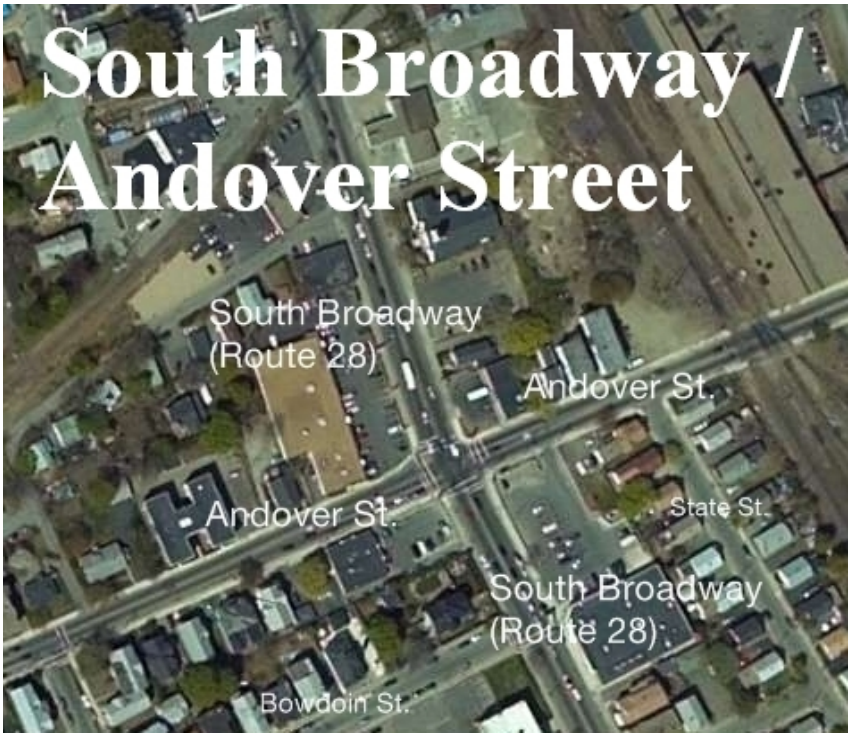
This intersection is located just south of the MA-28 / I-495 interchange in Andover. PM peak hour congestion is typically present on the MA-28 southbound approach to the intersection. The high traffic volumes, narrow width, limited number of approach lanes, and poor delineation of turning lanes on this approach all contribute to the congestion at this location. The Town has proposed making improvements to MA-28 from Shawsheen Plaza north to this intersection.


Congested Roadways and intersections in Lawrence
Broadway / Haverhill Street
Interstate 495
110
Lawrence
Mill Pond
28
114
South Broadway / Andover Street
495

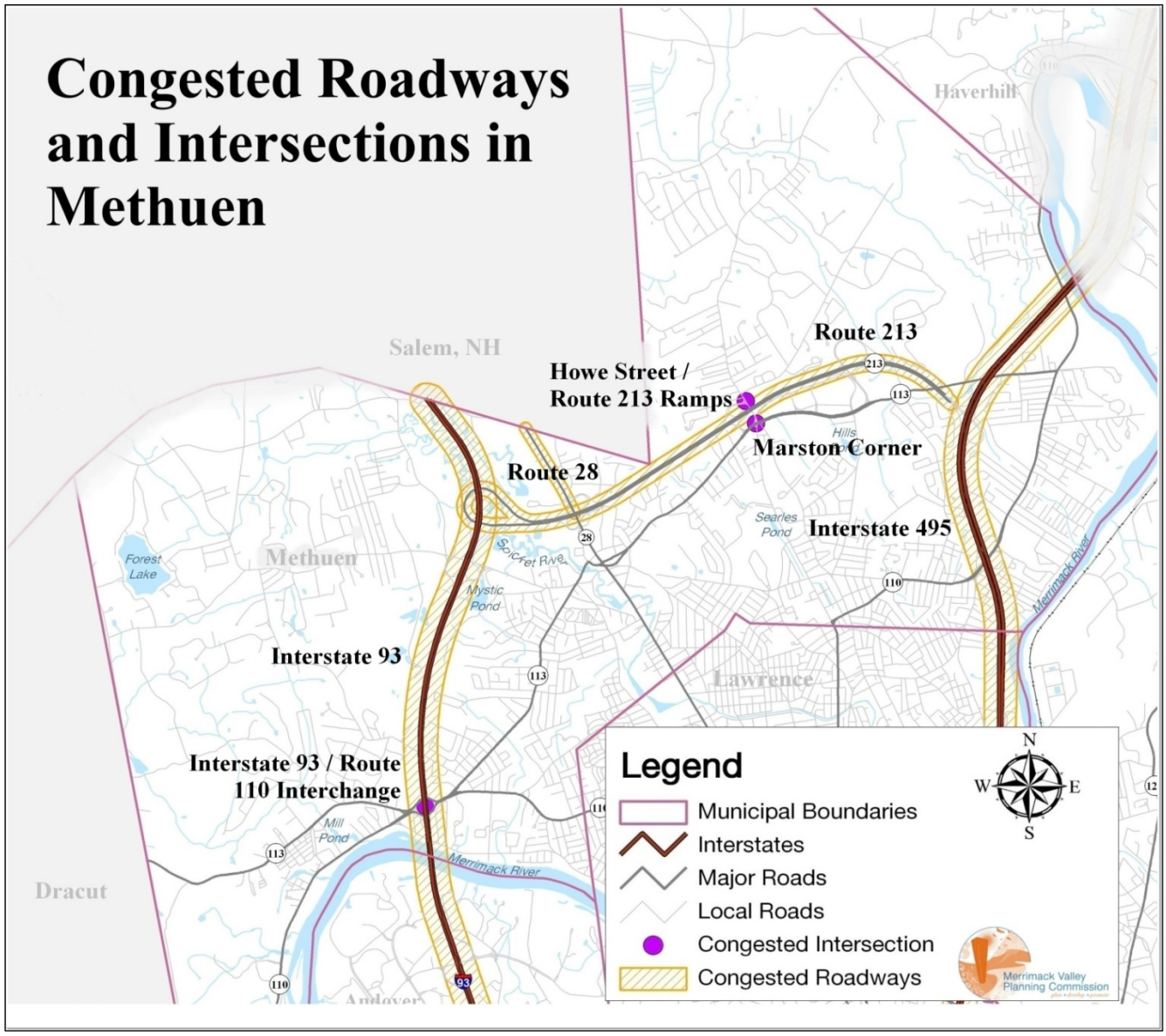
MA-28 (Broadway) and MA-110 (Haverhill Street), Lawrence

MA-28 is the City's major north / south arterial while MA-110 is one of the busiest east / west thoroughfares. High traffic volumes exist on all approaches to this inter-section. In recent years the MassDOT has improved the section of MA-28 that includes this intersection. Elimination of a limited amount of parking on MA-28 northbound approach to the intersection has provided room for an additional travel lane, but this loss of parking has met with resistance from local business owners and local officials. Tight turning radii on all corners of the intersection create lane crossover problems for larger trucks as they make turns. Frequent parking maneuvers near the intersection, limited sight distance on the MA-110 westbound approach and heavy pedestrian activity in and around the intersection all contribute to this intersection's congestion.

MA-28 (South Broadway) and Andover Street, Lawrence



MA-28 serves a densely developed retail area in South Lawrence and provides a local connection to I-495 and Andover to the south. Andover Street is an east-west roadway that serves Lawrence's resi-dential areas, employers in the Lawrence Industrial Park and the River Road section of Andover, where there is access to Route I-93. The MVPC analyzed this intersection, finding that it was difficult for trucks to make turns from all approaches to the inter-section. This is a problem given the nature of the development along MA-28 and in the surrounding areas. Congestion problems at this location are made worse when freight and passenger trains cross Andover Street just a few hundred feet east of the intersection. This causes traffic to back up into the intersection, often resulting in severe congestion and even temporary "gridlock" conditions.


Congested Roadways and Intersections in Methuen
Haverhill
Salem, NH
Route 213
Howe Street / Route 213 Ramps
Marston Corner
Route 28
Interstate 495
Searles Pond
Forest Lake
Methuen
Spicket River
Mystic Pond
Merrimack River
Interstate 93
Lawrence
Interstate 93 / Route 110 Interchange
Mill Pond
Merrimack River
Dracut
Andover
Legend
Municipal Boundaries
Interstates
Major Roads
Local Roads
Congested Intersection
Congested Roadways
N
W
E
S
Merrimack Valley Planning Commission

MA-28 in Methuen north of MA-213

MA-28 near the NH state line is severely congested during peak travel periods and on weekends as traffic from Methuen and MA-213 enters this roadway segment to access southern NH businesses. Heavy traffic volumes combined with a lack of turning lanes create back-ups that often impact the MA-28 / MA-213 interchange. Reconstruction of the Hampshire Road / MA-28 intersection located just north of the Methuen / Salem, NH town line along with the relocation of driveway entrances to the recently redeveloped plaza at the state line is expected to reduce congestion throughout the length of the corridor from MA-213 north. The improvements to this section of Route 28 were completed late in 2010. Key changes included the relocation of the main plaza driveway further north to a point at the state line, and the reconstruction of Route 28 to provide for a left-turn lane for southbound traffic to enter this new driveway.

MA-213, Methuen

This is a four lane, limited-access highway (two travel lanes in each direction) which connects I-495 and I-93 in Methuen. It also is a primary means of access to the Loop, a major retail development located on Pleasant Valley Street between Exits 3 and 4. Traffic volumes along this roadway have steadily increased over the years as development has taken place at the Loop and elsewhere on Pleasant Valley Street, such as the large multifamily residential development located east of the Loop. Congestion also occurs at the MA-28 interchange (Exit 2) as traffic is generated by commercial development along MA-28 in northern Methuen and NH-28 in southern NH.

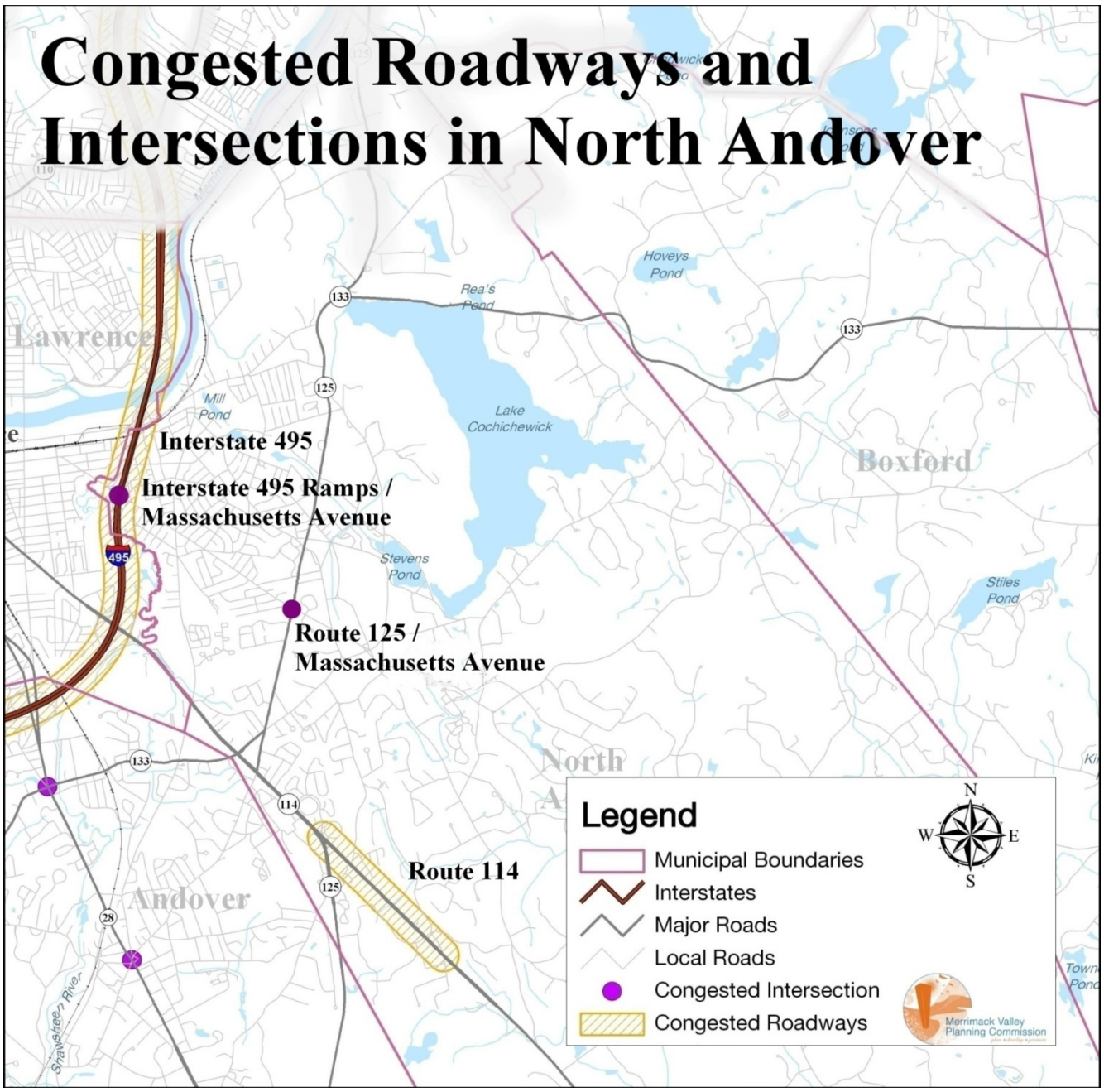
Howe Street at Jackson Street and Pleasant Valley Street (Marston Corner), Methuen

Howe Street Southbound at Pleasant Street

Howe Street is a north-south arterial roadway that provides access to the residential areas in northern Methuen. The roadway also provides access to the Loop development off MA-113 and connects to MA-213 just north of the Marston Corner intersection. Improve-ments to the Marston Corner intersection that were implemented as part of the Loop development have helped the traffic situation, but con-gestion remains due to the heavy traffic volumes in the area and the high number of left turns from Pleasant Street eastbound to Howe Street northbound during the PM peak period. The Merrimack Valley MPO will be reexamining traffic and safety conditions at this intersection under the FFY 2012 Unified Planning Work Program.

Howe Street at MA-213 Ramps, Methuen

Howe Street is a heavily traveled commuter route during peak travel periods. The MVPC staff has observed queues of southbound traffic from the intersection of MA-213 ramps with Howe Street as far north as Hampstead Street. In 2010, the City of Methuen restriped Howe Street south of this intersection to provide two northbound travel lanes over Route 213 and for the northbound approach to the intersection to have two through lanes and a left turn lane for traffic heading for Route 213 westbound. It is hoped that these changes will greatly improve the LOS at this intersection and, in doing so, reduce traffic queues on Howe Street that often extended back to the Marston Corner intersection.


Congested Roadways and Intersections in North Andover
Lawrence
Boxford
North Andover
Andover
Hoveys Pond
Rea's Pond
Lake Cochichewick
Mill Pond
Stevens Pond
Stiles Pond
Interstate 495
Interstate 495 Ramps / Massachusetts Avenue
Route 125 / Massachusetts Avenue
Route 114
Shawsheen River
133
125
114
28
495
Legend
Municipal Boundaries
Interstates
Major Roads
Local Roads
Congested Intersection
Congested Roadways
N
W
E
S
Merrimack Valley Planning Commission

Massachusetts Avenue at Route 495 Ramps

I-495 Southbound Off Ramp at Massachusetts Avenue

This interchange serves as a gateway to both South Lawrence and to both downtown North Andover and Old Town Center. PM peak period congestion at these ramps often causes traffic to back up onto the interstate. These locations were also recommended for signali-zation in MassDOT's Route 495 Corridor Study to address congestion and safety issues. That study found that each of the ramp intersections with Massachusetts Avenue operate at LOS F during both the morning and evening peak travel periods.

Route 125 at Massachusetts Avenue

Chickering Road (Route 125) is a state-maintained NHS roadway that runs northeast to southwest through North Andover from the Haverhill city line to Route 114 and then with Route 114 to the Route 125 Bypass Road into Andover and a connection with Route 93 in Wilmington. Massachusetts Avenue is an arterial roadway that extends from Route 495 (Exit 43) and Lawrence south to the Old Town Center. Both roadways carry significant volumes of traffic and their intersection is traffic signal controlled.

This intersection was ranked #104 in the Massachusetts Highway Department Top 200 list of high-crash intersections in the state from 2004-2006. In 2009, the Merrimack Valley Planning Commission completed a traffic study of the intersection to identify what factors might be contributing to this high crash frequency. This study found that both Massachusetts Avenue approaches to the intersection function at LOS D during the PM peak travel period. To address this issue, MVPC recommended that Route 125 be widened to provide a five lane cross section with opposing left turn lanes. Improvements to this intersection are now being designed by MassDOT.

Recommendations From 2007 RTP and 2011 status:

1. Implement I-93 Corridor Study recommended improvements. As of 2011, the Lowell Junction Interchange project component is in the environmental review/preliminary design process. The I-93 add-a-lane project component has been incorporated into the overall interchange project as well and the scope of the project has been revised to include the widening of the highway throughout the MVPC region. The MVPC is also pursuing funding to conduct a Bus-on-Shoulder feasibility study to determine whether this option could be used to improve the performance and reliability of transit services in the corridor.

2. Monitor status of the following ongoing traffic studies and implement their recommendations:

   - **I-93 Corridor Transit Investment Study**. *See 1, above.*
   - **MA-110 / MA-113 Rotary Study**. The MassDOT has completed the FEIR for this project and is constructing several short-term improvements. Consultant is designing long-term improvements. Permitting activities are underway.
   - **I-495 Corridor Study**. The MassDOT has completed the Study, including recommended short-term and long-term improvements. The MassDOT, MVMPO and NMMPO will jointly determine next steps.
   - **Route 114 Corridor Study**. MVPC has completed the Draft Final Report, including recommendations for improvements at specific locations.
   - **Haverhill Main Street Intersection Analysis**. The MVMPO approved this project for federal Highway Safety Improvement Program (HSIP) funds. The MassDOT and the City have reviewed two project concepts. MassDOT is preparing preliminary designs.
   - **Route 286 Corridor Study**. The MassDOT has prepared plans, specifications and cost estimates for geometry and signalization improvements at four intersections. As of 2011, the project is ready for programming.

3. Initiate studies of the following intersections and roadways:

   a. **Route 213 in Methuen**. *The MVPC continues to monitor this roadway's operations, has implemented modifications to a portion of the I-93 / MA-213 / Pelham Street interchange, and will review potential changes needed within the context of the I-93 Corridor add-a-lane and Bus-on-Shoulder projects.*

SECTION II

CONGESTION IDENTIFICATION PROCESS

PART B - TRANSIT FACILITIES

Transit Overview

The MVMPO region is served by both public and private sector transit services. These services include local and long distance bus routes; employer-supported shuttles; elderly and disabled services; Jobs Access Reverse Commute transportation, taxi services; MBTA commuter rail services that link the region to Boston, and Amtrak Boston, MA – Portland, ME intercity service.

Updates for the above recommended projects and information for additional congestion projects are found in the remainder of this MVCMS.

MVRTA

The MVRTA was established on October 11, 1974 to provide local fixed route bus service within the greater Lawrence and Haverhill areas. Since its inception, the MVRTA has expanded its operations to include:

- 18 local routes
- 3 intercity routes (Newburyport / Haverhill; Haverhill / Lawrence, and Lawrence / Lowell)
- 1 seasonal route (Lawrence – Hampton Beach)
- 2 weekday employment routes during peak hours (Haverhill and Lawrence MVRTA stations to major employers, i.e. Raytheon and IRS in Andover)
- EZ Trans shared-ride van service for seniors and persons with disabilities
- Ring and Ride flexible services in Boxford, Georgetown, Groveland, Methuen, Newbury, and West Newbury
- Commuter bus to / from Boston. The MVTRA assumed operation of the Boston commuter bus route on January 6, 2003 following Trombly Bus Lines' discontinuation of this service, because: 1) the route was well patronized; 2) there was a need for commuter bus services in the congested I-93 corridor to points in Boston other than the North Station area, and 3) the service had potential to develop additional ridership.

Fixed Route Bus System

The MVRTA is the primary provider of public transportation in the MVMPO region. The MVRTA service district corresponds to the MVPC region, which consists of the fifteen cities and towns listed below. However, not all MVPC communities choose to receive MVRTA services. The MVRTA now provides year-round local fixed route bus service to the communities of Amesbury, Andover, Haverhill, Lawrence, Merrimac, Methuen, Newburyport, North Andover, and Salisbury. The fixed route system predominantly serves the region's two largest communities, Lawrence and Haverhill (see MVRTA bus system map on the following page).

In Lawrence, all MVRTA buses originate at the Buckley Transportation Center, which is centrally located on Common Street in the downtown section of the city. Ten local fixed routes operate within greater Lawrence serving major shopping centers, hospitals and medical facilities, city government offices, schools, the McGovern Transportation Center and residential apartment complexes. Additionally, intercity routes operate between Lawrence and Haverhill (Route 01 with transfer to Route 51), Lawrence and Lowell (Route 41), and Lawrence and Salisbury Beach as well as Hampton Beach (Route 83) during summer months.

Buckley Transportation Center

In Haverhill, all MVRTA buses originate at the Washington Square Transit Station, which is currently located in the downtown section of the city[1]. Six local fixed routes operate within the city of Haverhill serving the two MBTA commuter rail stations, shopping plazas, social service agencies, and the public library. Additionally, intercity routes operate between Haverhill and Lawrence (Route 01), Haverhill and Newburyport (Route 51), and Haverhill and Salisbury Beach/Hampton Beach (Route 83) during the summer months.

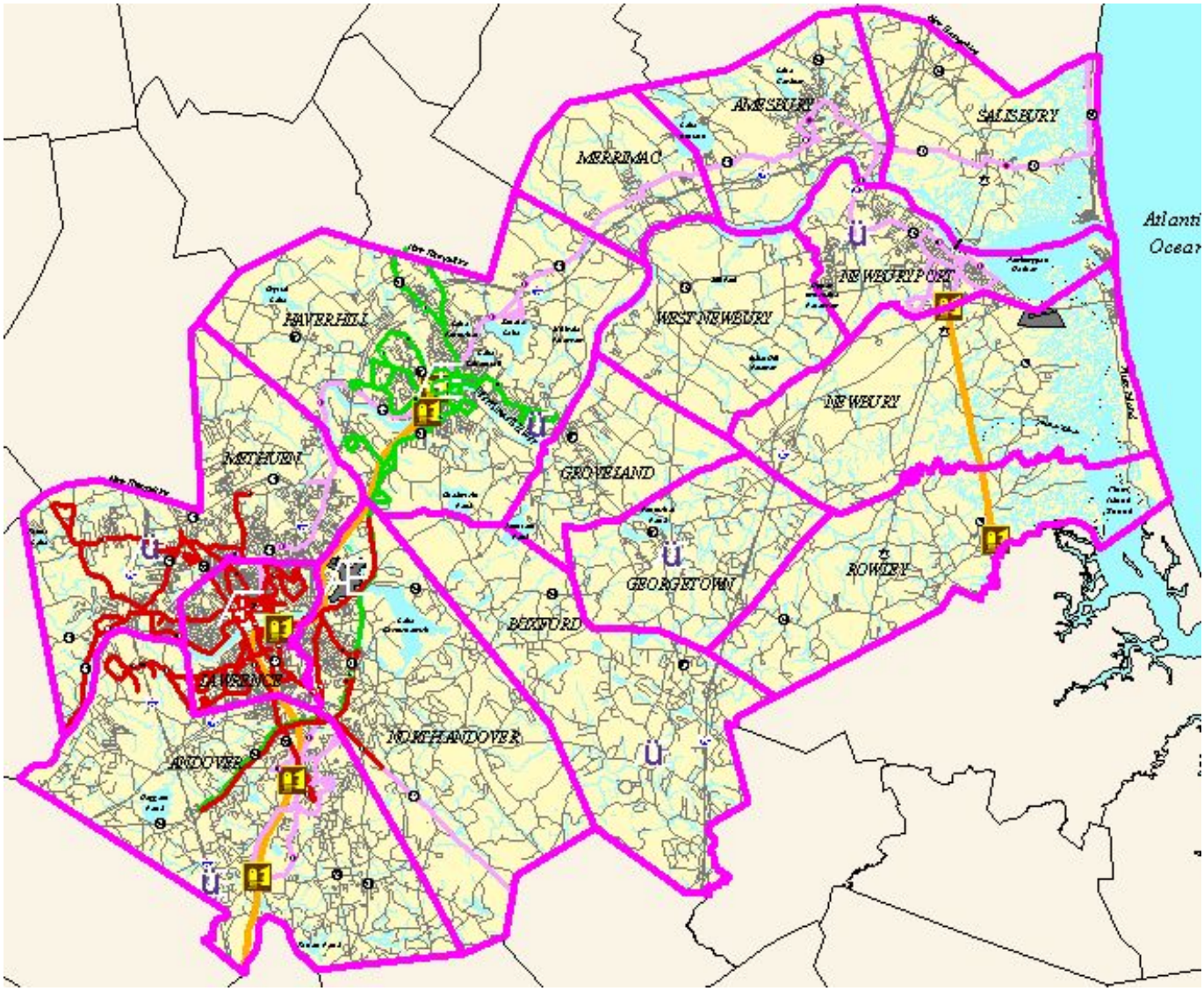
[1] The MVRTA has begun preliminary design for the possible relocation of this transit station to a site on Essex Street near the existing commuter rail station and planned downtown Intermodal Center.

Haverhill Transit Center

The MVRTA also operates special employment shuttle services (Routes 72 and 73); a "Call & Commute" transit shuttle service to / from the Lowell Junction area; "Ring and Ride" advance request transit service in Andover, Boxford, Georgetown, Groveland, Salisbury, West Methuen, and West Newbury, and "EZ Trans" special transportation services for the elderly and disabled.

The MVRTA is initiating a new Jobs Access Reverse Commute (JARC) – funded fixed-route bus service in the eastern sub-region communities of Amesbury, Newburyport and Salisbury. This service is funded as a pilot project for FYs 2011-2013 and will link to the MBTA Commuter Rail network at Newburyport Station. Service is scheduled to begin in June 2011.

MAP II-6
MVRTA Fixed Route System Map



MVRTA fixed route bus services operate on a Monday - Saturday schedule, with no Sunday or holiday service. Hours of operation vary by type of route and location. Lawrence-based routes typically begin weekday operations at 5:00 a.m. with service ending at 8:00 p.m.; Saturday bus services begin at 7:00 a.m. and operate until 7:00 p.m. Haverhill-based routes begin weekday operation at 5:30 a.m. and operate until 6:30 p.m.; Saturday services begin at 8:00 a.m. and run until 5:00 p.m. Service frequencies vary by route, with all Lawrence-based routes operating every 25 minutes in peak hours on weekdays and every 45 minutes on Saturdays, and Haverhill-based routes operating every 60 minutes on weekdays and every 80 minutes on Saturdays. MVRTA initiated the shorter bus headways on Saturdays for Lawrence-based routes on November 5, 2005 and changed weekday headways on April 3, 2006 in response to customers' requests. Table IV-8 below shows the MVRTA's fixed route system hours of operation and sample headways for its key routes.

The MVRTA has modified some of its Lawrence-based fixed route bus schedules to address the impacts of various bridge construction projects in Lawrence's downtown. The modifications allow for thirty-minute bus headways during peak travel periods and hourly service during off-peak periods. These changes became effective in July 2009 and remain in effect as of Spring 2011.

MVRTA Fixed Route Bus System Ridership

Chart IV-1 below shows the MVRTA's fixed route system ridership totals for FYs 2000-2010. It should be noted that there have been a number of changes to the fixed route bus system during the period. Table II-3 below shows that MVRTA's fixed route system ridership has grown steadily since FY 2000. Between FYs 2001 and 2009, fixed route ridership has increased by 86.5% overall and approximately 7.2% annually. However, much of the increase occurred in FY 2008 when the headways (i.e. time between buses) was reduced on the Haverhill and Lawrence subsystems. Ridership in FY 2010 dropped by almost 18% from 2,562,437 to 2,112,018. Much of this is due to the changes in the schedule that were made in July 2009.

Although the MVRTA fixed route bus system consists of numerous local and intercity routes, and special employment shuttles, two routes collectively account for over one-quarter of the system's total annual ridership. Route 01, which travels between Haverhill, Methuen, and Lawrence; and Route 41, which operates between Lawrence and Lowell, are the two most heavily patronized routes on the fixed route system. In 2000, these routes accounted for 24.4% of the total annual ridership. By 2003, this number had increased to 27.25% and in FY 2006 was about the same at 26.72%. In FY 2010, these two routes constituted 28.81% of total annual ridership. Route 39B (Phillips Street) in Lawrence carries the most passengers among the Lawrence-based local bus routes, with 184,256 riders in FY 2010. This constitutes just over 16% of Lawrence-based ridership. Among the Haverhill-based local routes, Route 13 (Main Street) is the most heavily traveled bus route, carrying over 28% of all Haverhill-based local ridership in FY 2010.

Table II-3
MVRTA Fixed Route Bus Ridership by Route, Commonwealth Fiscal Years 2002-2010

Route #	FY-02	FY-03	FY-04	FY-05	FY-06	FY-07	FY-08	FY-09	FY-10
01 Lawrence / NECC	199,357	225,158	263,223	270,284	301,143	328,794	406,551	431,173	359,399
13 Main St / North Avenue	36,830	37,000	40,388	42,622	42,933	38,146	43,383	46,743	46,281
14 Ward Hill	15,893	17,913	19,493	24,944	26,284	25,087	27,014	28,005	25,653
15 Hilldale Avenue	38,174	46,345	35,801	42,239	47,773	42,450	40,297	37,000	25,553
16 Washington Street	30,754	35,677	26,694	30,062	32,967	31,774	34,454	36,572	30,727
18 Riverside	30,057	28,497	28,201	31,735	33,911	31,346	35,203	36,348	33,494
19 Summer Street	21,128	19,728	18,279	17,526	17,384	16,667	22,392	21,141	76
21 Andover Shuttle	24,570	22,377	22,458	28,293	28,119	16,992	28,576	23,433	19,622
22 Ballardvale	7,584	X	X	X	X	X	X	X	X
29 Lawrence Intown	11,405	X	X	X	X	X	X	X	X
32 Andover	84,188	89,906	96,991	108,604	117,279	133,370	127,615	139,929	118,809
33 North Andover	40,280	35,938	48,444	53,044	54,610	74,069	92,816	93,853	81,976
34 Prospect Hill	57,469	72,544	97,693	99,830	116,808	127,227	137,629	155,740	107,475
35 Water Street	56,325	59,165	54,544	66,859	95,808	127,664	147,221	145,955	123,695
36 Holy Family	53,499	57,984	61,027	61,987	73,874	83,620	111,376	156,131	134,357
37 Beacon Street	85,299	102,246	122,843	122,976	143,321	153,732	171,627	178,822	129,051
38 Hampshire Street	46,905	51,874	55,507	59,608	71,550	82,917	103,711	168	
39A Colonial Heights	73,209	75,231	84,042	87,168	101,458	113,835	135,981	134,104	155,201
39B Philips Street	96,848	130,176	130,986	159,444	176,848	200,807	281,781	303,202	184,256
40 Methuen Square	58,962	72,705	80,419	88,086	98,574	107,551	135,904	144,275	116,126
41 Lawrence / Lowell	163,472	180,988	189,856	200,121	217,864	228,603	263,607	290,460	248,971
42 The Loop / W. Methuen	6,822	X	X	X	X	X	X	X	X
51 Haverhill / Newburyport	98,513	107,325	113,534	119,135	130,863	127,317	125,342	142,167	148,700
52 Amesbury / Newburyport	8,398	X	X	X	X	X	X	X	X
53 Commuter Rail Shuttle	5,581	9,679	X	X	X	X	X	X	X
Haverhill Employment	8,445	3,650	2,674	3,117	2,239	1,750	2,573	3,191	1,358
Lawrence Employment	6,968	5,343	5,276	5,027	6,172	5,691	7,034	9,424	17,597
83 Beach Bus	4,506	2,968	3,806	4,418	4,493	4,013	4,774	4,601	3,607
84 Liberty Tree Mall	2,375	X	X	X	X	X	X	X	X
TOTALS	**1,373,816**	**1,490,417**	**1,602,179**	**1,727,129**	**1,942,275**	**2,103,422**	**2,486,861**	**2,562,437**	**2,112,018**

X- Service combined with other routes, converted to Ring-and-Ride, or Discontinued (Deleted)
Source: MVRTA, 05/05/11 Final Draft FFY 2012 Budget

MVRTA Boston Commuter Bus

On January 6, 2003 the MVTRA assumed operation of a Boston commuter bus route when Trombly Bus Lines of North Andover discontinued its daily service. The MVRTA chose to continue this service, as: 1) there were a sizeable number of riders; 2) there was a need to provide bus service in the congested I-93 corridor to points in Boston other than to the North Station area, and 3) there was identified potential to attract additional riders to the service. The MVRTA operated it as a four-trip per weekday schedule, and increased it to a six-trip weekday schedule on October 24, 2005 to accommodate increased ridership.

Private Commuter Bus

The Coach Company (www.coachco.com) of Plaistow, NH operates daily commuter bus service between the central and eastern sections of the MVMPO region and Boston. This company serves the communities of Boxford, Georgetown, Groveland, Haverhill, Newburyport, and Newbury via two routes. One originates in Haverhill with stops in Groveland, Georgetown and Boxford (two trips each way on weekdays), while the second route originates in downtown Newburyport, stops at the Newburyport park-and-ride lot, and then proceeds directly to Boston (eight trips each way on weekdays).

C&J Trailways of Portsmouth, NH also operates commuter bus service from the eastern MVMPO region to downtown Boston and Logan Airport. Frequent service is provided from the Newburyport park-and-ride lot located adjacent to the I-95 / MA-113 interchange. Peak hour headways from Newburyport (AM) and Boston (PM) are less than 30 minutes.

MBTA Commuter Rail

The MBTA is the regional transit operating agency for the Boston metropolitan area and provides commuter rail services to the MVMPO region through a contract with the Massachusetts Bay Commuter Rail Company (MBCR). The MBTA operates two services in the MVMPO region: the Newburyport Line, with two stations and the Haverhill Line, with five stations. It operates these services over rights-of-way developed by the former Boston and Maine Railroad; the MBTA owns segments of these rights-of-way that it uses for its operations.

MBTA Commuter Rail Ridership

Total MBTA Commuter Rail ridership in the MVMPO region has grown significantly over the last twenty years (see Chart I-2). This growth is attributable to five actions. First, the MBTA (and more recently, the New England Passenger Rail Authority or NNEPRA) has made significant investments in track and rolling stock upgrades. Second, the MBTA and the MVRTA have jointly invested significant funding for improvements to the region's commuter rail stations. In particular, the Haverhill, Bradford and Lawrence commuter rail stations are evidence of these improvements. Third, the region's commuter rail service has been upgraded with additional trains operating to and from Boston. Fourth, the reinstitution of service from Newburyport and Rowley in 1998 resulted in a marked ridership increase between 1996 and 1999. Finally, the region added more residents, plus there were more residents commuting to work in Boston during this period.

However, ridership has shown limited growth over the last nine years (see Chart I-2 above). The 2000-2009 increase in boardings per day was 17.56%, which translates to an annual increase rate of 1.81%. Table 4 shows the approximate weekday inbound (toward Boston) boardings by station for the years 1999 through 2009.

Table II-4 Commuter Rail
Approximate Weekday Inbound Boardings By Station, 2000-2009

Station	Number of Boardings Per Day									
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Haverhill	311	490	537	507	489	669	533	543		435
Bradford	409	461	337	324	344	369	410	445		339
Lawrence	436	593	515	524	597	606	698	667		*618*
Andover	573	651	617	638	644	673	633	614		495
Ballardvale	251	296	300	303	305	198	304	326		307
Subtotal	*1,980*	*2,491*	*2,306*	*2,296*	*2,379*	*2,515*	*2,578*	*2,595*		*2,194*
Newburyport	719	652	697	N/A	739	624	653	746	732	609
Rowley	115	156	135	156	140	135	199	179	146	147
Subtotal	*834*	*808*	*832*	*156*	*879*	*759*	*852*	*925*	*878*	*756*
Total Regional Boardings	*2,814*	*3,299*	*3,138*	*2,452*	*3,258*	*3,274*	*3,430*	*3,520*		*2,950*

Data from Massachusetts Bay Transportation Authority commuter rail ridership audits, 2000-2009

AMTRAK – Boston, MA to Portland, ME Passenger Rail Service

After years of planning during the 1990's the MaineDOT, in conjunction with Amtrak and NNEPRA introduced the Downeaster, a new passenger rail service between Boston, MA and Portland, ME. The Downeaster originates at Boston's North Station with stops in MA (Anderson Transportation Center in Woburn, Downtown Haverhill); stops in NH (Exeter, Dover, Durham-University of New Hampshire), and stops in Maine (Wells, Saco, Old Orchard Beach). Downeaster service currently terminates at the Portland, ME Transportation Center. The Downeaster follows the former Boston and Maine Railroad's Western Division right-of-way. Prior to startup of service, significant capital improvements were made along the PanAm Railways' – owned route segments to ensure the reliability of the interstate passenger rail service.

The Downeaster began operations in December 2001. It carried 291,794 passengers in FFY 2002 with strong ridership in evidence during the first eight months of that year. However, ridership began to decline in the fall of 2002 and continued to decline during 2003, 2004 (248,571) and early 2005. This trend reversed in May 2005 and rose to 293,653 – approximately the ridership figure for 2002. Much of this increase was attributable to rising gasoline costs, but some of the ridership gains resulted from a Portland-Boston running time reduction (2 hours 45 minutes to 2 hours 30 minutes). Ridership continued to increase in 2006 and 2007 to 341,418 and 381,880 passengers, respectively. This growth in ridership prompted NNEPRA to add a fifth inbound train to the schedule in August 2007. FY 2008 ridership again rose 26.5% to 474,492, attributed as in 2005 to gasoline price increases. In response, NNEPRA added an additional coach on all trains in April 2008. Ridership gains continued in FFYs 2009 (460,474) and 2010 (478,463).

Downeaster boardings in Haverhill for FYs 08-10 are remarkably consistent: 36,050 (2008); 36,159 (2009), and 36,460 (2010). Over the years, approximately 5% of all trips made on the Downeaster are made by persons who either board inbound trains in Haverhill and travel to Boston or board outbound trains in Boston and get off in Haverhill.

The Downeaster's substantial ridership increases in recent years have generated passenger capacity problems on some of the busiest trains. It has been reported that the early train departing Portland (#680) is often full by the time that it gets to Haverhill, while the #685 train leaving from North Station at 5:00 p.m. is often at 95% or more of capacity. NNEPRA is considering such options as adding another train to the schedule and/or adding another car to all trains.

NEPRA's service planning and capital investment work is focused upon generating additional travel time reductions, which is expected to attract additional ridership. For example, if implemented the proposed Merrimack River Bridge Rehabilitation Project is expected to reduce trip times by 2 minutes; the ARRA-funded track and signal work is expected to further reduce travel times by five minutes and make it feasible to add service. Downeaster service will also benefit from the addition of a second track along the Haverhill Main Line between the Lawrence Rail Yards and Lowell Junction. NNEPRA estimates that about two thirds of all delays to Downeaster trains are caused by the problems with the Merrimack River Bridge and the operational issues associated with having only one track available between Lawrence and the MBTA's Lowell line.

It is anticipated that ridership will continue to rise in conjunction with higher fuel prices being experienced in 2011 and with the opening of extended Downeaster service north of Portland to Freeport and Brunswick in 2012. In addition, NNEPRA has proposed track improvements between Portland and Plaistow, NH to allow increased operating speeds and an increase from five to seven daily trips, which if implemented may add additional ridership.

Table II-5

AMTRAK Downeaster Ridership
January 2002 - June 2011

Month	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
January	20,235	15,790	17,182	17,363	23,387	24,224	29,869	32,148	31,630	34,822
February	25,824	17,498	20,694	18,581	25,487	26,070	35,509	32,220	33,958	35,927
March	25,119	18,502	20,962	20,733	26,817	29,259	36,778	35,362	37,358	42,826
April	29,628	23,315	23,659	23,109	30,075	28,867	42,810	41,018	42,786	48,101
May	24,039	22,320	20,383	22,158	27,183	28,624	39,120	35,445	38,879	42,543
June	25,704	24,021	21,061	23,961	28,568	28,784	41,690	37,927	43,365	45,699
July	29,683	24,512	17,050	26,967	31,783	36,248	48,438	47,441	47,173	
August	30,714	28,127	23,979	28,678	33,413	37,857	50,854	46,903	48,841	
September	20,118	19,215	20,557	30,372	29,412	36,471	43,955	38,086	40,823	
October	21,916	22,185	22,615	28,557	27,817	36,162	44,429	41,072	41,891	
November	19,501	21,275	19,860	27,479	29,155	35,074	39,818	37,379	40,434	
December	19,313	21,041	20,569	25,695	28,321	34,240	29,677	35,201	40,906	
TOTAL	**291,794**	**257,801**	**248,571**	**293,653**	**341,418**	**381,880**	**482,947**	**460,202**	**488,044**	**249,918**

Transit Congestion Screening

Fixed Route Bus Congestion Screening

There are certain times throughout the day when a few routes have standees on the bus. The "Regular Route Service" times with standees all occur on Route 39B which connects the Buckley Transit Station in Lawrence to the North Andover Mall. This route generally has standees going from Lawrence to the North Andover Mall at 7:55 a.m. and 11:15 a.m. and going from the North Andover Mall to Lawrence at 3:15 p.m.

An extra bus, or "Tripper Service" is automatically run for several trips throughout the system to accommodate overflow passengers from a single bus. The routes with daily "Tripper Service" are:

- The 3:30 p.m. Route 37 from Buckley Transit Station to Plaza 114;
- The 7:45 a.m. Route 37 inbound from Andover Street to Plaza 114;
- The 4:00 p.m. Route 39B inbound from the North Andover Mall;
- The 1:15 p.m. Route 15 from the Haverhill Transit Station to Haverhill High School;
- The 5:40 a.m. Route 16 from Westgate Plaza to the Haverhill Transit Station, and
- The 7:20 a.m. Route 1 from Buckley to Northern Essex Community College (NECC).

Overall, the MVRTA fixed route services meet regional travel demands. Congested conditions do occur, especially on Route 39B, which connects the Lawrence Transit Station with the North Andover Mall, and Route 1, an intercity route that connects with many other routes at the Buckley Center in Lawrence and the Washington Square Transit Center in Haverhill. At the same time, the Route 1 provides service to the Loop (a major retail center), and surrounding major retailers in Methuen. At times when this route may reach capacity, such as the holiday shopping season, the MVRTA adds a second bus to alleviate the congestion.

MVRTA Boston Commuter Bus

The MVRTA Commuter Bus service from the western side of the region is at or above the 48-seat capacity on the 5:00 p.m. trip from Boston most days, with three or four standees at least two days per week. 50%-70% of the seats are occupied most days on the other trips for this route.

Commuter Rail Service

The MBTA's Commuter Rail operations have progressively improved and overall system ridership has grown. However, two issues have hindered further system expansions. The first and most significant issue is 'double-tracking' or the presence of two parallel tracks within a given right of way, with interlockings and signal equipment that permit trains traveling in the same right-of-way to pass each other. Areas of the system, specifically south of Lawrence on the Haverhill Line, contain sections of single track. Trains operating on the single track must wait on a passing track or along a double-tracked section for the train running in the opposite direction to pass before proceeding on the same track. This wait time increases total travel time. Additionally, greatly reduces scheduling flexibility and restricts train capacity resulting in fewer trains operating the full length of the rail line. This lack of capacity was cited as a critical shortcoming to improving rail service in the MVMPO region in MVPC's I-93 Corridor Study.

The impact of limited commuter rail service on the region is visible at the region's commuter rail lots. While most commuter rail parking lots on the MBTA system are at or over capacity, more than half of the lots in the MVPC region are sparsely used. The difference is that the number of trains serving both Newburyport and Haverhill is less than is offered on the other lines in the MBTA commuter rail network.

The second issue is overcrowding on MBTA commuter trains system–wide. The MBTA conducts a continuous service planning process that employs a set of Board-approved performance standards. Its Service Delivery Policy, updated through 2010, details vehicle loading standards for its commuter rail services. Particular to capacity, the MBTA standard for congestion is determined by the ratio of boarding passengers to seated capacity. As follows:

- Early AM, AM Peak, Midday School & PM Peak: 110%
- Midday Base, Evening, Late Evening, Night/Sunrise and Weekends: 100%

Many riders must stand either inbound in the morning or outbound in the afternoon. The lack of rolling stock in the system limits ridership during peak periods.

SECTION II
CONGESTION SCREENING PROCESS

PART C
PARKING FACILITIES

Parking Screening

Parking Screening for the park-and-ride and commuter rail lots in the region is based upon facility utilization. Each lot' is sampled on a regular basis and the number of occupied parking spaces is noted. This is then compared to the total number of parking spaces available.

Commuter Park-and-Ride Facilities

The MVMPO region's intermodal transportation facilities chiefly consist of park-and-ride lots. These lots are meeting places where travelers can carpool, vanpool, take a bus or train to work or to other destinations. There are four MassDOT park-and-ride lots located near major regional highways: near I-93 in Andover and Methuen, and near I-95 in Georgetown and Newburyport. An additional Haverhill park-and-ride lot on MA-113 operates from an existing shopping plaza lot just west of the Bates Bridge. The park-and-ride lots in Methuen, Haverhill, Newburyport and Georgetown also offer fixed route bus services to Boston. In addition to fixed route service, MassRIDES vans have been observed using the Newburyport park-and-ride facility.

There are also seven park-and-ride lots at MBTA commuter rail stations in the region. The MBTA Haverhill Line has stations and parking lots in Haverhill, Bradford, Lawrence, Andover and Ballardvale, and the MBTA Newburyport Line has stations and parking lots in Newburyport and Rowley. More information about the location and usage of the commuter rail lots can be found in the MBTA Commuter Rail Parking section of this report.

The MVPC conducted park-and-ride lot surveys informing this MVCMS in November 2006 and November – December 2010.

TABLE II-6
SCREENING OF PARK AND RIDE FACILITIES

Location	Town	Spaces	2006 Usage	2006 Cars/ Spaces	2010 Usage	2010 Cars /Spaces
I-95 / MA-113	Newburyport	489	576	117%	600	130%
I-93 / Dascomb Road	Andover	75	103	130%	43	28%
MA-133 / Library Street	Georgetown	100	37	37%	54	54%
I-93 / Pelham Street / Mystic Street	Methuen	177	92	52%	86	49%

Newburyport

Newburyport Park and Ride Lot

The Newburyport park-and-ride lot is located just east of the I-95 northbound on-ramp from Storey Avenue (MA-113). At 489 spaces, it is currently the region's largest park-and-ride lot. MassHighway has expanded it several times to accommodate numerous illegally-parked vehicles. However, demand has continued to exceed capacity.

In September 2004 the MVPC staff observed 506 parked cars (above 100% capacity) at the lot. The MVPC conducted a second, more extensive lot survey in October 2006 for the former EOTC to determine how the lot was being used by long-term parking customers. Notably, the Coach Company (Coachco.com) and C & J Trailways (CJTrailways.com) provide Boston express bus service to / from the site. MVPC collected lot use data over a one-week period and found that long-term parkers were using a significant percentage of the spaces in the lot. Staff also noted the extensive use of valet parking at the lot to increase capacity. Subsequent MVPC November 2006 surveys counted 576 cars, or 117% of capacity (2006) and 600 cars, or 130% of capacity (2010). MassDOT is adding 106 spaces that will be available for use in Summer 2011.

Georgetown

Georgetown Park and Ride Lot

The Georgetown park-and-ride lot is located directly off of MA-133 just east (100 yards) of Georgetown Square. The lot connects to both MA-133 on the north and Library Street on the south. Private residents abut the lot to the east and west. It has a capacity of 100 cars. The Coach Company (Coachco.com) provides commuter service to Boston from this location. MVPC finds that parking demand at this facility is variable. It is often used by students from the nearby high school.

MVPC staff observed 37 cars parked at the lot in November 2006, and 54 in September 2010. Given the Georgetown lot's limited size and high parking demand at the Storey Avenue park-and-ride lot in Newburyport, plus the lack of other park and ride options in the I-95 corridor, MassDOT has initiated a project to construct a larger park and ride facility just off MA-133 near the I-95 interchange. This lot would be served by transit and thereby greatly improve transit and ride sharing options for Residents of Georgetown, rowley and Newbury.

Andover

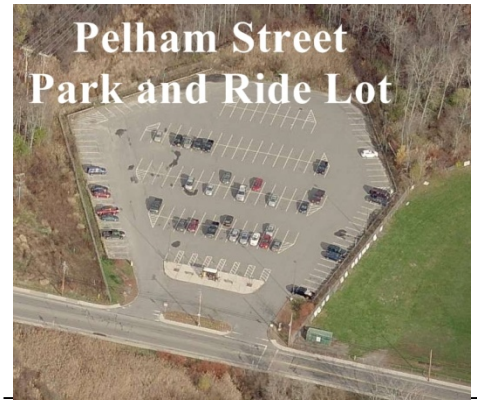
Dascomb Road Park and Ride Lot

The MassDOT Andover park-and-ride facility is located at the northwest corner of the I-93 / Dascomb Road interchange. It is bordered by Frontage Road to the west, the Frontage Road on-ramp to I-93 SB to the north, I-93 to the east, and Dascomb Road to the south. Access to the site is from Frontage Road northbound. This lot had a capacity of 75 cars. The lot was well over capacity in both 2004 and 2006, with 13 cars parked in unmarked places and 15 cars parked on the grass and dirt on the edge of the lot for a total of 103 cars parked in 2006. There was no bus service from this site, and the lot has historically been in poor condition, with no lighting, no visible pavement markings and a deteriorated parking surface. MassDOT in FFY 2010 reconstructed this facility, adding 80 spaces at its northern end with lighting, pavement markings and other amenities. MVPC counted 43 vehicles parked at this facility in November 2010.

Haverhill

A shopping plaza (Rivers Edge Plaza) with excess parking serves as a designated park-and-ride lot in Haverhill off of MA-97 / MA-113 near the Bates Bridge. The Coach Company (Coachco.com) offers bus service to Boston from this site. MVPC finds that this facility is consistently underutilized because: 1) the parking lot is in poor condition and spaces have not been allocated specifically for use by park-and-ride users; 2) there are no signs on local streets or regional roadways guiding people to this location, and 3) while bus service is offered from this location, it is limited. The MVPC counted 0 vehicles at this facility which could be attributed to park-and-ride patrons.

Methuen



This 177-space park-and-ride lot is located on Pelham Street just east of I-93. It was constructed in 2000 using federal CMAQ funds, and was intended to serve the commuter population that uses nearby Route I-93 to travel to Greater Boston and businesses along MA-128. The MVRTA (MVRTA.com) provides bus service from this lot along with three stops in Lawrence and three stops in Andover along MA-28 to several destinations in the City of Boston. In 2003 and in November 2006, the MVPC observed that 92 cars were parked at the lot,

representing approximately 51% of capacity. The MVPC November 2010 survey found 86 cars parked at the lot, 48% of the lot's capacity. One possible reason for this slight decrease in the usage of this lot is the opening of the Park and Ride Facility at Exit 2 on I-93 in Salem, New Hampshire. Boston Express operates frequent bus service between this new station and downtown Boston and Logan Airport (19 weekday inbound; buses, 18 weekday outbound buses). An MVPC count conducted in 2010 showed that 17 Massachusetts cars were parked at this new facility.

MassDOT Park-and-Ride Lot Recommendations

The MassDOT expanded Andover's Dascomb Road and Newburyport's Storey Avenue lots in 2010 and 2011, respectively, to accommodate long-documented parking capacity shortages at both facilities. In addition, the MassDOT and its predecessor agencies have for many years planned to construct a new park-and-ride lot in Georgetown, just west of I-95 Exit 55. The Georgetown facility has been planned as a result of the magnitude of the demand at the Newburyport facility and the observed lack of park-and-ride opportunities along I-95 north of Boston. It has been approved by the MassDOT Highway Division's Project Review Committee and is in preliminary design.

Commuter Rail Parking

All MBTA Commuter Rail stations in the MVMPO region provide parking (rate per day is $4.00) and handicapped-accessible commuter parking. The following table shows parking capacity, utilization, available spaces and utilization as a percentage of total capacity for each facility:

Table II-7
MBTA Commuter Rail Stations
Parking Space Utilization Rates

Commuter Rail Lots:	Town	Spaces	2006 Usage	2006 Cars/ Spaces	2008 Usage	2008 Cars / Spaces	2010 Usage	2010 Cars /Spaces
Haverhill	Haverhill	159	155	97.5%	119	74.8%	74	46.5%
Bradford	Bradford	303	126	41.6%	149	49.2%	65	21.5%
Lawrence	Lawrence	400	296	74.0%	371	92.8%	375	93.8%
Andover	Andover	146	152	104%	161	110%	88	60.3%
Ballardvale	Andover	115	129	112%	107	89.2%	73	63.5%
Newburyport	Newburyport	801	347	43.3%	312	39.0%	269	33.0%
Rowley	Rowley	282	49	17.4%	70	24.8%	42	14.9%

The above table shows that none of the MBTA Commuter Rail parking lots in the MVPC region were operating at or over capacity when surveyed in September 2010. This is a marked change from previous years, when MVPC observed that several lots routinely operated above capacity, most others were well utilized, and only a few were underutilized. Lower utilization of the region's MBTA Commuter Rail parking lots since 2008 can be attributed to several factors: 1) the national recession that commenced in 2008; 2) an increase in parking fees from $3.00 to $4.00, and 3) changing business practices, (i.e. workplace relocations, increased telework, use of private shuttles).

Some of the most striking changes in lot utilization were found at facilities with historically high parking demand. For example, Andover Station parking utilization dropped from 100% in 2008 to 60% in 2010. At the Ballardvale lot, parking utilization in 2008 was at 107.5% of capacity, and observed at 63% in 2010. Parking utilization at Haverhill Station, which in 2008 was at virtual capacity (155 of 159 spaces occupied), was observed to be 74 cars, or 47% in 2010. This decline may in part be the result of FFY 2011 construction work on the adjacent, new 315-space MVRTA

parking garage. This facility will open in Summer 2012 for use by MBTA Commuter Rail customers; adjacent residents / businesses, and visitors.

McGovern Transportation Center in Lawrence

By contrast, the McGovern Intermodal Transportation Center in Lawrence, which opened in late 2005, was operating at close to capacity in 2010 - approximately double the 2003 utilization rate for the former station's surface lot further east on Merrimack Street. Notably, a portion of this parking demand derived from nearby businesses that lease spaces for employee parking'

Rowley Commuter Rail Station

Parking utilization remained low at a few of the region's MBTA Commuter Rail facilities. The Rowley lot remained the most underutilized in the region, with an observed (2010) utilization rate of 15%, compared to an average weekday utilization rate in 2008 of 17.4%. The Bradford MBTA Commuter Rail Station also remained chronically underutilized. There are several reasons for this. First, the station is located in an isolated area on a street that is not well traveled. Second, station access is hampered by roadway capacity and sight distance problems at the intersection of Railroad Avenue and South Elm Street. Third, customers have avoided using this lot due to concerns for vehicle security. Fourth, direct access from downtown Haverhill via the Comeau Bridge was disrupted during its reconstruction; restoration of this connection several years ago has not made an appreciable difference.

MBTA Commuter Rail Parking Lot Recommendations

Congestion problems have been documented over the years at MBTA Commuter rail lots in Andover, Haverhill, and Ballardvale. In 2006, the Andover lot had 1.0 cars per space. The Lawrence lot was near capacity, with 0.9 cars per space followed by Ballardvale at 0.79 cars

per space and 0.76 cars per space in Haverhill. MVPC believes that service improvements implemented at that time may have contributed to the congestion problems. In 2010, the situation is somewhat different as the national recession has contributed to a loss of employment (and commuters) since 2006. However, some commuters seeking to avoid high fuel prices in 2010 and 2011 have likely switched from driving to taking the train. MVPC's long-term goal is to continue monitoring: the first priority is to maximize use of existing capacity, and second to plan for expansions where they are needed.

SECTION II
IDENTIFICATION PROCESS

PART D
FREIGHT FACILITIES

The regional transportation network must facilitate efficient movement of people *and* goods. Local freight movements to and from area businesses are critically important to the region's economy. The region also is a critical link in the nation's freight network, as significant quantities of freight imports from / exports to Canada travel on I-495 or on PanAm Railways through the region.

Rail

The major freight rail provider in the Valley is Pan Am Railways. This carrier, formerly Guilford Rail Systems, is headquartered at Iron Horse Park in Billerica, MA. Pan Am Railways operates over a network of about 1,600 miles of track in Connecticut, Maine, Massachusetts, New Hampshire, New York, and Vermont. The company's system is made up primarily of the former Boston & Maine, Maine Central, and Springfield Terminal railroads.[2]

The paper industry provides the largest source of business to the railroad including inbound chemicals, clay and pulp3. Pan Am Railways also ships coal to MA and NH power plants.

Pan Am Railways has freight rights over the MBTA Haverhill Main Line. This line carries virtually all of the rail freight traffic between western MA and the remainder of the US to eastern NH, ME and the Canadian Maritimes provinces.

Pan Am has a rail yard located off Andover Street in Lawrence. This is a classification facility where train freight shipments are collected and distributed to regional customers. It serves the MVMPO region and much of northeastern MA.

Lawrence Industrial Park

Rail freight service to the Lawrence Industrial Park is provided by PanAm Railways through its Lawrence Yard to its rail spur track which runs at-grade through South Lawrence. For many years, Industrial Park rail freight customers have sought improved PanAm Railways service, while PanAm Railways and its predecessor corporations have sought to maintain rail freight operations at this location while reducing existing operating inefficiencies. MVPC staff in 2005 worked with the City of Lawrence, Industrial Park freight rail customers, and PanAm Railways to address these issues; the parties jointly recommended construction of a passing/storage siding along the rail spur track. If constructed, the siding would allow Pan Am Railways to reduce the number of train trips necessary to deliver full cars and pick up empty cars from the Park by 50%. This project was included in the MVMPO FFYs 2007-2010 Transportation Improvement Program; and the MVPC sought capital funding from the former EOT. MVPC is advised that the project will be constructed in FFYs 2011-2012, concurrent to the MBTA Haverhill Line double-track project.

[2] 2007 Hoover's, Inc. All rights reserved.
[3] *Ibid*

Lawrence Rail Yard

Highway

I-495 is a major truck route in the MVMPO region and in MA. A significant proportion of truck freight imports from / exports to Canada travel on I-495 through the region. Data collected for the I-495 Corridor Study showed that trucks comprise almost 20% of traffic sampled from a permanent count location in Amesbury; approximately 6-14% of a.m. peak period traffic, and 4-8% of p.m. peak period traffic FHWA estimates that MA freight movements will grow from 230,195,141 tons in 1998 to 399,087,626 tons in 2020, an increase of 76.6%. This is a much higher growth rate than what is expected for rail or other mode freight movements.

Under a previous transportation plan, the MVMPO surveyed its region's shippers and truck freight users to identify any impediments to truck traffic on the region's highway network. This survey identified 29 problem locations on the region's transportation network. Since that survey, many of these issues have been addressed through improvements or are being / have been addressed in traffic studies of the affected areas. Table I-7 below shows the problem locations and what actions have been taken to address them:

Table II-8
Freight Survey: Status of Issues

City/Town	Route #/ Street Name & Problem	Actions Taken
Andover	Rt 125 & Rt 114 Congestion	MA-114 Traffic Study Completed
Andover	I-93/I-495 Interchange Congestion	I-93; I-495 Traffic Studies Completed
Andover	Rt 28 Congestion	Main Street Reconstruction Project Completed
Andover	River Street in Ballardvale Truck Restrictions	I-93 Tri-Town Interchange Project Under Development
Andover	Rt 133 Bridge Height	Still an Issue
Andover	Shawsheen Road Bridge Height	Still an Issue
Andover	Central Street (Horn) Bridge Height	Still an Issue
Andover	Rt 28 Railroad Bridge Weight Restriction	Accelerated Bridge Program Project
Andover/Methuen	I-93 Congestion	I-93 Tri-Town Interchange Project Under Development
Groveland	Salem Street Road Conditions	Roadway Reconstructed
Haverhill	Rt 97 from I-495 North to Methuen Line	Roadway Resurfaced
Haverhill	Rt 97 / North Broadway Intersection	Still an Issue
Haverhill	Washington Street Road Width	Still an Issue
Haverhill/Plaistow	MA-125 Congestion	Studies completed
Lawrence	Merrimack St at Broadway Turning Radius	City design consultant engaged
Lawrence	Manchester Street Bridge Height	Still an Issue
Lawrence	Merrimack St Road Conditions	City design consultant engaged
Lawrence	Rt 28 at Andover St	Still an Issue
Methuen	Rt 28 through Methuen Square	Traffic Signals Installed
Methuen	Pelham St/Cross St/I-93	New Turn Lane to I-93 SB Built
Newburyport	I-95 Signage for Access to Industrial Park	Still an Issue
Newburyport	Plummer Ave, Jefferson St, Ashland St	Still an Issue
Newburyport	Rt 1 Signage	Still an Issue
Newburyport	Rt 1 Rotary Safety	Still an Issue
Newburyport	Rt 113 Congestion	Improvements made @ Low St.
Newburyport	Chain Bridge Weight Limit	Bridge Upgraded
North Andover	Rt 114 at Willow Industrial Park Congestion	MA-114 Traffic Study completed
Salisbury	I-495 South to I-95 North Connection	MA-110 Widening in progress
Salisbury	Rt 1 Railroad Bridge Alignment	Bridge and Abutments Removed

SECTION II
IDENTIFICATION PROCESS

PART E
FREIGHT FACILITIES – HIGHWAY ACCESS AND ECONOMIC DEVELOPMENT SCREENING

As noted above the MVMPO region's economic growth over the last thirty years is directly related to its three interstate highways. However, factors preventing a particular firm or a number of firms in an area from moving goods and raw materials easily between markets, or factors impacting employees' commute times can inhibit and even prevent the growth of existing firms and the development of entire areas. Listed below are several industrial or commercial locations in the region that have been widely perceived as having transportation access problems. In many cases, the problems are the result of capacity limitations on the surrounding roadway system.

Haverhill Hilldale Avenue

As discussed in other CMS sections, Hilldale Avenue connects downtown Haverhill with industrial and commercial sites in the vicinity of Fondi Drive. Hilldale Avenue also provides access to the Newark Street Industrial Area, located just west of the MBTA RR Tracks, which can be accessed from Rosemont Street. Hilldale Avenue intersects with Rosemont Street approximately .5 miles west of the intersection of Newark Street and Rosemont Street. This roadway is also used by industrial / commercial traffic to gain access to points in southern New Hampshire. The City of Haverhill improved Hilldale Avenue in 2006 and 2010. The City also participated with MassDOT in reconfiguring Lafayette Square to improve traffic flows and safety, which benefits traffic on Hilldale Avenue.

North Andover Willow Street Industrial Area Access

This industrial area is accessible to MA-114 and abuts the MA-125 Bypass. All traffic traveling to / from this area must enter and exit from the signalized intersection of Willow Street and MA-114. Traffic congestion on MA-114 between I-495 in Lawrence and Willow Street during peak travel periods makes access to this location difficult. Improvements recommended for Route 114 in the MVPC's Route 114 Corridor Traffic Study would reduce much of the peak period congestion at this intersection. Most notably, the corridor study recommends widening of Route 114 in this area to increase capacity and to basically develop a five-lane cross section for roadway between this intersection and the Route 114/Route 495 interchange in Lawrence.

Newburyport Industrial Area Access

Over the years, industrial development in the City east of I-95 has created congestion problems at intersections along the Storey Avenue (MA-113) and Low Street corridors. In response, the City initiated plans, specifications and engineering work to incorporate an abandoned section of I-95 into the existing roadway network. This project's purpose was to alleviate existing roadway congestion and to sustain further industrial growth in the area. The project's environmental impacts, coupled with market conditions and the potential for transfer of development rights, have led to the project's cancellation. However, in 2010 MassDOT reconfigured the intersection of Low Street and Route 113 to improve its overall Level of Service. Improvements included changes to the timing of the traffic signal and the provision of

additional intersection approach lanes. These changes have reduced congestion at this intersection.

Georgetown Industrial Area Access

All traffic traveling through this area previously followed a narrow road through a residential neighborhood. In particular, the intersection of the residential roadway (Tenney Street) with MA-133, the major connector to downtown Georgetown and Route I-95, was substandard. Its geometrics and traffic volumes on MA-133 presented both a safety and capacity problem. In particular, Tenney Street itself was extremely narrow and structurally unsuited to carry heavy loads. Community officials proposed that an access road be constructed from MA-133 to the industrial area on the east side of I-95 thereby removing the industrial traffic from the residential area and the problematic MA-133 / Tenney Street intersection. This roadway was completed in 2006. Improvements to the Tenney Street/Route 133 intersection were completed by the town in 2010.

Holt Road Area Access Road, North Andover

A sizable amount of heavy industrial development has occurred over the years in the section of North Andover north of Sutton Street and west of MA-125. This area includes Lawrence Airport, the NESWIC trash burning facility, the Greater Lawrence Sanitary Treatment facility, and a number of industrial uses off of Holt Road. These facilities generate a substantial amount of heavy truck traffic, which use Sutton Street and MA-125. Continued development of available industrial land in the area will further increase congestion at the key Sutton Street / MA-125 intersection as well as at numerous unsignalized intersections along both corridors.

An MVPC analysis of this intersection in 2004 showed that it did not meet MUTCD signal warrants, but that left turns from Holt Road to Route 125 northbound were operating at LOS D. Any additional development that would use Holt Road might justify the installation of signals at this location.

Lowell Junction Industrial Area - Andover

The Lowell Junction Industrial Area is located along Route I-93 in southern Andover and northern Wilmington. This area is one of the largest employment centers in the state and poor access to / from I-93 has created frequent congestion problems, which have grown more acute over the years as the area continues to develop. Congestion in the area has led residents of the Lowell Junction section of Andover, located adjacent to the employment center, to file suit in order to block any further development that would increase employment in the area.

MassDOT and the Massachusetts Department of Housing and Community Development are now sponsoring the completion of a draft Environmental Impact Study/Environmental Impact Report for the construction of a new interchange off I-93 in the Lowell Junction area of Andover. This proposed project also calls for the widening of I-93 between the Tewksbury/Andover town line north to the New Hampshire state line. This effort is being supported by the communities of Andover, Tewksbury and Wilmington, who have been working together in recent years in developing a shared land use vision for the Lowell Junction area that will maximize the development/redevelopment potential in the area that will be provided by the completion of a new interchange.

Recommendations:

- Examine options for addressing bridge height limitation issues in Andover and Lawrence
- Review signage along I-95 and US-1 directing traffic to the Newburyport Industrial Park
- Continue development of the I-93 Lowell Junction Interchange, the I-93 Add-A-Lane Project, and a I-93 Bus-on-Shoulder Service.

SECTION III
2011 MVCMS STRATEGIES
CURRENT CMS STRATEGIES

INTRODUCTION

MVPC's chief goal in preparing its MVCMS is to recommend potential strategies for decreasing present and future congestion. This section covers a broad range of strategies and projects, from general to specific, including both short and long term. The MVCMS is intended to be a flexible, continuous process with future recommendations based on both the previous years' findings and on the current analyses at the time. The recommendations and strategies for the 2011 MVCMS are drawn from many sources:

- *The MVCMS – Section 1, Identification of Congested Roadways* created a list of the congested areas in the region. This provides a framework in which to recommend various strategies and projects to deal with these problems. As data collection procedures and analysis techniques become more refined each year, it is anticipated that an increasing portion of project recommendations for the Transportation Plan and the Transportation Improvement Program will come from this source.

- *The Regional Transportation Plan* - The MVMPO 2012 RTP outlines a number of general strategies which would help decrease traffic congestion. These strategies will continue to be evaluated in the context of current congestion issues as each is further studied. Together with the entire set of CMS analyses, they will form the basis for recommendations in future transportation plan updates.

- *Existing Studies* - Specific transportation studies, such as corridor plans or traffic intersection analyses, often provide detailed recommendations or options for reducing congestion.

- *The Transportation Improvement Program (TIP)* - The MVMPO FFY 2012-2015 TIP contains a variety of projects that also have an anticipated benefit of congestion reduction, even though many projects are listed primarily for other reasons (maintenance, safety, rehabilitation, etc.).

These sources form the outline for both the current CMS activities and new CMS strategies and projects identified in this section.

TRANSPORTATION DEMAND MANAGEMENT STRATEGIES IN THE REGIONAL TRANSPORTATION PLAN

The Merrimack Valley Metropolitan Planning Organization's 2012 Draft Regional Transportation Plan (RTP) outlined several Transportation Demand Management (TDM) strategies to reduce congestion. TDM strategies attempt to reduce highway demand by making high-occupancy vehicle (HOV) travel more convenient and cost-effective than traveling alone. Strategies include carpooling and transit incentives, as well as reducing or eliminating subsidies that benefit single-occupancy vehicle (SOV) users. Many of these transportation control measures (TCMs) have worked to reduce peak period traffic congestion in areas throughout the country. Some of the more common and effective measures are outlined as follows:

Employer-based trip reduction plans encourage workers to use alternative modes other than an SOV. These plans include transit and carpool subsidies, ride matching services, as well as racks and shower facilities for bike riders. In many parts of the country, large employers are required by law to develop and implement specific plans to reduce SOV use by their employees.

Ridesharing programs are administered by both employers and area-wide organizations. Many states have public or semi-public agencies that encourage the use of carpools and vanpools through marketing, commuter ride matching, transportation coordinators, and commuter information telephone "hotlines". In Massachusetts, the MassDOT's commute options service (MassRIDES) administers a web site (http://www.commute.com) which provides relevant information. MassRIDES administers vanpools in the MVMPO region from Andover, Haverhill, Newburyport, and Salisbury to various points in Boston, as well as from Attleboro/Franklin/Hudson to Raytheon in Andover and from Waltham to Hewlett Packard in Andover. A vanpool can be established to transport commuters from any start or end point as long as seven to fifteen people are interested in joining it. In addition to the obvious economic advantage of splitting the cost of each ride, other advantages of vanpooling are reduced insurance rates and the use of several free parking lots in Boston that are available exclusively to vanpools.

Flexible work hours reduce peak congestion by varying the times that employees begin and end the work day. Employees are allowed to start work within a set time period, and leave when the time frame for a normal workday is met. *Staggered work hours* are a variation, where an employer requires departments to have different starting times. Both of these measures reduce the total number of vehicles arriving at a work site at any one time, lessening congestion. The greatest benefits of such practices are measured within the immediate vicinity of each individual employer that implements these practices.

Compressed work week programs reduce congestion by decreasing the total number of trips made. Employees work longer hours on a given day to receive one or two days off per week, or every two weeks. The most common formats are a 4-day/40-hour schedule, or a 9-day/80-hour schedule.

Guaranteed ride home programs encourage carpooling, vanpooling, transit use and bicycling by providing employees who used these modes with a means to return home during the day (for emergencies), or if they work overtime. This reduces employees' fear of being "stranded" without their car, helping to increase the willingness to use alternative modes.

Teleworking allows employees to work remotely. Most teleworkers use commonly available data transmission equipment hookups to off-site computers, webcams, telephones, and other devices. This practice enables commuters to eliminate trips to a central workplace. With the rapid growth of the computer and telecommunications industries, and employers seeking to reduce business costs, teleworking has become an increasingly popular option for both employers and workers.

Public Transportation can reduce highway congestion by shifting SOV trips off of the region's roads. Factors such as hours of service, route and stop locations, service frequencies, cleanliness, safety, reliability, cost and marketing are all critical to any public transportation system. In the MVMPO region, public transportation includes local services provided by the MVRTA; commuter bus services provided by the MVRTA, the Coach Company and C&J Trailways; MBTA commuter rail services, and intercity rail service provided by Amtrak.

Parking Management involves a variety of techniques to discourage SOV use while encouraging carpooling, vanpooling, public transportation use, walking and bicycling. Employer-sponsored parking pricing programs either charge employees who drive alone to work a fee for parking at work, or offer free or discounted parking for carpoolers, or both. Municipalities and/or business improvement districts can impose parking restrictions in commercial and downtown areas through their zoning regulations. The supply of off-street parking spaces can be limited by establishing minimum and maximum parking ratios (spaces per employee) for work sites, shopping centers, and other areas that attract vehicle activity. On-street parking can be limited through time-of-day restrictions. Curbside parking can be prohibited during peak hours, which creates an additional travel lane - increasing capacity and thereby reducing congestion. These types of municipal parking restrictions can be a challenge to implement and enforce - effective communications with developers and business, along with the establishment of reasonable measures, are essential to success. Many types of parking restrictions do work effectively in cities across the country.

Other general TDM/TCM measures include:

- *Fringe and corridor parking facilities* serving multiple occupancy vehicles and transit
- *Congestion pricing* on highway facilities (tolls during peak periods).
- *Provision of day care and other services* proximate to public transportation facilities, to encourage transit use.
- *Limit portions of road surfaces* or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place.
- *Providing secure bicycle storage and other facilities*, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas.
- *Construction/major reconstruction of paths, tracks or areas* solely for the use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest.
- Employer membership in a Transportation Management Association (TMA) that offers alternative commuting services
- Car and ride-sharing programs.

These TDM measures have proven effective in reducing congestion in a variety of situations and in many MPO regions nationwide. MVPC finds that most of these measures have been implemented in the MVMPO region; their success depends upon the transportation industry's support, and the sustained commitment of employers and employees. The MVCMS recommends these strategies where appropriate and feasible, to reduce transportation congestion.

GENERAL REGIONAL CONGESTION MANAGEMENT STRATEGIES

Roadway improvements

A variety of roadway improvements are implemented to reduce congestion that also can improve safety and the environment. The benefits of roadway capital improvements are more frequently noticed than operational improvements such as TDMs, as a tangible "immediate" change is visible. The most basic and common congestion management capital improvement is a roadway widening project, which can range from adding additional lanes to simply widening the shoulder of the facility. These actions create additional capacity and decrease congestion, and it is hoped, community livability.

High-occupancy vehicle (HOV) lanes are special-purpose lanes reserved for vehicles carrying two or more people. These lanes are usually separated from other roadway lanes, either by distance (marked by striping) or a physical barrier. HOV lanes are typically less congested than general-purpose lanes, and consequently vehicles in these lanes operate at higher speeds. This encourages more HOV trips since HOV utilization reduces both travel time and traveler frustration. HOV lanes are in operation on highways in and around many U.S. cities, and many have been successful in lessening overall congestion by reducing the number of SOVs on these facilities.

High-occupancy toll (HOT) lanes are similar to HOV lanes but include variable toll pricing capabilities. They are designed to provide access to HOV lanes for single occupant vehicle drivers that are willing to pay to drive in the less congested conditions. To date, these facilities have chiefly been operated in the southwestern U.S., with some success.

Intersection improvements include several measures aimed at increasing capacity over a given time period. Alterations to an intersection's geometry can improve sight lines and turning radii. Re-striping of lane markings helps to reduce users' confusion. Traffic signal timing changes (explained below) can make the intersection operate more efficiently. All these types of improvements facilitate traffic flow through an intersection, reducing congestion.

Signal timing changes are adjustments made to traffic lights to improve the flow of traffic and decrease congestion. The cycle length of a traffic light can be adjusted to allow a particular congested approach more "green time". This adjustment can also be implemented for a sequence of traffic lights in a particular area to maintain a progressive traffic flow in a grid of intersecting major and local streets, thus minimizing signal delay through the entire corridor. Sometimes significant improvements in signal timing along a corridor are partially offset by some increased demand, as trips divert from parallel, congested routes. Nevertheless, signal timing changes represent relatively low cost, short-term improvements to many congested roadways.

Through the CMS, TIP, and RTP processes, the MVPC will continue to identify and recommend areas in the region where these highway improvements are needed.

SECTION IV
FUTURE MVCMS ACTIVITIES

Data Collection Efforts

This MVCMS is a blend of traditional and new data collection activities that support the region's Concentrated Development Centers (CDC) as identified in its Priority Growth Strategy (PGS). The MVPC will monitor transportation, land use and environment activities along its corridors and at specific locations. The MVPC will also move away from mode-specific to multimodal analyses within a given corridor or CDC.

This approach requires the MVPC to modify where, when and what data it has traditionally collected for CMS activities. Going forward, MVPC will monitor individual roadways, intersections and parking facilities as it has done, but it will develop capacity to monitor rights-of-way, sidewalks and specific networks of these facilities. MVPC will also compare modes within a specific CDC and in corridors to identify network gaps, and to calculate potential mode shifts.

As before, the MVPC will monitor its roadways and intersections. Where congestion is attributed to a single roadway or intersection, data for these facilities will be collected and analyzed to see if improvements can be made relatively easily and without further study. The MVPC will continue to monitor the performance of MVRTA's *transit* services, routes performance and ridership to assess congestion levels. New, extended or modified routes may be considered. Increased service frequencies are another option. Transfers and station services data may be compiled as necessary. .The MVPC will continue to survey MassDOT *park-and-ride lots* and MBTA Commuter Rail *parking lots* to measure their usage. Plans for expansion of these lots and for new lots will also be tracked. The MVPC will monitor the region's *rail* network to best understand and support improved rail passenger and freight transportation operations. While the MVMPO's role in managing rail network congestion is indirect, rail services directly benefit (or impact) the region's transportation corridors and CDCs. Whatever the mode, the MVPC will assess the performance of or opportunities to implement Intelligent Transportation Systems (ITS) to manage congestion.

The MVCMS is intended to be a continuous process that MVPC will update and report upon annually. CMS facilities will continue to be monitored to determine where congestion or mobility problems exist. Listings and work plans are intended to be flexible, in order to best address currently congested facilities and locations, as well as to develop a full range of possible alternatives to deal with the congestion problems. Future MVCMS recommendations will be based upon both previous years' findings and current analyses, resulting in a full range of projects and strategies for effective congestion management. Table III-21 on the next page outlines the MVPC's next steps for addressing congestion in specific locations.

TABLE IV-1
MVCMS SUMMARY OF PROPOSED ACTIONS
CONGESTED ROADWAYS AND INTERSECTIONS

Town	Roadway/ Intersection	Problem Identification	Next Step	Party Responsible for Next Step	Notes/Suggestions
Amesbury	Route 110 east of I-495	Model Screening V/C=	Complete reconstruction project	MassDOT	Project should be complete in 2012.
Andover	Elm Square	MVPC	Monitoring	MVPC	
Andover	*River Road (east of I-93 to North Street)	Model Screening V/C = .	Monitoring	MVPC	Being studied as part of I-93 Tri-Town Interchange Project
Andover	Clark Road (Andover Street to Dascomb Road)	Model Screening V/C =	Monitoring	MVPC	Being studied as part of I-93 Tri-Town Interchange Project.
Andover	MA-28 (Rt 133 to I-495)	Model Screening V/C =	Design	MassDOT/Town of Andover	Being studied as part of I-495 Tri-Town Interchange Project
Andover, Methuen	Interstate 93 (Wilmington TL to New Hampshire Stateline)	Model Screening V/C=0.80	Complete DEIS for new interchange and widening of I-93	MassDOT;EOHCD	Consider implementing in stages
And,N.And, Law,Met,Hav	*I-495 (I-93 to MA-110)	Model Screening V/C=.91	Implement Recommendations of I-495 Corridor Study	MassDOT	Implement short-term improvements
Georgetown	Georgetown Square	MVPC	Implement MVPC Study Recommendations	Town of Georgetown	
Haverhill	MA-125 (I-495 to NHSL)	Model Screening V/C=1.16	Project Development	MassDOT/City of Haverhill	
Haverhill, N. And.	*MA-125 (Holt Road to Laurel Avenue)	Model Screening V/C =	Monitoring/ Construction	MassDOT/MVPC	Revisit with new model run in 2012
Lawrence	Route 28 at Route 110	MVPC	Monitoring	MVPC	
Lawrence	Andover St./Route 28	MVPC	Develop project to improve intersection	City of Lawrence	Improvements identified by MVPC in earlier study.

TABLE IV-1 (cont.)
MVCMS SUMMARY OF PROPOSED ACTIONS
CONGESTED ROADWAYS AND INTERSECTIONS

Town	Roadway/ Intersection	Problem Identification	Next Step	Party Responsible for Next Step	Notes/Suggestions
Lawrence, N.And	*MA-114 (I-495 to Willow Street)	Model Screening V/C=.67	Prepare designs for improvements recommended in Route 114 Corridor Study	MassDOT/City of Lawrence/Town of North Andover	Project might be split into two or three phases.
Methuen	MA-110/113 Rotary (short term improvements)	Model Screening V/C=1.19	Complete construction of short term improvements	MassDOT	Project programmed in FFY 2012 - 2015 TIP
Methuen	MA-110/113/I-93 Interchange Reconstruction	Model Screening V/C=1.19	Complete design of interchange reconfiguration.	MassDOT	Design status is at 75%completion
Methuen	Marston's Corner	MVPC	Complete Traffic Study	MVPC	Study included in FFY 2012 UPWP
Methuen	Howe St. at Route 213 Ramps	MVPC	Complete Traffic Study	MVPC	
Methuen	*MA-28 (north of Rt 213 to NH state line)	MVPC	Monitor effectiveness of NH improvement In FFY 2011	MVPC	MVPC study of congestion in the area will be completed in late 2011.
Newburyport	Low Street at Route 113	MVPC	Monitoring	MVPC/MassDOT	Recent improvements have improved intersection operations
North Andover	Route 125 at Mass. Ave.	MVPC	Construct improvements to intersection	MassDOT	Preliminary design work underway
North Andover	I-495 ramps at Mass. Ave	MassDOT	Signalize intersection of both ramps.	MVPC/MassDOT	Project need identified in MassDOT's I495 Study
Rowley	Route 1 at Route 133	MVPC	Implement recommendations of MVPC Study	MassDOT/Town	

TABLE IV-1 (cont.)
MVCMS SUMMARY OF PROPOSED ACTIONS

CONGESTED ROADWAYS AND INTERSECTIONS

Town	Roadway/ Intersection	Problem Identification	Next Step	Party Responsible for Next Step	Notes/Suggestions
Salisbury	Route 286	MVPC/MassDOT	Implement intersection improvements at 4 locations	MassDOT	MVPC Study of corridor completed in 2008
Salisbury	Salisbury Square	MVPC	Monitoring	MVPC	

Section V
Update on Implemented Strategies

The MVMPO has utilized the MVCMS to identify transportation system deficiencies which are discussed in its 1997, 2000, 2003, 2007 and 2012 Regional Transportation Plans. The MVMPO then programs its annual Unified Planning Work Program (UPWP) to conduct required traffic corridor and intersection studies addressing these deficiencies.

Corridor studies have been completed for the three "Most Severe" congestion problems identified in the initial 1995 MVCMS: I-93 in Andover and Methuen; MA-125 from I-495 to the MA-NH state line in Haverhill, and the MA-110 traffic circle at I-93 in Methuen.

Completed Construction Projects from the TIP

Marston Street in Lawrence/ I-495 Ramps Lawrence and North Andover

Marston Street at Woodland Street, the "Jughandle", was part of the large ISTEA demonstration project in Lawrence. The project included the construction of new ramps to I-495 that greatly reduces the volume of traffic that must use the "jughandle" in order to access Route I-495 southbound. This project is now complete with the new ramps open and the signal installed at the intersection of Marston Street and Woodland Street. Also completed is the rehabilitation of the Route I-495 bridge over the Merrimack River, and the installation of the traffic signal at the intersection of the I-495 Southbound off-ramps and Merrimack Street.

River Road Bridge over I-93 in Andover

The River Road Bridge over Interstate I-93 was previously categorized as a "Problem" congestion area, and accesses I-93 which is one of the most congested roadways in the region. The bridge was widened to accommodate additional lanes at the intersections of River Road with the I-93 ramps on either side of the bridge. The project has successfully relieved congestion at these intersections, as well as on the bridge itself.

Lafayette Square in Haverhill (MA-97 at Essex St and MA-97 at Hilldale Ave.)

Lafayette Square has been reconstructed, eliminating a rotary and adding approach lanes at the two intersections located at either end of the Square—Essex Street/Winter Street/Lafayette Square (southern end), and Broadway/Lafayette Square/Hilldale Avenue (northern end). Since the completion of these changes, additional retail development has taken place both in (CVS Pharmacy) and around the Square (Hilldale Plaza located on Hilldale Avenue). MVPC staff will be reviewing the operation of the intersections and driveways in the Square area under the FFY 2012 UPWP to determine what additional changes might be needed to improve traffic and safety conditions in this area

Other Intersection Improvements

Construction was completed on the following projects which have successfully relieved congestion, by adding lanes at approaches and/or upgrading traffic controls at the following intersections:

- Haverhill - intersection improvements, Hilldale Avenue at Monument Street

- Haverhill - intersection improvements, Water Street at Groveland Street
- Haverhill – signal upgrade at intersection of Plaistow Road and Main Street
- Methuen - signal upgrade at Lowell Street (MA-113) and Haverhill Street (MA- 110)

Transit Center Construction

Lawrence Gateway
The new MVRTA Gateway Transportation Facility is an 865-car surface parking facility with MVRTA transit passenger service and amenities. The facility is in part utilized by employees of the adjacent Everett Mills, Lawrence General Hospital, and several other buildings. It was completed in 2010.

Amesbury Transportation Center
Construction began on the Center in fall 2010. The Center is expected to open in spring 2012. It will serve as the operations hub for the MVRTA in Amesbury and will contain office and meeting space that will be used by the City of Amesbury and the Amesbury Council on Aging

Haverhill Intermodal Center
This facility is under construction and located on the east side of Moulton Way opposite the Platform for the existing Haverhill Train Station. It will contain a multi-level parking garage that should provide enough additional parking to support expanded commuter rail and commuter bus service to the City's downtown.. Construction is expected to be complete in 2012.

APPENDIX A
REGIONAL MODEL DEVELOPMENT

The MVPC began full-scale development of a regional traffic model in 1992, in response to regulations concerning travel forecasting models set forth by ISTEA (including the management systems) and the Clean Air Act Amendments. The main reason for developing such models is to project future traffic volumes and their effects on congestion and air quality under a variety of scenarios. This section presents an overview of the MVPC's traffic modeling process, including the adaptations made to the model for its use as a CMS analysis tool. The MVPC Regional Traffic Model continues to be upgraded and refined to make it more responsive to changes in transportation demand and federal mandates.

Regional Traffic Modeling Process

In a regional traffic model, traffic volumes are forecast through the interaction of transportation supply and travel demand. Traffic zones are areas that represent demand, while the actual road network represents supply. A computerized network consists of a series of points, or *nodes*, that graphically show locations of roadway intersections and other elements of the network. Connections between nodes are called *links*. Links represent highway segments and contain information such as speed and road capacity. Traffic zones are represented by special nodes called *centroids*, and are attached to the network by specialized links called *centroid connectors*. Traffic outside the modeled area is represented by special centroids called *external stations*. These stations allow for the interaction of traffic flow between the region and the "outside world", while the interaction between all internal and external zones produces the actual traffic volume results for the entire region.

The interaction among traffic zones occurs because each zone produces and attracts person trips. Information contained within each zone (such as population, households, income and employment) determines the amount of trips produced and attracted. Households are the primary producer of trips, while employment sites are the primary trip attractors. These productions and attractions are converted to vehicle trips that enter and leave each zone. The fact that people make trips for different purposes (work, shopping, school, personal business, recreation, etc.) - and have different vehicle occupancy rates in doing so - is also calculated into the model. This entire process is called *trip generation*.

The process of *trip distribution* determines where the trips end up once they leave their traffic zones. Trip distribution produces a matrix of origins and destinations between all zones for each trip purpose. This is done according to the "attractiveness" of a zone, based on its proximity to other zones and on the total number of trips generated in that zone. Zones that are closest to each other will have more trips flowing between them, all other things being equal. The more trips a zone generates relative to all other zones, the greater the "pull" it will exert on all other zones in terms of attracting trips. This is the basic theory behind the *gravity model*, which is often used in travel demand forecasting.

Trip assignment determines what route, or *path*, trips will take in going from zone to zone. It is here where the travel demand of the traffic zones interacts with the supply, provided by the regional road network. All trips from all zones are assigned along the network to all their destination zones. From this point, there are several different

methods of trip assignment. In one such method, each individual path is determined through factors such as minimum travel time (determined by the speed, capacity and intersection delays of the utilized links), and congestion that would arise from too many vehicles using a particular link or route. In this case, the trip assignment step is run additional times, or *iterations*, to achieve the best possible balance between minimum travel times and minimum congestion. The end result produces traffic volumes for all roads in the network.

Once a model produces traffic volumes, it must be calibrated. *Calibration* refers to the adjusting of various model factors and components - and running the model again until it replicates current regional travel patterns and traffic volumes at acceptable levels of accuracy. Often adjustments and subsequent model runs must be conducted many times before an accurate result is reached. Once the model is calibrated to current, or *base year* conditions, it can then be used to forecast future scenarios.

Merrimack Valley MPO Regional Traffic Simulation Model

The Merrimack Valley MPO's Regional Traffic Simulation Model has been built using the TransCAD modeling software package. In 2010, the MVPC began the process of updating the base year of the model from 2000 to 2010. A base year for a model is a year where there is recent information on the various inputs that are used by the model to forecast travel patterns. Data on the number of households in the region, and the location, level and type of employment—the key variables used in the MVPC model-- are most typically made available during years that the US Census is conducted. MVPC has received information on these measures from the 2010 US Census. What is more is that this information is available at the block group level, which is a level of census geography that is similar in size to the Traffic Analysis Zones used in the MVMPO's model. Staff will be developing the 2010 Base Year model under the FFY 2012 Unified Planning Work Program.

In recent years, staff has embarked on a process of 'dissagregating' our existing traffic zones to make them smaller and, in doing so, improving the trip assignment step in the traffic modeling process. It is expected that this work will continue over the next two years.

In 2011, MassDOT embarked upon an ambitious effort to further improve the accuracy of the traffic modeling process in the Commonwealth by undertaking a travel survey. This survey will yield specific information on travel and trip making patterns in the state that can be incorporated into the various traffic simulation models that are being used by MPOs from the Berkshires to Cape Cod. Rather than using national standards for household trip generation rates, Massachusetts MPOs will soon be able to apply rates that are specific to their own regions. Rather than using the gravity model to distribute trips to destination zones, work trip, linked trip and non-work trip tables can be developed that reflect actual trip making patterns in the Valley.