Mobility 2040

Invest in Your Transportation Future

CENTRAL MASSACHUSETTS METROPOLITAN PLANNING ORGANIZATION

2016 LONG RANGE TRANSPORTATION PLAN

PREPARED BY:

Staff of the Central Massachusetts Regional Planning Commission

CMRPC
Central Massachusetts Regional Planning Commission

CMMPO
Central Massachusetts Metropolitan Planning Organization

Notice of Nondiscrimination Rights and Protections to Beneficiaries

Federal Title VI / Nondiscrimination Protections
The Central Massachusetts Metropolitan Planning Organization (CMMPO) hereby states its policy to operate its programs, services and activities in full compliance with federal nondiscrimination laws including Title VI of the Civil Rights Act of 1964 (Title VI), the Civil Rights Restoration Act of 1987, and related federal and state statutes and regulations.. Title VI prohibits discrimination in federally assisted programs and requires that no person in the United States of America shall, on the grounds of race, color, or national origin, including limited English proficiency, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal assistance.

Related federal nondiscrimination laws administered by the Federal Highway Administration, the Federal Transit Administration, or both prohibit discrimination on the basis of age, sex, and disability. These protected categories are contemplated within the CMMPO's Title VI Programs consistent with federal and state interpretation and administration. Additionally, the CMMPO provides meaningful access to its programs, services, and activities to individuals with limited English proficiency, in compliance with US Department of Transportation policy and guidance on federal Executive Order 13166.

State Nondiscrimination Protections
The CMMPO also complies with the Massachusetts Public Accommodation Law, M.G.L. c272 §§ 92a, 98, 98a, prohibiting making any distinction, discrimination, or restriction in admission to or treatment in a place of public accommodation based on race, color, religious creed, national origin, sex, sexual orientation, disability, or ancestry. Likewise, CMMPO complies with the Governor's Executive Order 526, section 4 requiring all programs, activities and services provided, performed, licensed, chartered, funded, regulated, or contracted for by the state shall be conducted without unlawful discrimination based on race, color, age, gender, ethnicity, sexual orientation, gender identity or expression, religion, creed, ancestry, national origin, disability, veteran's status (including Vietnam-era veterans), or background.

Filing a Complaint
Individuals who feel they have been discriminated against in violation of Title VI or related Federal nondiscrimination laws, must file a complaint within 180 days of the alleged discriminatory conduct to:

Mr. Lawrence Adams, Executive Director
Central Massachusetts Regional Planning Commission
2 Washington Square
Union Station, Suite 200
Worcester, MA 01604
(508) 756-7717

To file a complaint alleging violation of the State's Public Accomodation Law, contact the Massachusetts Commission Against Discrimination within 300 days of the alleged discriminatory conduct at:

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

Translation

English:	If this information is needed in another language, please contact the CMRPC/CMMPO Title VI Specialist at (508) 756-7717.
Spanish:	Si necesita esta información en otro lenguaje, favor contactar al especialista de Título VI de CMRPC/CMMPO al (508) 756-7717.
French:	Si vous avez besoin d'obtenir une copie de la présente dans une autre langue, veuillez contacter le spécialiste du Titre VI de CMRPC/CMMPO en composant le (508) 756-7717.
Portuguese:	Caso esta informação seja necessária em outro idioma, favor contatar o Especialista em Título VI do CMRPC/CMMPO pelo fone (508) 756-7717.
Vietnamese:	Nếu bạn cần thông tin bằng ngôn ngữ khác, xin vui lòng liên lạc với Tiêu đề VI Chuyên CMRPC/CMMPO tại (508) 756-7717.
Chinese:	如果用另一种语言需要的信息，请联系第六章专门CMRPC/CMMPO（508）756-7717。
Afrikaans:	As jy inligting nodig het in 'n ander taal, kontak asseblief die Titel VI Spesialis CMRPC/CMMPO by (508) 756-7717.

ADA / 504 Notice of Nondiscrimination

The CMMPO does not discriminate on the basis of disability in admission to its programs, services, or activities; in access to them; in treatment of individuals with disabilities; or in any aspect of their operations. The CMMPO also does not discriminate on the basis of disability in its hiring or employment practices.

This notice is provided as required by Title II of the Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973. Questions, complaints, or requests for additional information regarding ADA and Section 504 may be forwarded to:

Mr. Lawrence Adams, Executive Director
Central Massachusetts Regional Planning Commission
2 Washington Square
Union Station, Suite 200
Worcester, MA 01604
(508) 756-7717

This notice is available from the CMMPO in large print, on audio tape, and in Braille upon request.

Endorsement of Mobility2040
2016 to 2040 Long Range Transportation Plan

The Central Massachusetts Metropolitan Planning Organization (CMMPO) hereby endorses Mobility2040: 2016 to 2040 Long Range Transportation Plan

✓ I concur
___ I do not concur
Stephanie Pollack, Secretary of Transportation, MassDOT — Date 7/22/15

✓ I concur
___ I do not concur
for Thomas Tinlin, Acting Administrator, MassDOT –H'way — Date 7-22-15

✓ I concur
___ I do not concur
for Howard Drobner, Chairperson, CMRPC — Date 7-22-15

✓ I concur
___ I do not concur
Stephen O'Neil, Chairperson, WRTA — Date 7.22.15

___ I concur
___ I do not concur
Edward M. Augustus, Jr., Worcester City Manager — Date _____

✓ I concur
___ I do not concur
Kathlyn Inman, Representative, North Subregion — Date 7.22.15

✓ I concur
___ I do not concur
Maurice DePalo, Representative, Northeast Subregion — Date 7.22.15

___ I concur
___ I do not concur
John Hebert, Representative, Southeast Subregion — Date _____

✓ I concur
___ I do not concur
Dennis Lamarche, Representative, Southwest Subregion — Date 7.22.2015

___ I concur
___ I do not concur
Vacant, Representative, West Subregion — Date _____

Central Massachusetts Metropolitan Planning Organization

Listing of CMMPO Members:

1. **Edward M. Augustus, Jr.**, Worcester City Manager
2. **Stephanie Pollack**, Secretary of Transportation, MassDOT
3. **Vacant,** West Subregion Representative
4. **Maurice Depalo,** Northeast Subregion Representative
5. **Thomas Tinlin,** Acting Administrator, MassDOT-Highway
6. **Howard Drobner**, CMRPC Chairperson
7. **John Hebert,** Southeast Subregion Representative
8. **Kathlyn Inman**, North Subregion Representative
9. **Dennis Lemarche,** Southwest Subregion Representative
10. **Stephen O'Neil**, WRTA Chairperson

Ex-Officio Members (Non-Voting):

1. **Kristin Woods,** FTA Liaison
2. **Brandon Wilcox,** FHWA Liaison
3. **Steven J. Tyler, P.E.,** MPO Advisory Committee

Listing of MPO Advisory Committee Members and Organizations:

1. **Matt Benoit**, Town of Auburn
2. **Sarah Bradbury**, MassDOT-H District 3
3. **Andrea Briggs**, Massachusetts DEP
4. **Laurie Connors**, Town of Millbury
5. **Zack Dyer**, Worcester Public Health
6. **Amanda Gregoire**, City of Worcester
7. **Laura Hanson**, MassDOT-H District 2
8. **Jeff Hoynoski**, MassDOT-H District 2
9. **Kathy Joubert**, Town of Northborough
10. **Joanne Kasper-Dunne**, Massachusetts DEP
11. **John Knipe**, Town of Shrewsbury
12. **Steve O'Neil**, WRTA Administrator
13. **Charles D. Rennick,** P&W Railroad
14. **Jessica Strunkin,** 495/Metrowest Partnership
15. **Ann Sullivan,** MassDOT-H District 3
16. **Anthony Sylvia**, Town of West Boylston
17. **Steven J Tyler, P.E.,** Town of Spencer
18. **Karin Valentine Goins,** Private Citizen

Ex-Officio Members (Non-Voting):

1. **Daneil Denzila**, Town of Westborough
2. **Bryan Pounds,** MassDOT
3. **Brandon Wilcox,** FHWA Liaison

THIS PAGE IS INTENTIONALLY LEFT BLANK

Table of Contents

EXECUTIVE SUMMARY

CHAPTER I: INTRODUCTION AND BACKGROUND

CHAPTER II: PERFORMANCE MANAGEMENT

CHAPTER III: TRANSPORTATION LINKAGES

CHAPTER IV: TRANSPORTATION MODES

CHAPTER V: SUMMARY OF NEEDS AND ANALYSIS

CHAPTER VI: FINANCIAL PLAN

CHAPTER VII: AIR QUALITY AND GREENHOUSE GAS ASSESSMENT

List of Tables

EXECUTIVE SUMMARY

CHAPTER I: INTRODUCTION AND BACKGROUND

CHAPTER III: TRANSPORTATION LINKAGES

CHAPTER IV: TRANSPORTATION MODES

PEDESTRIAN

BICYCLE

PUBLIC TRANSIT AND PASSENGER RAIL

AUTO TRAVEL

CHAPTER V: SUMMARY OF NEEDS AND ANALYSIS

SUMMARY OF NEEDS

MOBILITY2040 PROJECTS / INITIATIVES ANALYSIS

CHAPTER VI: FINANCIAL PLAN

CONSTRAINED RECOMMENDATIONS AND FUTURE INITIATIVES

List of Figures

EXECUTIVE SUMMARY

CHAPTER I: INTRODUCTION AND BACKGROUND

CHAPTER III: TRANSPORTATION LINKAGES

CHAPTER IV: TRANSPORTATION MODES

PEDESTRIAN

PUBLIC TRANSIT AND PASSENGER RAIL

AUTO TRAVEL

FREIGHT - RAIL AND TRUCKING

AIRPORT

CHAPTER V: SUMMARY OF NEEDS AND ANALYSIS

SUMMARY OF NEEDS

HIGHWAY PROJECT ANALYSIS

CHAPTER VI: FINANCIAL PLAN

CONSTRAINED RECOMMENDATIONS AND FUTURE INITIATIVES

MAJOR INFRASTRUCTURE PROJECTS

CHAPTER VII: AIR QUALITY AND GREENHOUSE GAS ASSESSMENT

GREENHOUSE ANALYSIS

Executive Summary

Overview

Mobility2040 is the long range transportation plan developed by the Central Massachusetts Metropolitan Planning Organization (CMMPO) for the south central Massachusetts planning region. Its purpose is to identify the multi-modal transportation needs of the region, the resources available to address the needs, and the initiatives and project investments planned for the next 25 years. An extensive process of public outreach was undertaken to achieve community input on regional performance management goals and to prioritize resource allocation.

As part of the development of the 2016 Mobility2040, the Central Massachusetts MPO reiterated its future transportation-related vision for the region:

> The CMMPO believes that a safe, efficient, and well-maintained transportation system, along with prudent land use planning and economic development, is an essential component of sustainable public policy aimed at improving people's lives.
>
> The CMMPO envisions Central Massachusetts in 2040 as a growing region of 40 well-connected, livable communities with congestion reduction, and improved multi-modal mobility and air quality. Healthy, creative transportation methods that integrate active travel modes through the use of technology will safely and efficiently move people between homes, jobs, and services and move products between places of manufacturing and sale.

Mobility2040 reflects the federal emphasis areas by:

- developing the plan through a performance-driven, outcome-based approach,
- examining access to essential services,
- coordinating across metropolitan planning boundaries, and
- through use of scenario planning strategies.

Together these emphasis areas help to determine the optimal mix of projects, initiatives, and funding allocation across modes and programs in order to address the needs of the region through 2040.

The plan also reflects federal guidance to:

- provide a benefits and burdens analysis to ensure fair treatment for minority, transportation vulnerable, and non-minority communities,
- work to improve livability in communities, and

- achieve sustainability by assessing and mitigating the potential effects of climate change.

The plan also considers the MassDOT emphasis on reducing greenhouse gases, the Healthy Transportation Compact Policy and other GreenDOT goals of improving the availability of alternative healthy modes of transportation, including achieving the future year mode shift goal set by MassDOT.

Finally, with extensive community involvement, Mobility2040 underscores the regional goals set by the CMMPO of:

- Goal 1: Reduce Congestion and Improve Mobility for all modes
- Goal 2: Improve the Safety and Security of the region
- Goal 3: Achieve State of Good Repair
- Goal 4: Increase Transportation Options and Promote Healthy Modes
- Goal 5: Reduce Greenhouse Gas and Promote Sustainable practices
- Goal 6: Equitable Transportation for all populations
- Goal 7: Improve Economic Vitality and Freight Movement

Future Growth

Future growth is an important consideration in transportation planning. Between years 2010 and 2040 the region is expected to add over 75,000 people and approximately 25,000 jobs. By comparison, in the last few decades Central Massachusetts growth averaged approximately 6-7% per decade and is now projected to increase at approximately 5% for each of the next three decades. This growth is in line with overall Massachusetts growth that is expected to slow compare to previous decades. Comparing to other regions in the Commonwealth Central Massachusetts growth, it is still robust. Within the region, it's significant to understand where growth will happen. The following explains where population and employment growth will occur.

Population

The communities in the CMRPC region can be grouped in the following three categories based on the past growth trends, available land and infrastructure for future growth, and planned future residential projects. The average growth for population is projected around 5% for the next few decades.

- **Low growth communities** (expected to remain close to the 2010 numbers): Auburn, Barre, Brookfield, Dudley, East Brookfield, Hardwick, Hopedale, Leicester, New Braintree, North Brookfield, Oakham, Oxford, Paxton, Princeton, Southbridge, Webster, West Brookfield, and Worcester.
- **Medium growth communities** (expected to grow at a rate close to the regional average): Blackstone, Boylston, Douglas, Holden, Mendon, Millbury, Millville, Shrewsbury, Spencer, Sutton, Upton, Warren, West Boylston, and Westborough.
- **High growth communities** (expected to grow more rapidly than the region as a whole): Berlin, Charlton, Grafton, Northborough, Northbridge, Rutland, Sturbridge, and Uxbridge.

Employment

The communities in the CMRPC region can be grouped in the following three categories based on the past employment and planned future projects. The average growth for employment is projected around 3-4% for the next few decades.

- **Low growth communities** (expected to remain close to the 2010 numbers): Blackstone, Brookfield, East Brookfield, Hardwick, Hopedale, Leicester, Mendon, Millbury, Millville, New Braintree, North Brookfield, Princeton, Southbridge, Spencer, Upton, Uxbridge, Warren, and West Brookfield.
- **Medium growth communities** (expected to grow at a rate close to the regional average): Auburn, Barre, Dudley, Grafton, Holden, Oakham, Oxford, Paxton, Rutland, Sturbridge, Webster, West Boylston, and Worcester.
- **High growth communities** (expected to grow more rapidly than the region as a whole): Berlin, Boylston, Charlton, Douglas, Northborough, Northbridge, Shrewsbury, Sutton, and Westborough.

Public Outreach

During the Mobility2040 development process, public participation was conducted through a variety of accessible outreach methods as outlined in the CMMPO Public Outreach Program (POP). CMMPO Staff used diverse approaches to educate and inform the public about the long-

range transportation plan process and encourage interested parties to express their views and provide input on transportation issues and prioritizing limited funding resources.

Information was distributed to the public through press releases, a Mobility2040 webpage, social media, and e-mails to a robust distribution list. The webpage focused on study information, the planning process, and how the public can be involved, including a five-minute informational video. The Mobility2040 Twitter account served the purpose of detailing public information meetings locations and times. Messages were sent to various committees, stakeholder groups, member community staff and boards, interested parties, and others.

A series of stakeholder meetings were held with transportation stakeholders in the region throughout the Mobility2040 development process. The purpose was to learn what issues and challenges exist within the current multi-modal transportation network while seeking input on crafting performance measures and targets that would be used to guide a vision for the future. This type of outreach allowed for interaction with a broad range of participants from a variety of expertise and backgrounds.

Fourteen public information meetings were held in different communities throughout the region, in a variety of venues including grocery stores, colleges, shopping centers, farmer's market, and business exposition. These meetings were designed for the public to interact with staff and learn about the Mobility2040 process and transportation happenings in their area. In addition to public information and stakeholder meetings, 623 surveys were completed by the public.

Overall, public input indicated that the automobile would continue to be the most important transportation method in the future and that roadway maintenance, safety, and congestion should remain the top priorities for transportation funding investment. As secondary and tertiary options, survey respondents displayed a shift in preference towards utilizing alternative transportation modes in the future. The results highlighted that bicycling, walking, and public transportation (both WRTA buses and MBTA commuter rail) would be important transportation modes to prioritize and fund.

While public input shared a general theme, but there were slight variations based on demographics. Younger people seem more interested in commuter rail and bicycle as options to consider and prioritize for funding allocation, while older individuals place more emphasis on walking and transit as focus points for future planning and investment. Input also fluctuated marginally based on the subregion.

Financially-Constrained Recommendations & Future Initiatives

Federal MAP-21 regulations require that the long-range regional transportation plan be a financially-constrained document. To ensure financial constraint, it is necessary to estimate the costs of all projects recommended in Mobility2040 and to assess the amount of funds that are expected to be available over the course of the planning horizon (2016-2040). Ultimately, the costs of the proposed projects should not exceed that of the expected funding. Because there is not enough expected revenue to meet all the need, not all the projects identified in the needs analysis can be included in the Financial Plan.

Throughout the past year, the CMMPO has embarked on a process to define and assess projects and initiatives for future programming based on:

- Review of all available data, including management systems data
- Sought and received extensive public input on needs and priorities for funding
- Developed policies, projects, and initiatives for possible consideration

In order to prioritize projects for funding, projects and initiatives then went through a two-step process. In the first step, projects and initiatives were prioritized into three tiers based on how well they address measures within the CMMPO performance management goals of:

- Reduce congestion & improve mobility for all modes
- Improve the safety & security of the region
- Achieve a state of good repair
- Increase transportation options & promote healthy modes
- Reduce greenhouse gas & promote sustainable practices
- Equitable transportation for all populations
- Improve economic vitality & freight movement

In the second step, the projects, primarily drawn from Tier 1, were combined into five scenarios which placed the projects into financially-constrained five-year bands for implementation through 2040. These scenarios were then analyzed in the Travel Demand model, and assessed for:

- congestion reduction and savings in vehicle miles travelled
- greenhouse gas effects
- geographic equity
- environmental justice benefits and burdens
- consistency with prior public input

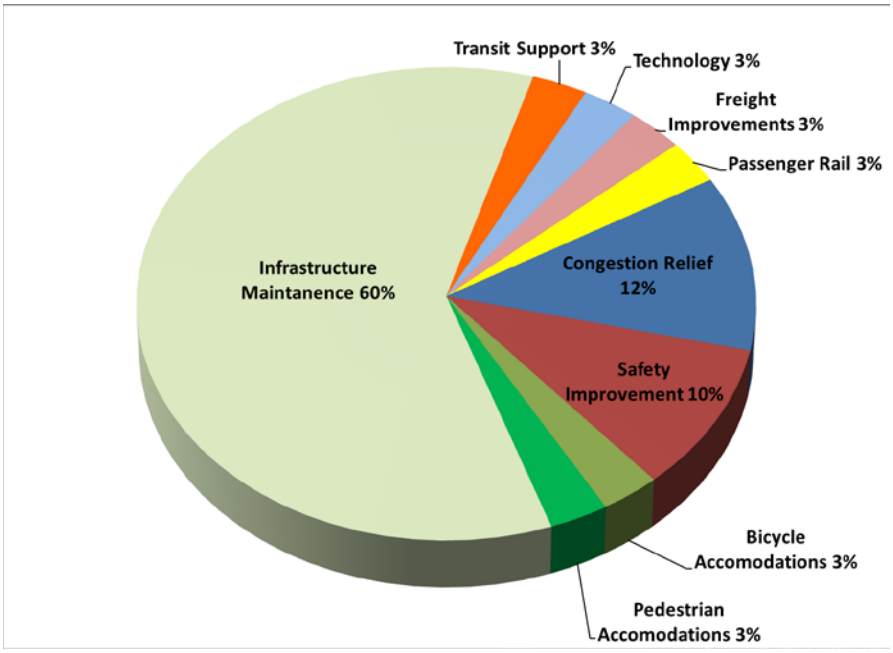
Following mix of program strategies, study initiatives, and projects were endorsed by the CMMPO based on the analysis mentioned above, project specific information, and community consensus.

Management & Operations Considerations

Given the limited funding, competing priorities, and the comprehensive list of unmet needs, it is crucial to maintain the current system at optimal efficiency. Also various management and operation methodologies such as ITS, Transportation Demand Management strategies, Park & Ride lots, Transit Signal Priority, and Corridor Management strategies, such as signal coordination, will help the region reach its goals of improving mobility, reducing greenhouse gases, improving sustainability and promoting economic development.

Based on these considerations, the CMMPO chose to spend the regional target funding among diverse transportation programs and modes. The chosen funding scenario maintains current roadway and bridge infrastructure in the "fair" category with 60% of the total regional transportation spending allocation. High funding allocations are also included for improved safety and congestion reduction projects, as well as separate funding categories created for bicycle and pedestrian infrastructure improvements. The remaining categories (transit support, technology, freight, and passenger rail) were funded at an allocation of 3% each.

Figure 1: Regional Target Funding Programs



Policies

While the CMMPO did not adopt any new policies during the development of Mobility2040, their adoption of Option 1 allocation of funding from regional targets and their choices of major initiatives and infrastructure projects re-affirms the commitment to:

- provide for an increasingly balanced multi-modal transportation system that will improve the mobility for users of all modes;
- provide adequate funding to maintain the current system;
- increase healthy options that reduce congestion and greenhouse gas, and are more sustainable;
- improve system safety and security; and
- continue to promote economic vitality & freight movement.

Initiatives

There are several projects that still require more definition before moving forward, and they have been termed Initiatives. The Blackstone River Greenway, the Multimodal connection between the Blackstone River Greenway to the Mass-Central Rail Trail and the Pedestrian Connection between Blackstone River Greenway to the Mid-State Trail are all initiatives that require identification of the project lead agency and more definition of project scope. These initiatives will help move the project forward in future years.

Table 1: Bicycle and Pedestrian Initiatives

Study Cost will be included in the Unified Planning Work Program

Recommended Implementation Schedule	Project	Project Scope
2015-2020	Blackstone River Greenway (Segments 3,4 and 5)	To collaborate with the lead agency to identify segments, establish costs for each segment and project scope
2020-2025	Multimodal Connection: Blackstone River Greenway to Mass-Central Rail Trail	To collaborate with the lead agency to establish costs and project scope
2020-2025	Pedestrian Connection: Blackstone River Greenway to Mid-State Trail	To collaborate with the lead agency to establish costs and project scope

Major Infrastructure Projects

The CMMPO deliberated extensively on what major infrastructure projects to recommend in the Mobility2040 Plan, given the need to remain within the constraints of estimated funding available, and given that revenues are only expected to grow at 1.5% and costs are projected to grow at 4%. This task was made more difficult for projects in the later years of the plan because it was often necessary to estimate costs on projects that are in the early concept stages. The following represent the CMMPO recommendations.

Table 2: Major Infrastructure Projects

Highway Projects

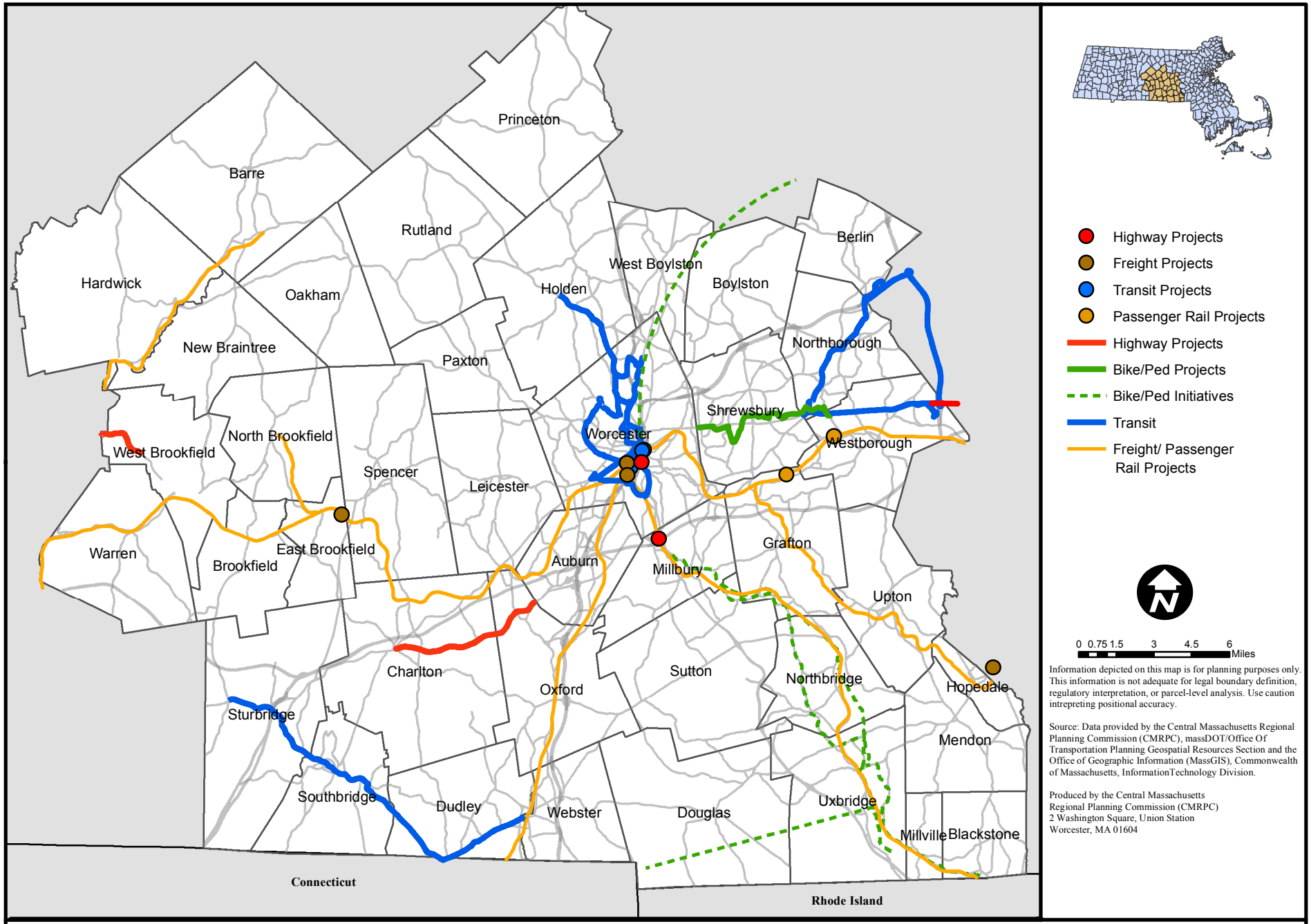
Recommended Implementation Schedule	Project Name	Project Scope	Project Cost (in Millions)
2016-2020	Route 9 - West Brookfield	2.1 mile segment of rural highway requires widening by 10' to address safety and accommodate bicycles and pedestrians	$12.17
2021-2025	Rte 9 Improvements from Rte 9/I-495 interchange to Rte 9/Crystal Pond Road intersection	Enhance safety and capacity improvements along Rte 9	$11.40
	Rte 20 Oxford (Rte 20/12 to Rte 20/56 intersection)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford	$23.00
2026-2030	Rte 20 Oxford/Charlton (West of Rte 20/56 to Richardson's corner)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford	$34.00
2031-2035	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Reconstruction & widening of Vernon Street (Route 122A) bridge over I-290 and related ramp work	$23.84
2036-2040	Route 146/20/MassPike Interchange - Millbury	Observed congestion causes operational issues. Investigate improved signals and interchange roadways.	$29.00

Bicycle and Pedestrian Projects

Recommended Implementation Schedule	Project	Project Cost (in Millions)	Project Scope
2015-2020	Boston Worcester Air-Line Trail	$0.50	TIP or TAP funding

Freight Rail Projects

Recommended Implementation Schedule	Project	Project Scope	Project Cost (in Millions)	Comment
2015-2020	Grafton & Upton Railroad	At-grade highway crossing improvements	$0.50	Private funding
2020-2025	Providence & Worcester Railroad	Bridge over Southbridge Street	$2.00	Private funding
2015-2040	East Brookfield & Spencer Railroad	Various expansion and IRAP track improvements for improved operations	$0.50	Private funding
2015-2040	Providence & Worcester Railroad	IRAP track improvements	$0.50	Private funding



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts
Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

Figure II Major Infrastructure

Transit-Related Initiatives

The WRTA is considering expansion/upgrade of the WRTA Hub Transfer facility at Union Station and implementation of Transit Signal Priority to improve transit operations in congested areas.

The major capital rail initiatives anticipated over the planning horizon of Mobility2040 is the continued MassDOT study of expanding high speed passenger rail between Worcester and Springfield, as well as possible private passenger rail service re-instituted over Providence & Worcester rail lines through the Blackstone Valley from Worcester to Providence, RI. An additional initiative is considering upgrades to the three MBTA commuter rail stations in Westborough, Grafton, and Worcester.

Some of these initiatives are more likely to become projects than others, but each will require additional study to move forward, and costs and revenue sources will have to be identified.

Transit-Related Projects

A major transit capital project anticipated over the planning horizon of Mobility2040 is the creation of transit "mini hubs" within the region, to house vehicle fleets and serve as connection and transfer facilities. Another capital project is the replacement of the WRTA Maintenance and Operations facility, which is currently underway, and will be completed in 2016.

The WRTA also intends to embark on a replacement of the fixed route fleet once again in 2020 and has programmed a modest expansion of the fleet in the current four-year Transportation Improvement Program. The WRTA will be purchasing nine expansion vehicles beginning in 2017 to accommodate recommendations contained in the 2015 Comprehensive Service Analysis.

Table 3: Transit and Commuter Rail Projects

Transit Projects

Recommended Implementation Schedule	Project	Project Scope	Project Cost (in Millions	Comments
2015-2020	Route 43 - New route connecting Webster, Dudley, Southbridge, and Sturbridge	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2015-2020	Route 32 - New route to connect Holden with Worcester.	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2020-2025	Route 17 - New route to connect Westborough Office Park, Solomon Pond Mall, and Northborough Crossing (Wegman's).	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2020-2025	Route 44 - Proposed new route to connect colleges: - Becker, WPI, Assumption, WSU, Clark, Holy Corss, Quinsigamond CC	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2015-2040	New fixed route buses	Replacement or expansion of the WRTA fixed route fleet.	$93.00	Fleet expansion item

Commuter Rail Projects

Recommended Implementation Schedule	Project	Project Cost (in Millions)	Comment
2020-2025	Worcester-Providence passenger service and railroad improvements	TBD	Private Railroad operations and funding
2015-2040	MBTA commuter rail station upgrades	TBD	MBTA funding

Conclusion

Mobility2040 provides a blueprint to achieving a balanced multi-modal transportation system that is reasonably maintained. Although additional funding would could be well-spent on expanding and better maintaining the system, the resources that are expected to be available have been programmed in a responsible manner. Based on the above considerations, Mobility2040, the long range plan for the CMMPO region, meets all federal planning and financial constraint requirements.

Resumen Ejecutivo

Trasfondo

Mobility2040 es el plan de transportación a largo plazo de la Organización Metropolitana de Planificación del Centro de Massachusetts (CMMPO, por sus siglas en inglés) para la Región Sur-Central de Massachusetts. Tiene como propósito identificar las necesidades de transportación multi-modal de la región, los recursos disponibles para atender dichas necesidades, así como las iniciativas y la inversión estimada para los proyectos de transporte planificados por los próximos 25 años. Se llevó a cabo un proceso extenso de participación ciudadana para recibir el insumo de la comunidad acerca de las metas sobre el desempeño regional y la priorización de la asignación de los recursos disponibles.

Como parte del desarrollo del plan Mobility2040, el CMMPO reiteró su visión de futuro para la transportación en la región.

> El CMMPO cree en un sistema de transportación seguro, eficiente y en buenas condiciones, de la mano con la planificación prudente de usos de suelo y el desarrollo económico, los cuales son un componente esencial de la política pública de desarrollo sostenible dirigido a mejorar la calidad de vida de los habitantes de la región.
>
> El CMMPO visualiza a la región Central de Massachusetts en el 2040 como una región en crecimiento de 40 comunidades habitables, conectadas entre sí, con una reducción en la congestión de tránsito y mejoras en la movilidad multi-modal y la calidad del aire. Los modos de transporte saludables y la creativos que integren los modos activos de transporte mediante el uso de tecnología que apoyará el movimiento de personas entre sus áreas de residencia, empleos y servicios y el movimiento de bienes entre los lugares de producción y consumo.

Mobility2040 refleja las áreas de énfasis federal al:

- desarrollar el plan con un enfoque en los resultados esperados a la luz de las medidas de desempeño de la región,
- examinar el acceso a los servicios esenciales,
- coordinar con las regiones metropolitanas limítrofes, y
- mediante el uso de estrategias de planificación de escenarios.

En su conjunto, las áreas de énfasis ayudan a determinar la mezcla óptima de proyectos, iniciativas y la asignación de fondos a través de modos y programas de manera que las necesidades de la región sean atendidas hasta el 2040.

El plan, también refleja las directrices federales al:

- proveer un análisis de cargas y beneficios para asegurar un trato justo a las minorías, aquellos más vulnerables y a las comunidades no minoritarias.
- trabajar para mejorar la calidad de vida de las comunidades, y
- lograr la sustentabilidad al evaluar y mitigar los posibles efectos del cambio climático.

El plan también considera el énfasis de MassDOT en la reducción de gases de efecto invernadero, la política pública de Transportación Saludable, así como otras metas incluídas en GreenDOT para mejorar la disponibilidad de las alternativas de modos de transporte saludables, incluyendo el futuro logro de la meta trazada por MassDOT de cambio modal.

Finalmente, y junto a una amplia participación de la comunidad, Mobility2040 pone de relieve las metas trazadas por el CMMPO de:

- Meta 1: Reducir la Congestión Vehicular y Mejorar la Movilidad para Todos los Modos de Transporte
- Meta 2: Mejorar la Seguridad de la Región
- Meta 3: Lograr el Estado de Buena Condición de la Infraestructura
- Meta 4: Aumentar las Opciones de Transportación y Promover los Modos Saludables
- Meta 5: Reducir los Gases de Efecto Invernadero y Promover Prácticas Sustentables
- Meta 6: Transporte Equitativo para Todas las Poblaciones
- Meta 7: Mejorar la Vitalidad Económica y el Movimiento de Carga y Acarreo

Crecimiento Futuro

El crecimiento futuro es una consideración de suma importancia en la planificación del sistema de transportación. Entre los años 2010 y el 2040, se espera que la región experimente el crecimiento de más de 75,000 habitantes y de aproximadamente 25,000 nuevos empleos. A manera de comparación, en las últimas décadas el promedio de crecimiento de la región central de Massachusetts fue de aproximadamente 6% a 7% por década y se proyecta un crecimiento de 5% por década en los próximos 30 años. Este crecimiento estimado es comparable con lo que se proyecta para el estado de Massachusetts en su totalidad, el cual experimentará una leve desaceleración del crecimiento. Sin embargo, el crecimiento esperado en la región central de Massachusetts es todavía un crecimiento robusto al comparársele a otras regiones en el Estado. Dentro de la región, es significativo entender dónde ocurrirá el crecimiento. Más adelante se explica donde ocurrirá el crecimiento esperado de la población y el empleo.

Población

Las comunidades de la Región pueden agruparse en las siguientes tres categorías basado en las tendencias pasadas de crecimiento, los terrenos y la infraestructura disponibles para el crecimiento futuro y los proyectos residenciales planificados. Se espera un crecimiento promedio de 5% en la región por las próximas décadas.

- **Comunidades de Bajo Crecimiento** (se espera que permanezcan cerca de los números del 2010): Auburn, Barre, Brookfield, Dudley, East Brookfield, Hardwick, Hopedale, Leicester, New Braintree, North Brookfield, Oakham, Oxford, Paxton, Princeton, Southbridge, Webster, West Brookfield, y Worcester.
- **Comunidades de Crecimiento Medio** (se espera que crezcan a una tasa cercana al promedio de la región): Blackstone, Boylston, Douglas, Holden, Mendon, Millbury, Millville, Shrewsbury, Spencer, Sutton, Upton, Warren, West Boylston, y Westborough.
- **Comunidades de Alto Crecimiento** (se espera que crezcan más rápidamente que el resto de la región en su conjunto): Berlin, Charlton, Grafton, Northborough, Northbridge, Rutland, Sturbridge, y Uxbridge.

Empleo

Las comunidades en la Región pueden agruparse en las siguientes tres categorías basadas en las tendencias de empleo en el pasado y los proyectos planificados para el futuro. Se proyecta que el crecimiento promedio del empleo en la región será cerca del 3% a 4% por las próximas décadas.

- **Comunidades de Bajo Crecimiento** (se espera que permanezcan cerca de los números del 2010) Blackstone, Brookfield, East Brookfield, Hardwick, Hopedale, Leicester, Mendon, Millbury, Millville, New Braintree, North Brookfield, Princeton, Southbridge, Spencer, Upton, Uxbridge, Warren, y West Brookfield.
- **Comunidades de Crecimiento Medio** (se espera que crezcan a una tasa cercana al promedio de la región): Auburn, Barre, Dudley, Grafton, Holden, Oakham, Oxford, Paxton, Rutland, Sturbridge, Webster, West Boylston, y Worcester.
- **Comunidades de Alto Crecimiento** (se espera que crezcan más rápidamente que el resto de la región en su conjunto): Berlin, Boylston, Charlton, Douglas, Northborough, Northbridge, Shrewsbury, Sutton, y Westborough.

Participación Ciudadana

Durante el proceso de desarrollo de Mobility2040, se llevó a cabo un proceso de participación pública usando una extensa variedad de métodos de divulgación accesible tal y como se indican en el Programa de Divulgación Pública del CMMPO (POP, por sus siglas en inglés). El personal del CMMPO utilizó acercamientos diversos para educar e informar al público sobre el proceso de planificación del sistema de transportación a largo plazo y alentar a aquéllos interesados a expresar sus opiniones y proveer su insumo acerca de los problemas de transportación y priorizar los limitados fondos disponibles.

La información fue distribuida al público mediante comunicados de prensa, una página en el internet de Mobility2040, redes sociales y correos electrónicos a una lista de correos robusta. La página de internet se enfocó en la información concerniente al estudio, el proceso de planificación y en cómo el público podía involucrarse y participar en el proceso, incluyendo un video informativo de 5 minutos. La cuenta en Twitter de Mobility2040 cumplió el propósito de detallar la información relacionada con los lugares y horarios de las reuniones. Los mensajes fueron enviados a varios comités, grupos de interés, personal y oficiales de las comunidades miembro, miembros de juntas, entre otros.

Durante el proceso de desarrollo de Mobility2040 se celebraron múltiples reuniones con grupos de interés a través de la región. El propósito era conocer los temas y desafíos que existen en la red de transporte multimodal actual y a la vez buscar insumo en la elaboración de las medidas de desempeño y las metas que se iban a utilizar para guiar la visión de futuro. Este tipo de estrategia de divulgación permite la interacción con una amplia gama de participantes de una variedad de conocimientos y experiencias.

Se celebraron catorce (14) reuniones informativas en diversos lugares a través de la región, incluyendo supermercados, universidades, centros comerciales, mercados agrícolas y convenciones de negocios. Estas reuniones fueron diseñadas para lograr una interacción del público con el personal y aprender sobre el proceso de elaboración de Mobility2040 y los acontecimientos relacionados a la transportación en sus respectivas áreas. Además de las reuniones informativas y las reuniones con grupos de interés, se recopilaron 623 encuestas al público.

En resumen, el insumo público indicó que el automóvil privado continuará siendo el modo de transporte más importante en el futuro y que el mantenimiento de las carreteras, la seguridad y la congestión vehicular continuarían siendo las prioridades más importantes a la hora de asignar la inversión de fondos disponibles. Como opciones secundarias y terciarias, los encuestados presentaron un cambio en sus preferencias hacia el uso de modos alternativos de transporte en el

futuro. Los resultados destacan el acomodo para peatones y ciclistas, así como el uso del transporte público (servicio de autobuses de la WRTA y el tren de pasajeros de la MBTA) como modos de transporte los cuales deben tomar prioridad y se deben asignar más fondos en el futuro.

Aún cuando el insumo público compartía un tema general, se encontraron variaciones mayormente relacionadas con el perfil demográfico de los encuestados. Los más jóvenes parecían estar más interesados en las opciones relacionadas con el tren de pasajeros y el acomodo de bicicletas como las opciones a ser consideradas prioritarias en la asignación de fondos en el futuro. Mientras que los encuestados de mayor edad ponían mayor énfasis en caminar y el uso del transporte público como los puntos de interés para la planificación futura y la asignación de fondos. Cabe destacar, que el insumo también varió marginalmente por subregión.

Recomendaciones Financieramente-Restringidas e Iniciativas Futuras

Las regulaciones federales contenidas en MAP-21 requieren que el plan de transportación a largo plazo sea un documento financieramente restringido. Para asegurar que el plan es financieramente restringido es necesario estimar los costos de todos los proyectos que se incluyen en Mobility2040 y evaluar la cantidad de fondos que se esperan estén disponibles a través del periodo que comprende el plan (2016-2040). A la larga, el costo de los proyectos propuestos no deben exceder la cantidad de fondos disponibles. Debido a que no hay suficientes fuentes de ingreso para cubrir todas las necesidades identificadas, no todos los proyectos que se identificaron como necesarios se pudieron incluir en el Plan de Financiamiento.

Durante el pasado año, el CMMPO se embarcó en un proceso de definir y evaluar proyectos e iniciativas que pudieran ser programados en los próximos años:

- Revisó todos los datos disponibles, incluyendo los datos del sistema de manejo de datos
- Solicitó y recibió extenso insumo del público sobre las necesidades y prioridades para la asignación de fondos
- Desarrolló las consideraciones para políticas, proyectos e iniciativas

Para poder priorizar la asignación de fondos para los proyectos e iniciativas fue necesario pasar por un proceso el cual se dividió en dos (2) pasos. En el primer paso, los proyectos e iniciativas fueron colocados en tres (3) niveles de prioridad, basado en cuán bien atendían o cumplían con las medidas de desempeño establecidas por el CMMPO en las siguientes metas de:

- Reducir la Congestión Vehicular y Mejorar la Movilidad Para Todos los Modos

- Mejorar la Seguridad de la Región
- Lograr el Estado de Buena Condición de la Infraestructura
- Aumentar las Opciones de Transporte y Promover los Modos Saludables de Transporte
- Reducir los Gases de Efecto Invernadero y Promover Prácticas Sostenibles
- Transporte Equitativo para Todas las Poblaciones
- Mejorar la Vitalidad Económica y el Movimiento de Carga y Acarreo

En el Segundo paso, los proyectos, derivados del primer nivel de prioridad, fueron combinados en cinco (5) escenarios en periodos de cinco (5) años financieramente restringidos para su implementación hasta el 2040. Estos escenarios fueron entonces analizados usando el Modelo de Demanda de Viajes y evaluados en las siguientes áreas:

- Reducción de la congestión vehicular y ahorros en las millas recorridas por vehículo
- Gases de efecto de invernadero
- Equidad geográfica
- Beneficios y cargas a las poblaciones de Justicia Ambiental
- Consistencia con el insumo público

En adelante se presenta una mezcla de estrategias, iniciativas de estudio y proyectos que fueron endosados por el CMMPO basado en el análisis anteriormente mencionado, la información específica disponible para cada proyecto y el consenso de la comunidad.

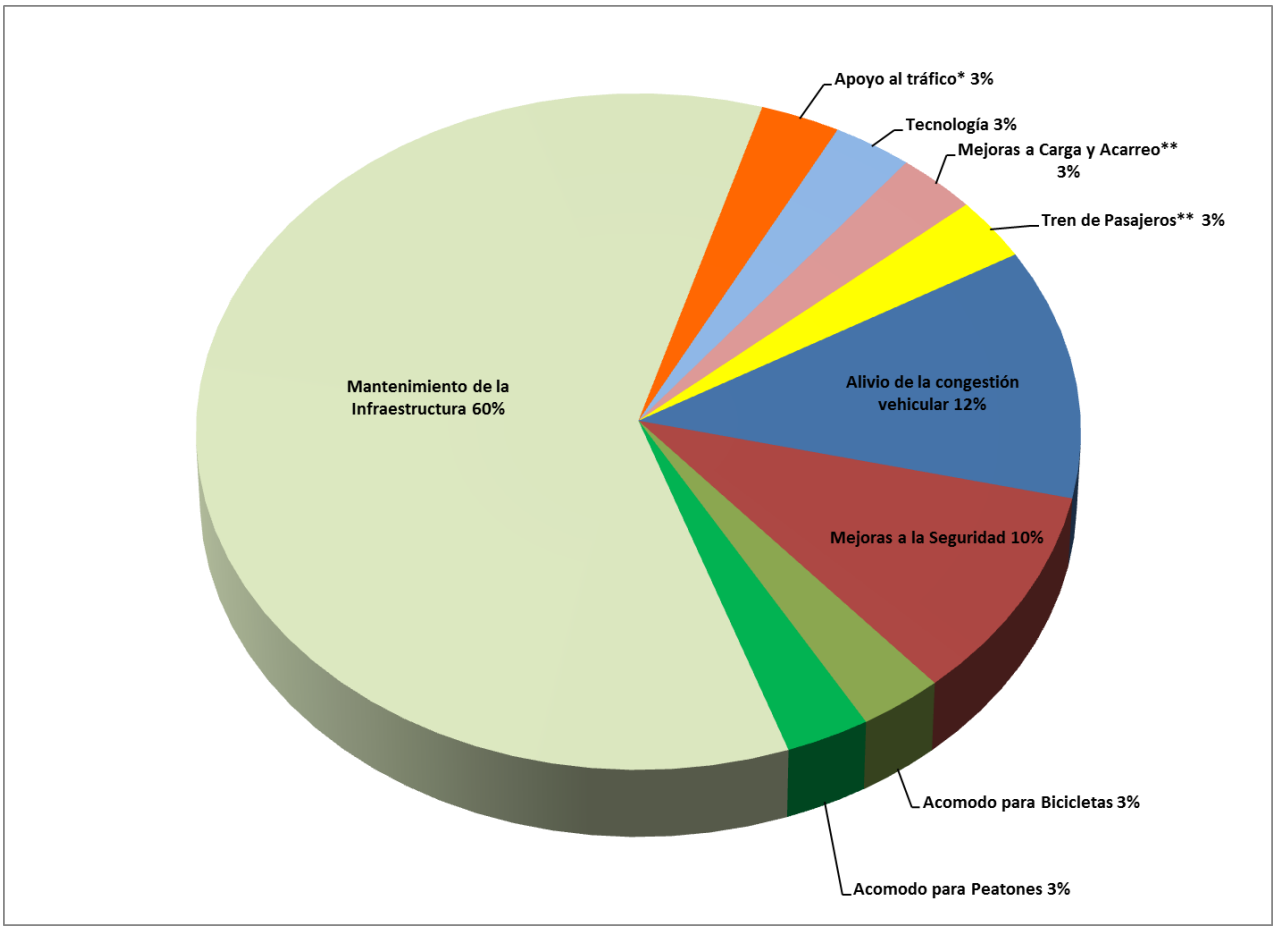
Consideraciones Administrativas y Operativas

Dada la limitación en los fondos disponibles, las prioridades encontradas y la lista comprensiva de las necesidades que no han sido satisfechas, es crucial mantener eficiencia óptima del sistema de transportación actual. De igual manera, otras metodologías administrativas y /o de operaciones como los sistemas inteligentes de transportación (ITS, por sus siglas en inglés), las estrategias de manejo de la demanda de transportación (TDM, por sus siglas en inglés), los lotes de Parquee & Viaje, las señales de tránsito prioritario (TSP, por sus siglas en inglés), y las estrategias de manejo de corredores, tales como la coordinación de señales, pueden ayudar a la región a alcanzar sus metas de mejorar la movilidad, reducir los gases de efecto invernadero, mejorar la sustentabilidad y promover el desarrollo económico.

Basado en estas consideraciones, el CMMPO eligió distribuir los fondos disponibles para la región en diversos programas y modos de transportación. El escenario de fondos seleccionado mantiene la actual infraestructura vial y los puentes en la categoría de estado “razonable” con el 60% del total de la asignación regional para el mantenimiento de la infraestructura. Otras

asignaciones mayores de fondos fueron incluidas para mejorar la seguridad en las carreteras y en los proyectos que reduzcan la congestión vehicular. De igual manera, otras fuentes de fondos separadas fueron creadas para mejoras a la infraestructura peatonal y de ciclistas. A cada una de las categorías restantes (apoyo al transporte colectivo, tecnología, carga y acarreo, y tren de cercanías) se les asignó un 3% de los fondos.

Figura 1: Asignación de Fondos en la Región por Programa



Políticas

Aún cuando el CMMPO no adoptó políticas públicas nuevas en el desarrollo de Mobility2040, su adopción de la Opción #1 para la asignación de fondos basados en los fondos disponibles para la región y la elección de iniciativas y proyectos de gran envergadura reafirma su compromiso con:

- proveer un sistema de transporte multimodal balanceado que mejore la movilidad de los usuarios de todos los modos;
- proveer la cantidad de fondos adecuados para mantener el sistema actual;
- aumentar las opciones saludables de transporte que reducen la congestión vehicular y los gases de efecto invernadero y que son más sustentables;
- mejorar la seguridad en las carreteras; y
- continuar la promoción de la vitalidad económica y el movimiento de carga y acarreo en la región.

Iniciativas

A la fecha, hay varios proyectos que requieren más definición antes de seguir adelante y que por consiguiente se incluyen como iniciativas. Los proyectos Blackstone River Greenway, la conexión multimodal entre el Blackstone River Greenway con el Mass-Central Rail Trail y la conexión peatonal entre el Blackstone River Greenway con el Mid-State Trail son todas iniciativas que requieren la identificación de una agencia que lidere el proyecto y mayor definición del alcance del proyecto. Estas iniciativas ayudarán a que estos proyectos se lleven a cabo en el futuro.

Tabla 1: Iniciativas Peatonales y de Acomodo de Bicicletas

Los costos asociados al estudio de las iniciativas se incluirá en el Programa Unificado de Trabajos de Planificación, UPWP por sus siglas en inglés.

Itinerario Recomendado de Implementación	Proyecto	Alcance del Proyecto
2015-2020	Blackstone River Greenway (Segmentos 3,4 y 5)	Colaborar con la agencia líder para identificar segmentos y determinar costos y alcance del proyecto por segmentos
2020-2025	Conexión Multimodal: Entre el Blackstone River Greenway y el Mass-Central Rail Trail	Colaborar con la agencia líder para determinar costos y alcance del proyecto
2020-2025	Conexión Peatonal: Entre el Blackstone River Greenway y el Mid-State Trail	Colaborar con la agencia líder para determinar costos y alcance del proyecto

Proyectos de Infraestructura de Gran Envergadura

El CMMPO deliberó extensamente para determinar cuáles proyectos de infraestructura de gran envergadura iban a ser recomendados en Mobility2040, dado el caso que tenían que mantenerse dentro de un escenario con fondos limitados y que se espera que los ingresos crezcan solamente 1.5%, mientras que se proyecta que los gastos crezcan a un 4%. Esta encomienda fue aún más difícil para aquellos proyectos planificados en los últimos años del plan debido a que es necesario estimar los posibles costos de proyectos que aún están en una etapa conceptual. A continuación se presentan las recomendaciones del CMMPO.

Tabla 2: Proyectos de Infraestructura de Gran Envergadura

Proyectos de Carreteras

Itinerario Recomendado de Implementación	Nombre del Proyecto	Alcance del Proyecto	Costo del Proyecto (en Millones)
2016-2020	Ruta 9 - West Brookfield	Segmento de 2.1 millas de carretera rural que require ser ampliada por 10' para mejorar la seguridad y acomodar infraestructura peatonal y de ciclistas	$12.17
2021-2025	Mejoras a la Ruta 9 desde la intersección Ruta 9 con la I-495 hasta la intersección de la Ruta 9 con la Crystal Pond Road	Mejorar la seguridad y la capacidad a lo largo de la Ruta 9	$11.40
	Ruta 20 en Oxford (desde la intersección de la Ruta 20 con la Ruta 12 hasta la intersección con la ruta 56)	Modernización de la Ruta 20 incluyendo barreras medianeras y mejoras a las intersecciones en Charlton/Oxford	$23.00
2026-2030	Ruta 20 en Oxford y Charlton (Al oeste de la intersección de la Ruta 20 con la Ruta 56 hasta Richardson's corner)	Modernización de la Ruta 20 incluyendo barreras medianeras y mejoras a las intersecciones en Charlton/Oxford	$34.00
2031-2035	Ampliación del puente sobre la I-290 en Vernon St y Kelly Square - Worcester	Reconstrucción y ampliación del puente de la Calle Vernon (Ruta 122A) sobre la I-290 y trabajos relacionados a las rampas de acceso	$23.84
2036-2040	Intersección de la autopista MassPike con la Ruta 146 y la Ruta 20 - Millbury	La congestión vehicular causa problemas operacionales. Mejorar las señales de tránsito y la infrasestructura vial de esta intersección.	$29.00

Proyectos Peatonales y de Acomodo de Bicicletas

Itinerario Recomendado de Implementación	Proyecto	Costo del Proyecto (en Millones)	Comentario
2015-2020	Sendero Aéreo entre Boston y Worcester (Air-Line Trail)	$0.50	Fondos TIP o TAP

Proyectos Ferroviarios

Itinerario Recomendado de Implementación	Proyecto	Alcance del Proyecto	Costo del Proyecto (en Millones)	Comentario
2015-2020	Ferrocarril de Grafton & Upton	Mejoras al cruce ferroviario al nivel de la carretera	$0.50	Fondos Privados
2020-2025	Ferrocarril de Providence & Worcester	Puente sobre la Calle Southbridge	$2.00	Fondos Privados
2015-2040	Ferrocarril de East Brookfield & Spencer	Varias ampliaciones y mejoras a los rieles IRAP para mejorar las operaciones ferroviarias	$0.50	Fondos Privados
2015-2040	Ferrocarril de Providence & Worcester	Mejoras a los rieles IRAP	$0.50	Fondos Privados

Fig. II

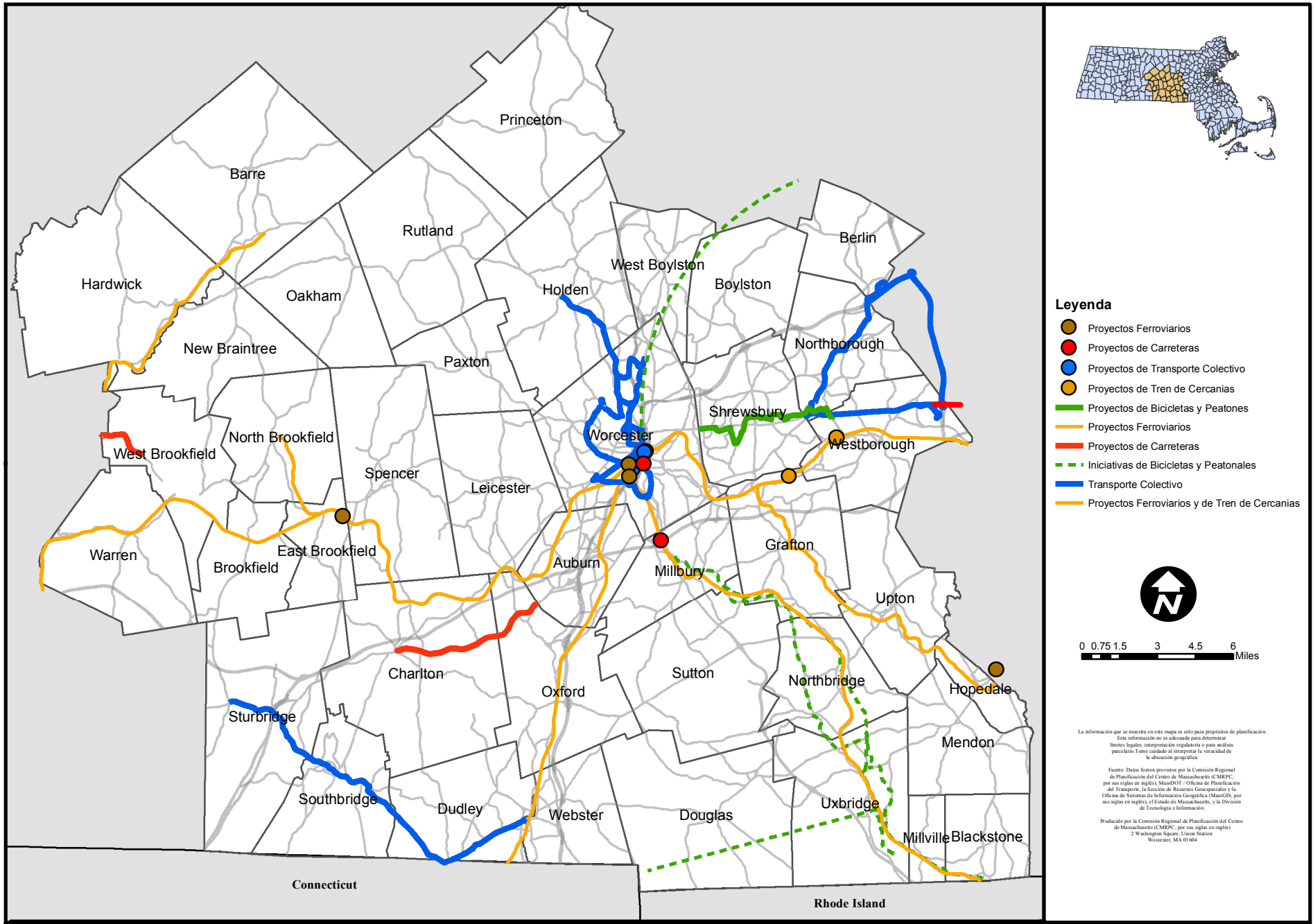


Figura 2: Mapa de Proyectos de Infraestructura de Gran Envergadura

Iniciativas de Transporte Colectivo

La Autoridad de Transporte Público Regional de Worcester, conocida como la WRTA por sus siglas en inglés, está considerando la ampliación y mejoras de la estación de trasbordo conocida como WRTA Hub en Union Station y la implantación de señales de tránsito prioritario (TSP por sus siglas en inglés) para mejorar las operaciones en las áreas más congestionadas.

Las iniciativas relacionadas con el tren de pasajeros que se anticipan durante el periodo de planificación de Mobility2040 es la continuación del estudio de MassDOT para expandir el tren de alta velocidad entre Worcester y Springfield, así como también la restitución de un posible servicio privado de tren de pasajeros usando las vías ferroviarias de Providence y Worcester atravesando el Valle de Blackstone entre Worcester y Providence, Rhode Island. Una iniciativa adicional es la consideración de la mejora a tres estaciones del tren de cercanías de la MBTA en Westborough, Grafton y Worcester.

Algunas de estas iniciativas son más propensas a convertirse en proyectos, pero cada una requerirá de estudios adicionales para avanzar y los costos y las fuentes de ingresos tendrán que ser identificados.

Proyectos de Transporte Colectivo

El único gran proyecto de transporte público que se anticipa ocurra durante el periodo que comprende Mobility2040 es la creación de mini estaciones de trasbordo en la región que incluya el albergue para la flota de autobuses y funcione como un punto de conexión y transferencia de pasajeros. Otro proyecto de capital es el reemplazo de la sede Administrativa y de Operaciones de la WRTA, la cual está siendo construida actualmente y se espera esté completada para el 2016.

La WRTA también emprenderá el proceso de reemplazo de los autobuses de ruta fija una vez más en el 2020 y ha programado una expansión moderada de la flota por los próximos cuatro (4) años en el Programa de Mejoras del Transporte (mejor conocido como TIP por sus siglas en inglés). La WRTA estará adquiriendo nueve (9) autobuses comenzando en el 2017 para acomodar las recomendaciones incluidas en el Análisis Comprensivo del Transporte Público completado en el 2015.

Tabla 3: Proyectos de Transporte Público y de Tren de Pasajeros

Proyectos de Transporte Público

Itinerario Recomendado de Implementación	Proyecto	Alcance del Proyecto	Costo del Proyecto (en Millones)	Comentario
2015-2020	Ruta 43 - Nueva ruta conectando Webster, Dudley, Southbridge y Sturbridge	Recomendación incluida en el Borrador Analisis Comprensivo del Servicio de Transporte Público. La implementación del proyecto dependerá en la disponibilidad de fondos operativos disponibles y la aprobación final de la WRTA	Costo Operacional	No es parte del fondo de capital de inversión
2015-2020	Ruta 32 - Nueva ruta para conectar Holden con Worcester.	Recomendación incluida en el Borrador Analisis Comprensivo del Servicio de Transporte Público. La implementación del proyecto dependerá en la disponibilidad de fondos operativos disponibles y la aprobación final de la WRTA	Costo Operacional	No es parte del fondo de capital de inversión
2020-2025	Ruta 17 - Nueva ruta para conectar Westborough Office Park, Solomon Pond Mall y Northborough Crossing (Wegman's).	Recomendación incluida en el Borrador Analisis Comprensivo del Servicio de Transporte Público. La implementación del proyecto dependerá en la disponibilidad de fondos operativos disponibles y la aprobación final de la WRTA	Costo Operacional	No es parte del fondo de capital de inversión
2020-2025	Ruta 44 - Nueva ruta propuesta para conectar las universidades: Becker College, WPI, Assumption, WSU, Clark, Holy Corss, Quinsigamond CC	Recomendación incluida en el Borrador Analisis Comprensivo del Servicio de Transporte Público. La implementación del proyecto dependerá en la disponibilidad de fondos operativos disponibles y la aprobación final de la WRTA	Costo Operacional	No es parte del fondo de capital de inversión
2015-2040	Nuevos autobuses de ruta fija	Reemplazo o expansión de la flota de autobuses de ruta fija de la WRTA.	$93.00	Elemento de la expansión de la flota de autobuses

Proyectos de Tren de Pasajeros y Tren de Cercanías

Itinerario Recomendado de Implementación	Proyecto	Costo del Proyecto (en Millones)	Comentario
2020-2025	Mejoras ferroviarias y servicio a pasajeros entre Worcester-Providence	Por determinarse	Operaciones y fondos ferroviarios privados
2015-2040	Mejoras a las estaciones de tren de cercanías de la MBTA	Por determinarse	Fondos de MBTA

Conclusión

Mobility2040 provee un punto de partida para lograr un sistema de transportación multimodal balanceado y que es mantenido de forma razonable. Aún cuando fondos adicionales muy bien podrían ser utilizados para expandir el sistema y mejorar el mantenimiento del mismo, los recursos que se esperan estén disponibles han sido programados de una manera responsable. Basado en las consideraciones antes mencionadas, Mobility2040, el plan de transportación a largo plazo de la región del CMMPO, cumple con todos los requerimientos federales de planificación y con la restricción de fondos disponibles.

CHAPTER I

Introduction and Background

Introduction

Mobility2040 is the long range transportation plan developed by the Central Massachusetts Metropolitan Planning Organization (CMMPO) for the south central Massachusetts planning region. Its purpose is to identify the multi-modal transportation needs of the region, the resources available to address the needs, and the initiatives and project investments planned for the next 25 years. An extensive process of public outreach was undertaken to achieve community input on regional performance management goals and to prioritize resource allocation.

As part of the development of the 2016 Mobility2040, the Central Massachusetts MPO reiterated its future transportation-related vision for the region:

> The CMMPO believes that a safe, efficient, and well-maintained transportation system, along with prudent land use planning and economic development, is an essential component of sustainable public policy aimed at improving people's lives.
>
> The CMMPO envisions Central Massachusetts in 2040 as a growing region of 40 well-connected, livable communities with congestion reduction, and improved multi-modal mobility and air quality. Healthy, creative transportation methods that integrate active travel modes through the use of technology will safely and efficiently move people between homes, jobs, and services and move products between places of manufacturing and sale.

Mobility2040 reflects the federal emphasis areas by:

- developing the plan through a performance-driven, outcome-based approach,
- examining access to essential services,
- coordinating across metropolitan planning boundaries, and
- through use of scenario planning strategies.

Together these emphasis areas will determine the optimal mix of projects, initiatives, and funding allocation across modes and programs in order to address the needs of the region through 2040.

The plan also reflects federal guidance to:

- provide a benefits and burdens analysis to ensure fair treatment for minority, transportation vulnerable, and non-minority communities,
- work to improve livability in communities, and

- achieve sustainability by assessing and mitigating the potential effects of climate change.

The plan also considers the MassDOT emphasis on reducing greenhouse gases, the Healthy Transportation Compact Policy and other GreenDOT goals of improving the availability of multi-modal, healthy, active transportation options, including achieving the future year mode shift goal set by MassDOT.

Finally, with extensive community involvement, Mobility2040 underscores the regional goals set by the CMMPO of:

- Goal 1: Reduce Congestion and Improve Mobility for all modes
- Goal 2: Improve the Safety and Security of the region
- Goal 3: Achieve State of Good Repair
- Goal 4: Increase Transportation Options and Promote Healthy Modes
- Goal 5: Reduce Greenhouse Gas and Promote Sustainable practices
- Goal 6: Equitable Transportation for all populations
- Goal 7: Improve Economic Vitality and Freight Movement

Population and Employment Projections

Background

The Central Massachusetts Metropolitan Planning region see Figure I-1 (also referred to as the Central Massachusetts Regional Planning District) is made up of the City of Worcester and the 39 surrounding towns of south-central Worcester County and is one of 13 planning regions in the state. The region is diverse, extending from the urban core of Worcester, the second largest city in the Commonwealth, through the suburban neighborhoods of the nearby towns, to the rural fields and farms of the Brookfields, Hardwick, and New Braintree. It is a transportation crossroads for New England, located at the junction of four major interstate highways and three major railroads. It is centered about 50-60 miles from the major urban areas of Boston, Springfield, Providence RI, and Hartford CT. From Princeton on the north to Douglas on the Rhode Island state line is about 35 miles, and it's about the same distance from Warren in the west to Westborough in the east. The total area of the region is about 960 square miles. It contains the headwaters and main trunk of the Blackstone River, one of the major river basins of Massachusetts and Rhode Island stretching from Worcester to Narragansett Bay near Providence, and includes the John H. Chafee Blackstone River Valley National Heritage Corridor in Massachusetts. Parts of several other river basins are also found within the Region, including the Chicopee, French-Quinabaug, Nashua and Concord-Sudbury-Assabet.

The transportation system in the CMMPO region is a collection of roads, bridges, transit services, freight facilities, bicycle routes, pedestrian facilities and intermodal connectors that need to work as an integrated system within and throughout the 40 communities and beyond. The transportation system is maintained and operated by a number of different agencies, including but not limited to the Massachusetts Highway Department, the Massachusetts Bay Transportation Authority, the Massachusetts Port Authority, the Department of Conservation and Recreation, and local entities.

Historically the region was a center for agriculture, manufacturing, and education. In recent years both agricultural and manufacturing activity has declined significantly, although still important to the local economy. New, high-tech and biotech firms have come to the region, taking advantage of the well-educated workforce. In addition, healthcare systems are also significant employers.

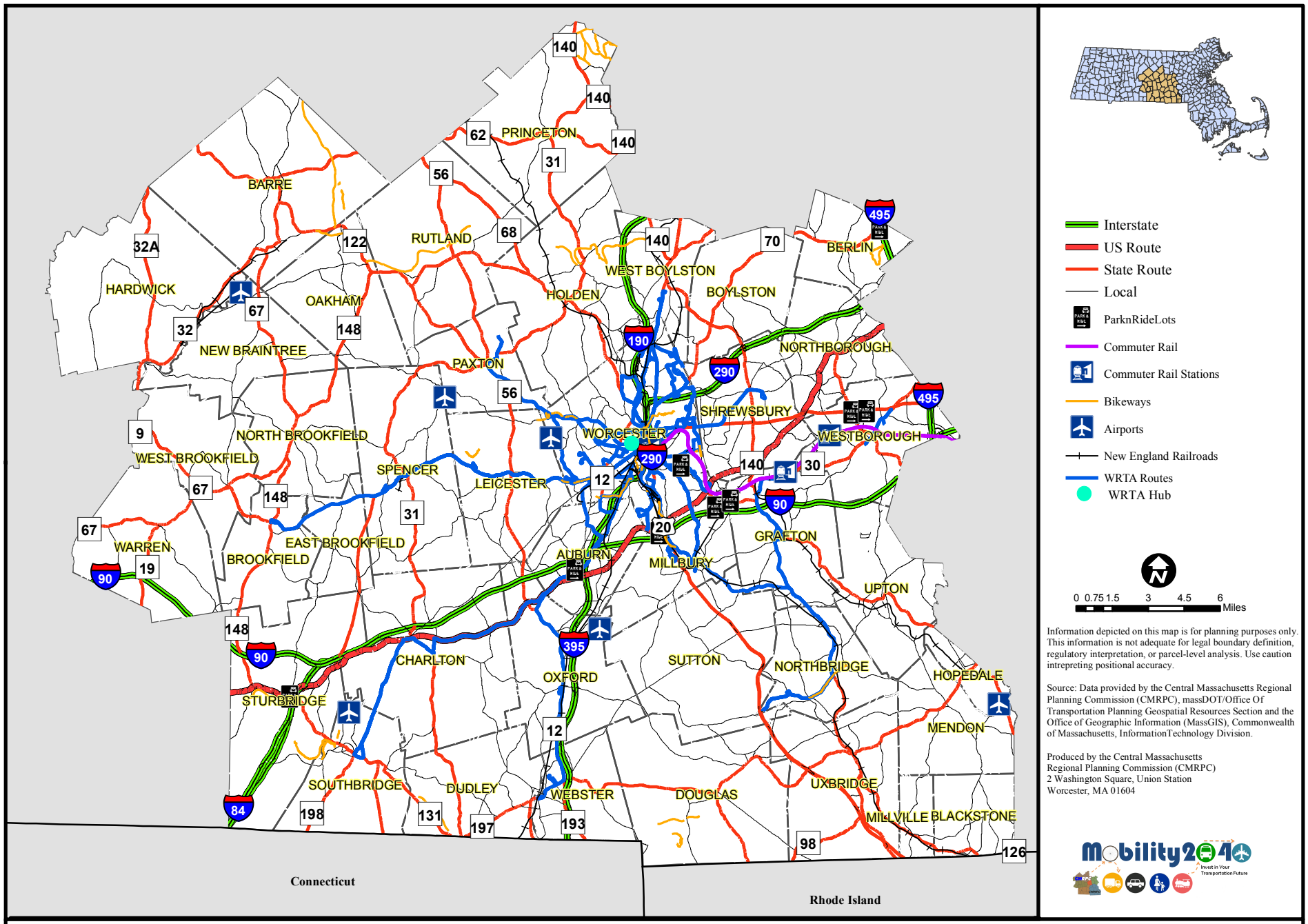
The trend since the 1950s has been toward increasing residential development outside the central city at the expense of the city's population, although the city has seen a growing interest in urban living. Interstate 495, the fastest growing industrial corridor in the state, brushes the eastern edge of the region and has encouraged rapid residential development in the nearby towns including

those in Central Massachusetts. The transportation infrastructure in the region has facilitated the trend of people living in this area while commuting daily to eastern Massachusetts. That trend, too, is expected to continue. This trend is validated by increased auto travel along I-90 and improved ridership on the commuter rail to Boston. Also, the abundance of affordable housing in comparison to housing prices in Eastern Mass is still the trend that is fueling living in Central Mass and commuting to the east. As of 2010, more than 20% of the workers residing in Central Massachusetts commuted to jobs outside the region in eastern Massachusetts. The region is a net exporter of workers as well, with nearly twice as many workers leaving the region daily for jobs elsewhere as come in from other regions.

Future Growth

In the last 30 years, population and employment growth in the Central Massachusetts Region have outpaced the rest of state; however, this growth has not occurred uniformly throughout the region and through the decades. Between 2000 and 2010 the employment decreased about 3% and is expected to get back to the 2000 levels before 2020. This was a trend observed by the entire nation and Massachusetts due to the economic recession in 2007-2008. In order to forecast future trends it is useful for examining the actual demographic trends in Central Massachusetts in the past few decades. Tables I-1[1] and I-2[1] found on the following pages depict the population and employment for each town in the six subregions current and projected from 2000 through 2040.

[1] 2040 population and employment numbers are subject to change pending final concurrence from MassDOT and individual town input.



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts
Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

Mobility2040 Invest in Your Transportation Future

Figure I-1 CMRPC Transportation System Map

Table I-1 Municipal Population Projections by Subregion

	Population			
	US Census Bureau			CMRPC Projections*
	2000	2010	% Growth	2040
North Subregion				
Barre	5,113	5,398	6%	5,936
Holden	15,621	17,346	11%	19,862
Oakham	1,673	1,902	14%	2,053
Paxton	4,386	4,806	10%	5,493
Princeton	3,353	3,413	2%	3,828
Rutland	6,353	7,973	25%	9,543
West Boylston	7,481	7,669	3%	8,766
Total North	43,980	48,507	10%	55,481
Northeast Subregion				
Berlin	2,380	2,866	20%	4,336
Boylston	4,008	4,355	9%	5,051
Northborough	14,013	14,155	1%	17,836
Shrewsbury	31,640	35,608	13%	41,171
Westborough	17,997	18,272	2%	21,010
Total Northeast	70,038	75,256	7%	89,404
Southeast Subregion				
Blackstone	8,804	9,026	3%	10,213
Douglas	7,045	8,471	20%	9,820
Grafton	14,894	17,765	19%	22,390
Hopedale	5,907	5,911	0%	6,809
Mendon	5,286	5,839	10%	6,416
Millbury	12,784	13,261	4%	15,319
Millville	2,724	3,190	17%	3,522
Northbridge	13,182	15,707	19%	18,855
Sutton	8,250	8,963	9%	10,213
Upton	5,642	7,542	34%	10,357
Uxbridge	11,156	13,457	21%	17,022
Total Southeast	95,674	109,132	14%	130,936
Southwest Subregion				
Auburn	15,901	16,188	2%	17,814
Charlton	11,263	12,981	15%	15,380
Dudley	10,036	11,390	13%	12,503
Oxford	13,352	13,709	3%	15,601
Southbridge	17,214	16,719	-3%	17,814
Sturbridge	7,837	9,268	18%	12,392
Webster	16,415	16,767	2%	19,142
Total Southwest	92,018	97,022	5%	110,646
West Subregion				
Brookfield	3,051	3,390	11%	3,745
East Brookfield	2,097	2,183	4%	2,382
Hardwick	2,622	2,990	14%	3,289
Leicester	10,471	10,970	5%	12,048
New Braintree	927	999	8%	1,071
North Brookfield	4,683	4,680	0%	5,154
Spencer	11,691	11,688	0%	12,915
Warren	4,776	5,135	8%	5,709
West Brookfield	3,804	3,701	-3%	4,096
Total West	44,122	45,736	4%	50,409
Central Subregion				
Worcester	172,648	181,045	5%	197,196
Regional Total	518,480	556,698	7%	634,072

*Projections - Draft MassDOT regional control totals March 2015

Table I-2 Municipal Employment Projections by Subregion

	Employment			
	Labor & Workforce Development			CMRPC Projections*
	2000	2010	% Growth	2040
North Subregion				
Barre	1,161	1,230	6%	1,334
Holden	3,923	3,520	-10%	3,875
Oakham	138	210	52%	227
Paxton	703	850	21%	915
Princeton	805	740	-8%	813
Rutland	1,076	1,060	-1%	1,221
West Boylston	3,817	3,730	-2%	4,320
Total North	11,623	11,340	-2%	12,705
Northeast Subregion				
Berlin	666	480	-28%	499
Boylston	1,429	1,800	26%	1,728
Northborough	6,923	5,800	-16%	7,158
Shrewsbury	14,556	13,010	-11%	14,069
Westborough	26,574	23,610	-11%	26,167
Total Northeast	50,148	44,700	-11%	49,621
Southeast Subregion				
Blackstone	1,192	1,030	-14%	1,458
Douglas	887	830	-6%	1,047
Grafton	4,634	4,100	-12%	4,464
Hopedale	1,831	1,620	-12%	1,637
Mendon	1,501	1,280	-15%	1,488
Millbury	3,884	5,050	30%	5,490
Millville	202	270	34%	301
Northbridge	4,715	5,320	13%	6,234
Sutton	1,554	2,110	36%	2,351
Upton	1,071	1,010	-6%	1,598
Uxbridge	2,828	3,080	9%	3,690
Total Southeast	24,299	25,700	6%	29,757
Southwest Subregion				
Auburn	12,299	9,940	-19%	10,685
Charlton	2,839	3,740	32%	4,395
Dudley	2,978	2,720	-9%	3,109
Oxford	3,532	3,760	6%	4,691
Southbridge	6,690	5,820	-13%	6,877
Sturbridge	5,163	4,470	-13%	5,188
Webster	6,667	6,690	0%	7,932
Total Southwest	40,168	37,140	-8%	42,877
West Subregion				
Brookfield	499	460	-8%	500
East Brookfield	387	420	9%	403
Hardwick	342	390	14%	397
Leicester	2,251	2,290	2%	2,418
New Braintree	157	210	34%	245
North Brookfield	1,251	910	-27%	918
Spencer	3,758	3,090	-18%	3,344
Warren	1,293	600	-54%	629
West Brookfield	956	830	-13%	860
Total West	10,894	9,200	-16%	9,714
Central Subregion				
Worcester	107,536	95,920	-11%	105,115
Regional Total	244,668	224,000	-8%	249,790

*Projections - Draft MassDOT regional control totals March 2015

Some Basic Definitions:

Population - All people living in a geographic area.

Household - A person or group of people who occupy a housing unit as their usual place of residence. The number of households equals the number of occupied housing units in a census.

Employment - The total number of persons on establishment payrolls employed full or part time who received pay for any part of the pay period.

MassDOT - Office of Planning recently released the draft future demographic control totals for all the State's subregions. The Central Massachusetts region's population and employment totals as released were in keeping with the demographic trends the region was experiencing in the past decade. This plan uses several sources for deriving the town level projections. They include, the town-level projections that staff has developed using the previous RTP projection trends, priority development and preservation areas study conducted for the CMRPC region, zoning/parcel information and other known landuse/infrastructure constraints from local input. When staff receives input and concurrence from MassDOT on the town-level projections, staff will refine the draft town level projections and communicate with the communities for their input and comment to finalize the town level projections.

Future year projections through 2040 are not predictions *per se*, nor are they expressions of an ideal future. They are simply educated assessments which offer a picture of likely socio-economic changes in the region, including the population, number of households and number of jobs by municipality. In providing these projections to each municipality, CMRPC hopes to inform discussion on how communities shape their policies to address expected growth. Together CMRPC and the towns it serves can move the region toward building the future most desired by those who live and work within its boundaries.

Primarily, the demographic data described above has been derived in order to inform this Regional Transportation Plan, out of which flows the Central Massachusetts Transportation Improvement Program (TIP), the annual list of projects slated to receive federal funding. These two documents are prerequisites for the region's eligibility for federal transportation funding. The projections are also used in the region's Travel Demand Forecast model, which estimates the current and future use of the region's transportation infrastructure and aids in analyzing projects being considered for both the RTP and the TIP.

Key Findings

Between years 2010 and 2040 the region is expected to add over 75,000 people, nearly 40,000 household units, and approximately 25,000 jobs. By comparison, in the 30 years between 1980 and 2010, the region added 122,000 people to its population and over 40,000 jobs.

Predicting future demographics is an important aspect to advancing transportation planning. Without the knowledge of where and when people and jobs occur in the future it would be very difficult to address future needs and issues. Mobility2040 plan looks to cater to the transportation needs and address issues for at least 25 years into the future. The travel demand model helps connect the demographic trends with travel patterns and behavior of the travelling public.

Population & Housing

- Currently the Central Massachusetts Region is home to 556,698 people, 8.5% of the Massachusetts population
- Currently the Central Massachusetts Region contains approximately 210,870 occupied housing units, 7.7% of the state's housing units
- The communities in the CMRPC region can be grouped in the following three categories based on the past growth trends, available land and infrastructure for future growth, and planned future residential projects. All rates of growth were projected only to the nearest percent, and were discussed with the stakeholders before converting the rates into projected counts.
    - **Low growth communities** (expected to remain close to the 2010 numbers): Auburn, Barre, Brookfield, Dudley, East Brookfield, Hardwick, Hopedale, Leicester, New Braintree, North Brookfield, Oakham, Oxford, Paxton, Princeton, Southbridge, Webster, West Brookfield, and Worcester.
    - **Medium growth communities** (expected to grow at a rate close to the regional average): Blackstone, Boylston, Douglas, Holden, Mendon, Millbury, Millville, Shrewsbury, Spencer, Sutton, Upton, Warren, West Boylston, and Westborough.
    - **High growth communities** (expected to grow more rapidly than the region as a whole): Berlin, Charlton, Grafton, Northborough, Northbridge, Rutland, Sturbridge, and Uxbridge.

Employment

- In 2000 the Central Massachusetts Region was home to approximately 245,000 jobs, about 7% of the jobs in Massachusetts. This number has decreased to 224,000 in 2010, and in 2040 the region is expected to host 250,000 jobs, about 7.3% of the total jobs in Massachusetts. This trend seems to be on par with historical data.
- Due to the current economic recession many economists predict that it will be several years, perhaps between 2017 and 2020, before employment numbers climb back to the 2005 levels.
- The communities in the CMRPC region can be grouped in the following three categories based on the past employment and planned future projects. All rates of growth were projected only to the nearest percent, and were discussed with the stakeholders before converting the rates into projected counts.

- **Low growth communities** (expected to remain close to the 2010 numbers): Blackstone, Brookfield, East Brookfield, Hardwick, Hopedale, Leicester, Mendon, Millbury, Millville, New Braintree, North Brookfield, Princeton, Southbridge, Spencer, Upton, Uxbridge, Warren, and West Brookfield.
- **Medium growth communities** (expected to grow at a rate close to the regional average): Auburn, Barre, Dudley, Grafton, Holden, Oakham, Oxford, Paxton, Rutland, Sturbridge, Webster, West Boylston, and Worcester.
- **High growth communities** (expected to grow more rapidly than the region as a whole): Berlin, Boylston, Charlton, Douglas, Northborough, Northbridge, Shrewsbury, Sutton, and Westborough.

The demographic projections presented here are estimates based on available data and short-term and long-term trends. They provide information to decision makers who can take actions and make choices that might ultimately affect the actual results. Markets and the nature of the transportation and working environments are likely to change between now and 2040, impacting the actual numbers in uncertain ways. Nevertheless, best educated estimates are made in order to have some rational basis for planning.

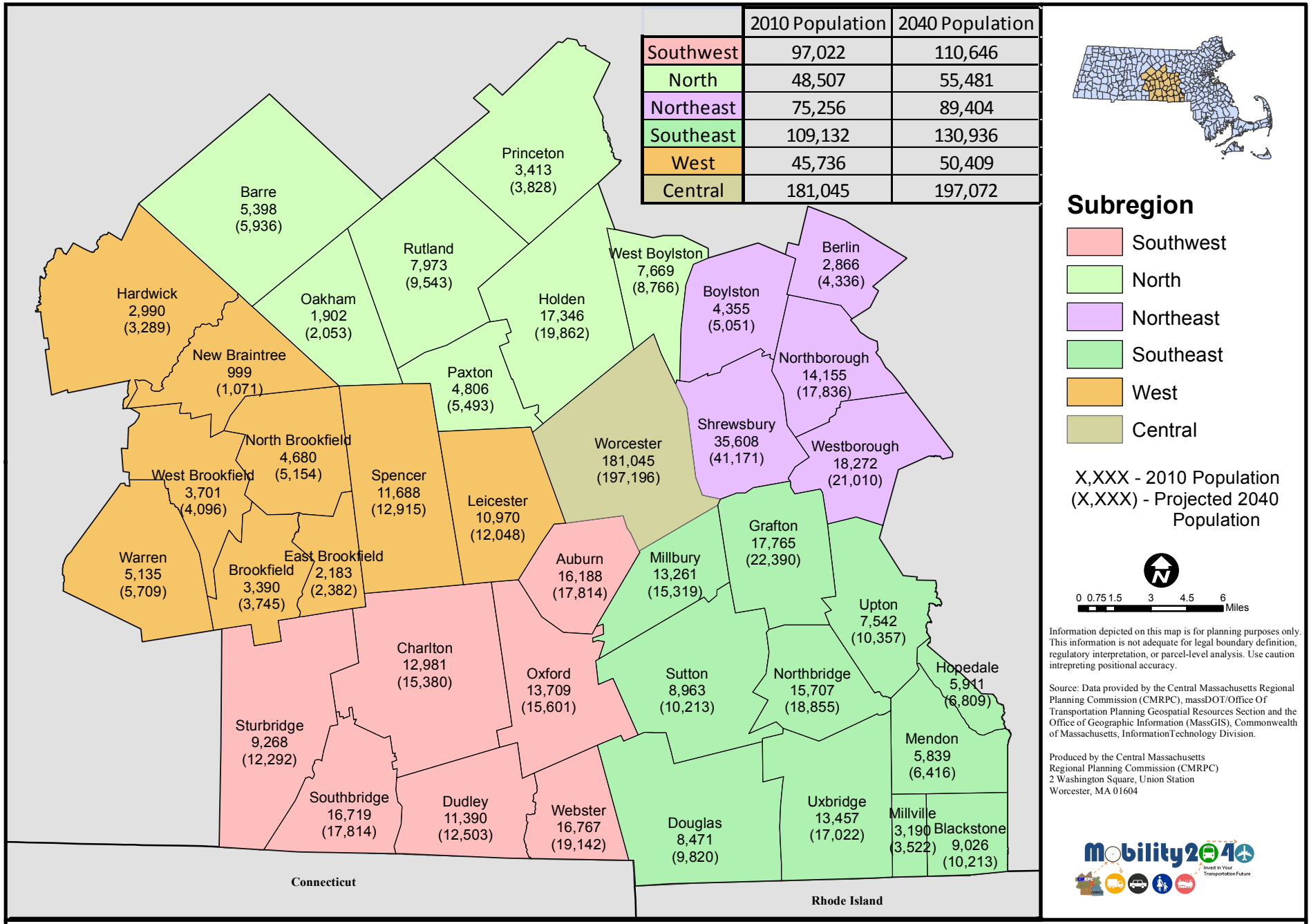


Figure I-2 2010 Population and Projected 2040 Population

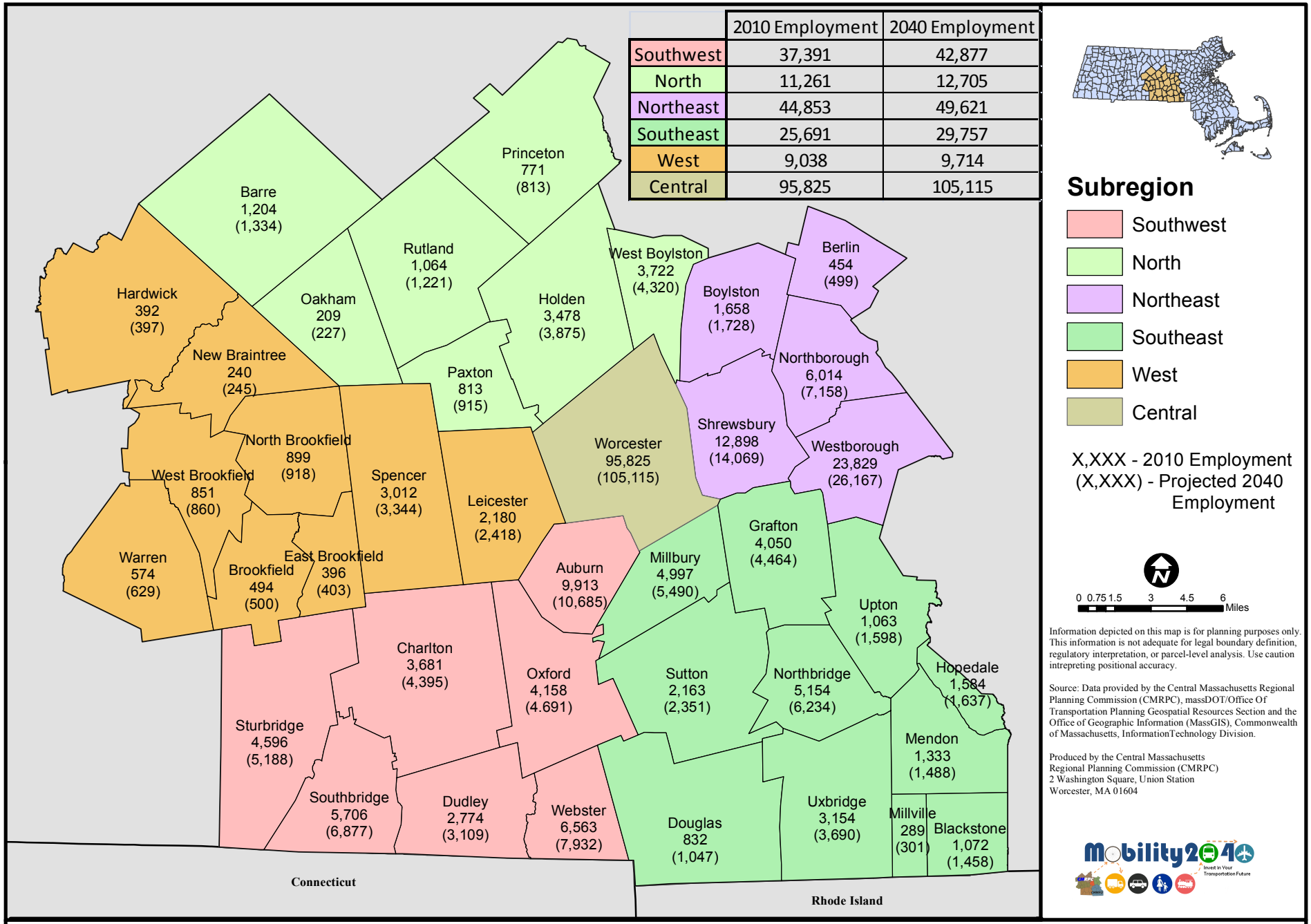


Figure I-3 2010 Employment and Projected 2040 Employment

Public Outreach

Overview

During the Mobility2040 development process, public participation was conducted through a variety of outreach methods as outlined in the CMMPO Public Outreach Program (POP). CMMPO Staff used diverse approaches to educate and inform the public about the long-range transportation plan process and encourage interested parties to express their views and provide input on transportation issues in the Central Massachusetts region.

Information was distributed to the public through press releases, the Mobility2040 webpage on the CMRPC website, social media, and e-mails to a robust distribution list. The press release was sent to over forty traditional and online-only media outlets throughout the region. Staff produced the Mobility2040 webpage and hosted the page through the CMRPC website. The page focuses on background information, the planning process, and how the public can be involved.

Using YouTube, staff created a five-minute video based on the information that was listed on the webpage. For accessibility purposes, a transcript of the video was provided. The Mobility2040 Twitter account served the purpose of detailing public information meetings locations and times. E-mails were sent to various committees, stakeholder groups, member community staff and boards, interested parties, and others.

CMMPO and CMMPO Advisory Committee Meetings

The Central Massachusetts Metropolitan Planning Organization (CMMPO) is the region's transportation policy and programming body. As required by MAP-21, the CMMPO oversees the development and update of a Long Range Transportation Plan document, every four years in the Central Massachusetts region.

The CMMPO has discussed the development of Mobility2040 at all of their monthly meetings starting in September 2014 and continuing to the present. The CMMPO Advisory Committee is a group formed by the CMMPO to provide input on a wide range of both technical and non-technical subjects. The Advisory Committee consists of a number of individuals from a variety of backgrounds with expertise in both transportation and transportation-related topics such as land use and conservation. As directed by the CMMPO, the Advisory Committee has discussed the development of Mobility2040 at all of their monthly meetings starting in August 2014 and continuing to the present.

Stakeholder Meetings

A series of meetings were held with transportation stakeholders in the region throughout the Mobility2040 development process. The purpose was to learn what issues and challenges exist within the current multi-modal transportation network while seeking input on crafting performance measures and targets that would be used to guide a vision for the future. This type of outreach allowed for interaction with a broad range of participants from a variety of expertise and backgrounds. A listing of the five stakeholder meetings that were conducted can be found in the accompanying Technical Appendix.

Public Information Meetings

A series of public information meetings were held in different communities throughout the region. These meetings were designed for the public to interact with staff and learn about the Mobility2040 process and transportation happenings in their area. Meetings included a table-top with a poster board display of various transportation topics, paper and interactive surveys, and business cards with the Mobility2040 webpage and social media information. There were fourteen public information meetings completed at a variety of venues; grocery stores, colleges, shopping centers, farmer's market, business exposition, and others. A listing of the public information meetings that were conducted can be found in the Technical Appendix.

Survey Methods

In addition to public information and stakeholder meetings, three survey methods were prepared to encourage participation. Overall, 623 surveys were completed. The complete results and copies of each survey method can be found in the Technical Appendix.

The first method was an interactive survey tool displayed on a computer table that was available at public information and stakeholder meetings, which asked participants how they would hypothetically invest into seven main categories that transportation dollars are invested into. The results of this particular survey will assist in developing funding scenarios in the financial chapter. This survey received 61 responses.

The second method was a paper survey that was distributed at all Mobility2040 meetings and was available in English and Spanish, for accessibility purposes. The survey asked respondents to choose their top three priorities for investment of transportation funding. Paper surveys were

also available at public libraries and other municipal buildings in twenty-two member communities. This survey received 229 responses.

The third method was an eight question online survey that incorporated questions from the other two survey methods. This survey received 333 responses, which proved more successful than the online survey conducted for the 2012 RTP. Links to the survey website were sent primarily through e-mail, the Mobility2040 website and Twitter page, and were available on the homepage of a few member community websites. Questions included the location of where respondents live and work, modes of travel, methods of transportation important in the present and future, issues to consider in Mobility2040, and the most difficult areas and/or intersections faced.

Survey Results

Survey respondents indicated that the automobile would continue to be the most important transportation method in the future and that roadway maintenance, safety, and congestion should remain the top priorities for transportation funding investment. As secondary and tertiary options, survey respondents displayed a shift in preference towards utilizing multi-modal, healthy, active transportation options in the future. The results highlighted that bicycling, walking, and public transportation (both WRTA buses and MBTA commuter rail) would be important transportation modes to prioritize and invest transportation funding into.

Overall, the survey results shared a general theme, but answers slightly varied based on the results of the demographic information provided by respondents. Younger respondents selected commuter rail and bicycle as options to consider and prioritize for funding allocation, while older respondents placed more emphasis on walking and transit as focus points for future planning and investment. Survey answers fluctuated marginally based on the respondents subregion.

The complete survey results can be found in the Technical Appendix or viewed online through the Mobility 2040 website.

CHAPTER II

Performance Management

Introduction

The 2016 Central Massachusetts Long Range Transportation Plan includes performance management measures, primarily as a requirement of the state's landmark transportation reform legislation signed in June 2009, but expanded with the current Moving Ahead for Progress in the 21st Century, also known as MAP-21. The Federal legislation creates a performance-based and multimodal program that focuses on national goals as a means to increase accountability and improve transparency[1]. It is intended to improve the decision-making process through better informed planning and programming.

Increasingly, over the past two decades, transportation agencies have been utilizing "performance management"—a strategic approach that uses performance data to support decisions to help achieve desired outcomes for their multimodal transportation systems. Performance management is credited with improving project and program delivery, informing investment decision making, focusing staff on leadership's priorities, and providing greater transparency and accountability to the public.

Performance-based planning and programming (PBPP) refers to transportation agencies' application of performance management in their planning and programming processes. For MPOs, this includes a range of activities and products undertaken by a transportation agency, together with other agencies, stakeholders, and the public as part of the 3C Metropolitan Transportation Planning Process. This includes developing:

- Long-range transportation plans (LRTPs)
- Other plans and processes (including those that are federally required, such as Strategic Highway Safety Plans, Asset Management Plans, the Congestion Management Process, Transit Agency Asset Management Plans, and Transit Agency Safety Plans, as well as others that are not required)
- Programming documents, including state and metropolitan Transportation Improvement Programs (STIPs and TIPs)

The goal of PBPP is to ensure that transportation investment decisions—both long-term planning and short-term programming—are based on their ability to meet established goals.

The cornerstone of *Moving Ahead for Progress in the 21st Century's* (MAP-21) highway program transformation is this movement toward performance- and outcome-based results.

[1] http://www.fhwa.dot.gov/tpm/about/action.pdf.

States will invest resources in projects to achieve individual targets that collectively will make progress toward national goals.

The goals and objectives presented herein express the values and the spirit of the 2016 Central Mass LRTP, formally known as Mobility2040. MPO investments over the life of the Mobility2040 plan commit funding to specific projects and reserve future funding for different project types through investment programs. In reporting the benefits of specific projects, MPO staff conducted project-level assessments to determine each project's impact in advancing MPO goals through performance measures.

The goals, objectives and performance measures reflect the vision of the plan set in the earlier chapter of the plan. The objectives and the performance measures that are included in this plan helps solidify the performance based planning process for the Central Mass region. The performance measures presented is a first attempt to set measures and targets to achieve the goals and objectives of the plan. As federal and state agencies finalize the goals and performance measures, staff expects to add and update performance measures in the next few years to better align with the federal and state goals and to capture the essence of the goals and objectives presented below.

Goal 1: Reduce Congestion and Improve Mobility for all modes

Objective 1 - Coordinate Improved Incident Management (Highway & Transit).

- Facilitate group to improve incident detection & clearance time. Have 1 meeting per year.

Objective 2 - Enhanced Traveler Information (ITS).

- Facilitate the installation of information systems/kiosks at major intermodal locations, such as Union Station. 2 locations every 5 years.
- Expand I-290 ITS Real Time Traffic Management (RTTM). RTTM on I-395 and Route 146 also. Install 2 Variable Message Boards (VMB) every 5 years.

Objective 3 - Improve Corridor Management Integration.

- Increase % of overall bus trips with an on time % greater than 90% (leaving hub and end of line). 10% increase over 10 years.
- Install Transit Signal Priority – 5 signals every 5 years.
- Reduce average travel delays along identified congested major roadway segments; 2 segments every 5 years.

- Improve 2 of the top 20 congested intersections every 5 years to a LOS of "D" or better.

Objective 4 - Improved Transportation Accessibility for all modes.

- Increase the number of ADA-compliant roadways and intersections. 2 locations every 5 years.
- Improvement in the bicycle and pedestrian network within ½ mile of transit stations – for the top 10 high boarding and alighting locations. 2 locations every 5 years.
- Increase average frequency on core-routes to 10 minutes. 2 routes every 5 years.

Goal 2: Improve the Safety and Security of the region

Objective 1 - Reduce the number & rate of Fatal & Injury crashes in the region.

- Reduce number of fatalities by 10% in ten years.
- Reduce number of serious injuries by 10% in 10 years.
- Reduce rate of fatalities (fatalities per 100 million Vehicle Miles Traveled (VMT)) by 10% in 10 years.
- Reduce rate of serious injuries (serious injuries per 100 million VMT) by 10% in 10 years.

Objective 2 - Achieve Industry standards for preventable accidents for transit.

- Reduce preventable accident rate (accidents per 100,000 miles) by 10% in 5 years.

Objective 3 - Enhance Transportation Security Coordination Region wide.

- Conduct one regional workshop/tabletop exercise every year to advance Evacuation Planning.
- Continue involvement with MRPC & Statewide Evacuation Planning efforts.

Goal 3: Achieve State of Good Repair

Objective 1 - Maintain condition of on and off-system bridges.

- Decrease the number of "Structurally Deficient" bridges in the region by 10% every 10 years.
- Decrease the number of "Functionally Obsolete" bridges in the region by 10% every 10 years.

Objective 2 - Maintain the condition of the region's roadways.

- Rehabilitate 25 miles of pavement over 10 years that are in poor or failed pavement condition, including roadways that accommodate bicycle lanes.
- Improve 10% of sidewalks that are in poor or very poor condition over 10 years.

Objective 3 - Maintain fixed route and paratransit vehicles in state of good repair.

- Replace WRTA fixed route vehicles on a 12-year replacement schedule.
- Replace WRTA paratransit vehicles on a five-year replacement schedule.

Goal 4: Increase Transportation Options and Promote Healthy Modes

Objective 1 - Increase the share of transit, bicycling & walking in the region.

- Triple walk/bike/transit share in Worcester by 2040.
- Double walk/bike/transit share in urbanized areas outside of Worcester by 2040.

Objective 2 - Expand the walk/bike network in the region.

- Expand bicycle infrastructure in the region by 50 miles by 2040.
- Increase bicycle parking at public facilities in the next five years.
- Improve pedestrian network within ½ mile of the top 10 high activity transit stops.
- Identify bicycle/pedestrian/transit gaps in the region.

Objective 3 - Work with member communities to implement Complete Streets policies.

- 10% of communities in the region have a local Complete Streets policy over 10 years.

Goal 5: Reduce Greenhouse Gas and Promote Sustainable practices

Objective 1 - Encourage compact and mixed use development where possible.

- Each four year TIP will include at least one project that supports development of a regional Priority Development Area (PDA).
- Include criteria to the TIP scoring system to consider the effects of a proposed project on regional PDAs and Priority Preservation Areas (PPAs).
- Discourage capacity building at low density areas (less than 4000 persons/sq mile or 1000 jobs/sq mile).

Objective 2 – Avoid/Minimize/Mitigate Negative Environmental effects.

- All proposed projects must be included as part of all TIP Environmental screening to determine opportunities for avoidance, minimization, and mitigation of impacts.

- Identify vulnerable infrastructure susceptible to climate change now and add scoring criteria in the TIP for future years.

Objective 3 - Reduce GHGs generated by Auto and Transit in the region.

- Maintain age of transit vehicles per FTA standards (6 years for buses and 5 years or 100,000 miles for vans).
- Institute one new Park and Ride lot in each five year period for Transit & TDM along congested corridors.
- One percent VMT reduction in each 5 years period.

Goal 6: Equitable Transportation for all populations

Objective 1 - Provide access to essential services; minimize burdens and maximize benefits associated with low-income and minority areas.

- Increase the number of ADA-compliant intersections by 10% over 10 years.
- Improve traveler information at Union Station complex by installing Information Systems/Kiosks.
- Improve outreach efforts by facilitating at least one open house/community sessions across the region every year.
- Increase multimodal access to job opportunities, health care, education, recreation, healthy food and affordable housing in two EJ or vulnerable population neighborhoods in 5 years.
- Inventory the bicycle and pedestrian network within a ½ mile of the top 10 transit boarding locations in the next two years.
- Expand transit/paratransit coverage in areas that lack adequate transit service with EJ population and other vulnerable populations. 2 routes every 5 years.

Objective 2 - Consider Geographic Equity of transportation projects across the region.

- Maintain an average fleet age of 5-6 years for transit vehicles in the region.
- Equity (based on distribution of projects) in sub-regional project programming (by mode) at least one TIP project over each five year period.
- Equity for Environmental Justice identified areas (by mode). One project that benefits an EJ area over each five year period.

Goal 7: Improve Economic Vitality and Freight Movement

Objective 1 - Reduce delay along identified Freight Routes.

- Expand ITS Real Time Traffic Management (RTTM) to include identified freight routes. Install 2 VMBs every 5 years.
- Reduce average travel delays along roadway segments of major freight routes. 2 every 5 years.

Objective 2 - Increase access to major employment centers.

- Improve the bicycle and pedestrian network near 2 major employment centers every 5 years.
- Increase frequency of bus routes traveling to/from 2 identified major employment centers every 5 years.

Objective 3 - Improve Safety along Freight Routes.

- Reduce injuries and fatalities along freight routes. 10% every 10 years.

CHAPTER III

Transportation Linkages

Introduction

Mobility2040 summarizes the efforts, the accomplishments to date and the identification of future transportation needs in the region in consultation with local communities and in cooperation with public and private entities. This chapter introduces the "linkages" from the transportation planning perspective. These linkages are overarching themes that influence or are relative to the decision-making process. Since there are real financial constraints to pursue all the transportation needs in the region, the linkages act as a compass by providing thorough and thoughtful weight to the planning process.

Land Use

Transportation planning should be conducted in concert with overall land use planning. The landmark agreement by the U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (EPA), and the U.S. Department of Housing & Urban Development (HUD) reinforces the concept that the transportation system is inextricably linked to the natural and built environment, and that planning for transportation must account for impact to/from economic development, housing, and the environment.

With considerable development pressure facing the region, Central Massachusetts' land use pattern is constantly changing. Its former agricultural landscape has given way to new subdivisions, shopping centers, and industrial parks. The early pattern of development in the 1700's and 1800's also entailed the presence of manufacturing centers located on rivers and streams as a source of power for mills and factories. Around these mills sprouted self-contained villages to supply workers and the surrounding area by necessity contained farms and forests with residents engaged in production of food and crafts to meet local needs. These villages today lend each community its own distinctive character and are cherished by residents. But growth and development outside of these town centers has taken on a vastly different character. With permissive development regulations, growth has taken on characteristics of "sprawl," resulting in large lot subdivisions, strip corridor commercial development, and new residences rising as continuous frontage development along once rural country roads. Farms and forests are disappearing, impacting wildlife and natural communities, while requiring ever-increasing costly solutions for maintaining environmental quality. Slowly, the region's New England character is being replaced by a less distinctive suburban landscape.

According to the latest Massachusetts Audubon's *Losing Ground* database, prepared in 2014, the region experienced the fourth highest number of acres of land converted from agriculture and forest for development of all 14 regions of the state from the period between 2005 and 2013 (2,866 acres). At the same time, the region ranked sixth among the state's regions for the number of acres protected. In fact, the Region protected over 3.5 times as land as was developed over the 2005-2013 period (10,649 acres protected versus the 2,866 acres of new development).

Communities experiencing the highest growth in the region based on change in land cover (acres of new development) include Northborough, Shrewsbury, Grafton, and Uxbridge. Northborough, Shrewsbury and Grafton have also been in the top five in constructing new residential units, based on building permits issued in 2012 and 2013. The other two communities are Holden (#1 in each year with 132 and 188, respectively in 2012 and 2013) and Westborough.

Table III-1: State Rank of Areas of New Development

Community	Total Area (Acres)	Total Area of New Development (Acres)	New Development (Acres/Sq. Mi.)	State Rank
Northborough	11,996	185	10	8
Shrewsbury	13,924	157	7	22
Grafton	14,918	185	8	12
Worcester	24,602	185	5	77
Uxbridge	19,179	213	7	24
CMRPC Region	614,639	2,866	3	3

The influence of highways on development patterns is also clear, as much of the commercial and industrial development took place near major regional routes, including Routes 9, 12, 16, 20, 122, 122A, 140, and 146. In spite of this development, forested lands still make up 68.2% of the regional land use as of 2013. Low-density residential land uses make up the second highest use at 12.9% for the region. In Worcester, the highest percentage of land use is residential at 46% (two-thirds of residential land use are various forms of multi-family residential units), while commercial and industrial occupies 15%, according to Worcester Assessor's Office data.

Most communities in the region are conflicted about how to grow. They often agree that they don't want continuous sprawl, but worry that higher density development will ultimately increase the size of the community, with a corresponding burden on resources. They also worry that high density development will negatively impact their desire to preserve small town charm. While CMRPC sees

the general pattern and pace of greenfield[1] development to continue as a trends extended, most communities in the region are beginning to focus commercial and other large scale development on specific sites identified in the prioritization plans developed for the region. CMRPC completed the Blackstone Valley, Central 13, and Rural 11 Prioritization Plans and participated in the 495/Compact Plan completed in 2011. These plans[2] identified a number of Priority Development Areas (PDAs) and Priority Preservation Areas (PPAs) which are intended to be magnets and areas of concentration for development and redevelopment in each subregion, including where additional infrastructure investments would be targeted which were identified as Priority Infrastructure Investments or PIIs. For the purpose of this project, CMRPC staff considered it useful to divide the Central Massachusetts region into subregions corresponding to the prioritization plans completed between 2010 and 2014. The subregions include: (See Figure III-1)

1. Blackstone Valley (47 local, 29 regional, and 6 state PDAs)
2. Central 13 (69 local, 48 regional, and 10 state PDAs)
3. Rural 11 (69 local, 29 regional, and 0 state PDAs)
4. 495/Compact (55 local, 11 regional, and 8 state PDAs)

In all, there were 240 local PDAs of which a total of 117 were designated regional PDAs and 24 were state-designated. The principles underlying the prioritization projects included the following:

- Continued new growth will likely require major transportation and other infrastructure upgrades, beyond what is needed to keep existing systems in good repair.
- New commercial and residential growth must occur in a manner that is respectful of open space resources, transportation networks, and water resources in the region.
- Land use and transportation decisions must take into account the principles established by the Global Warming Solutions Act, the Clean Energy and Climate Plan, the transportation re-organization statute and GreenDOT Initiative.
- Workforce housing must continue to be produced and preserved within the region at a scale that allows the number of workers living in the region to keep pace with the number of new jobs created in the region.
- Sustainable new growth will involve the creation and maintenance of well planned-transportation networks and, where available, an effective public transit system that will coordinate with and build on existing transportation and encourage intermodal uses (mode shift).
- Coordinated planning and implementation efforts are necessary, particularly where jurisdictions and boundaries intersect.

[1] An area of agricultural or forest land, or some other undeveloped site targeted for potential uses like residential, commercial or industrial development.
[2] Find links to all Prioritization Plan and resources at: http://www.cmrpc.org/community-development-documents

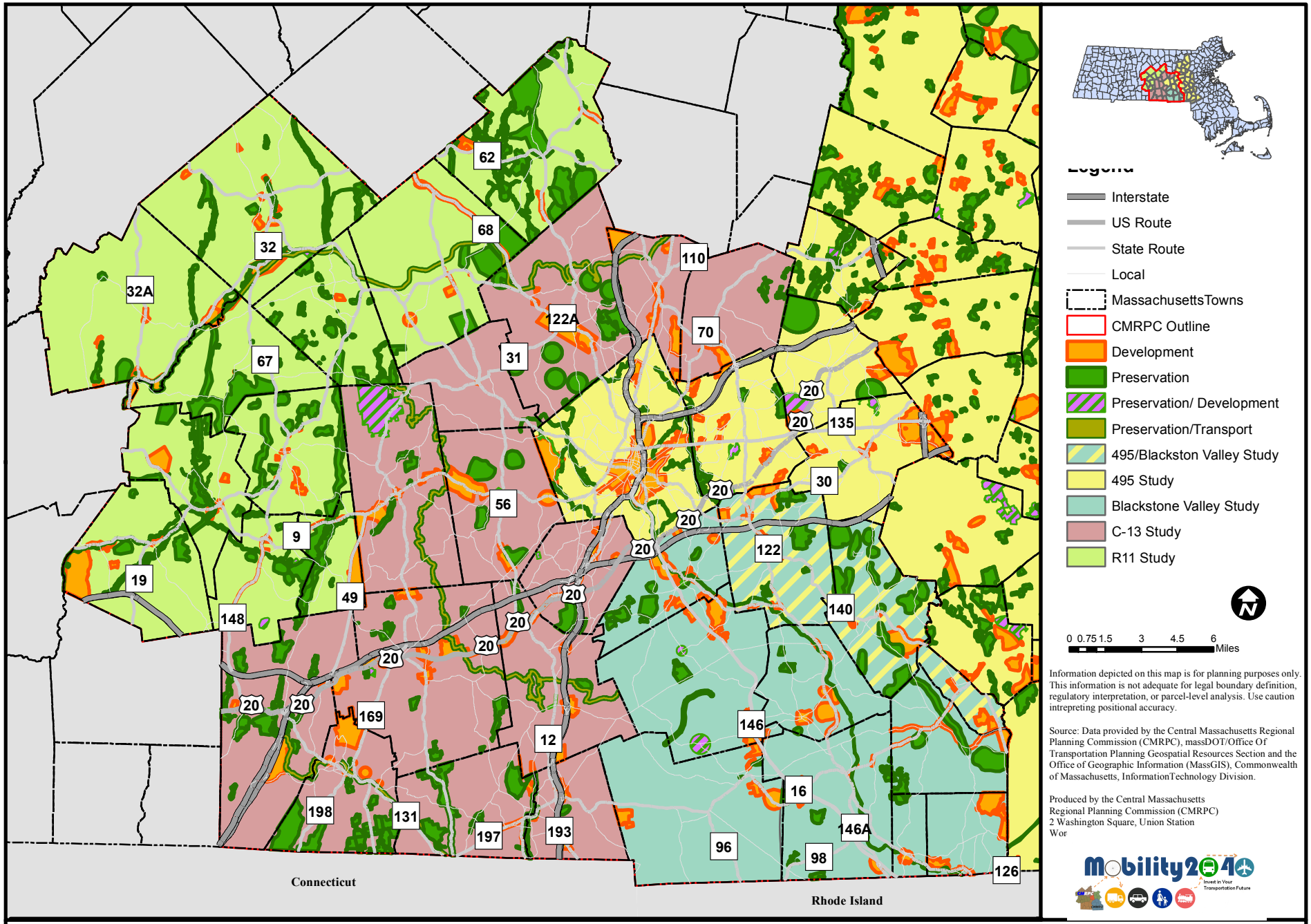


Figure III-1: CMRPC Prioritization Plans

Planning, both locally and regionally, must continue to work to protect open space (facilitated by the PPA designated sites) and consider sustainable growth patterns of development when making land use decisions. Priority Development Areas, in many cases, are existing town centers that communities are seeking to revitalize. These preexisting developed areas are ideal to align with the stated principles of prioritization planning. Focusing on these areas will result in more compact development patterns than has been the norm over the past 60 years. While Priority Preservation Areas are not necessarily protected, their designation will provide local officials with specific targets for preservation and conservation efforts and thus may further steer development into PDAs and other areas of potential development and redevelopment. CMRPC plans to update and coordinate the different prioritization plans in a comprehensive regional plan scheduled to begin work in the future.

Overall, we anticipate that while PDAs may become a greater focus for development in Central Massachusetts communities, we still expect that communities experiencing the greatest growth pressures are still those most likely to see development both in PDAs and in other locations. The exception to this is the City of Worcester where buildout is nearly completed and a recent resurgence in interest in redevelopment has occurred. This is occurring at the same time as demand for urban living is occurring on a national basis, and is having an effect on downtown Worcester development.

The impact of these land use development trends will likely be continued pressure on major and minor arterials to get generally sprawling commuters to more concentrated employment locations. The region has seen high growth on its major arterials over the past decade and that trend is likely to continue into the foreseeable future, absent more communities in addition to Worcester embracing more dense residential development. While millennials nationwide are trending to more urban environments, the effect of this trend is much softer in this region than in the Boston region where there is tremendously more attractiveness in terms of the urban offerings. That said, Worcester is reaping some benefits of this trend and that will continue at a moderate pace into the future.

Access Management

Policy Background

The Federal Highway Administration defines access management as “the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. It involves roadway design applications, such as median treatments and auxiliary lanes, and the appropriate spacing of traffic signals.” In practical terms, it means managing the number of driveways that a vehicle may encounter without hampering reasonable access to a property and removing slower, turning vehicles from the arterial as

efficiently as possible. Access Management focuses on both short term and long term improvements.

A safe and efficient transportation system is an important element of a local commercial area. Individual business owners sometimes express concern regarding the potential impact of access management requirements on commercial activity. However, studies conducted of businesses within areas where access management has been implemented show that improved access has virtually no adverse impact on business activity.

Access Management Strategies can be useful components of transportation plans, often providing multiple benefits to communities that choose to include the strategies in their plan of development. These strategies can be used to improve the overall safety, capacity, and appearance of a corridor. The Massachusetts Department of Transportation (MassDOT) states that the object of Access Management is to ensure roadway safety and efficient operations while providing reasonable access to the adjacent land uses. Access Management can also improve the environment for pedestrians, bicycles, and motor vehicles in all settings and on all roadway types by reducing and consolidating driveway conflict points. Additionally, access management techniques can be used to foster economic development or redevelopment in an area.

By managing the number and spacing of driveways along a corridor, without restricting access to property unreasonably, access management can remove slower, turning vehicles from roadways with heavy traffic movement. Access management can provide for safe and efficient traffic flow, helping to negate some of the problems caused by driveways and turns associated with suburban-style strip development.

The intent of an access management plan is to evaluate the ability of transportation system users to safely access the existing or proposed land uses from the roadway and/or from adjacent parcels. Multimodal planning guidelines and recommended standards can be developed to help ensure that communities and other regulating authorities consider both internal and external vehicle, transit, bicycle, and pedestrian access in the planning, design, permitting and project approval stages.

Performance Management

Mobility2040 has a number of overarching goals that relate to Access Management. Reducing congestion and improving mobility, reducing Greenhouse Gas and promoting sustainable practices, and improving economic vitality and freight movement are three goals that Access Management can play a role in achieving.

Accomplishments

In FY 2008, Central Massachusetts Regional Planning Commission (CMRPC) and the CMMPO staff began to develop access management and land use planning strategies that would assist communities in managing land adjacent to roadways in order to provide for safe and efficient internal and external access for motorists, transit users, bicycle riders, and pedestrians. Staff examined three corridor development scenarios along "vital links," as identified in the 2012 Long Range Transportation Plan, within the region:

- Near build-out conditions of primarily commercial/retail development (MA-9 Westborough)
- Medium-density development with residential and commercial land uses (MA-122A Holden)
- Under-utilized developable land identified as a future growth area (MA-140 Boylston)

For each of these scenarios, staff evaluated the ability to safely access the existing or proposed land uses from the roadway and/or from adjacent parcels. In addition, staff evaluated site design standards currently in place and their ability to provide for efficient vehicle, transit, bicycle, and pedestrian movement. This task has been developed as a multimodal planning effort. Copies of the resulting reports can be found on the CMRPC website.

Planning Ahead

Guidelines and recommended standards have been developed to help ensure that communities and other regulating authorities consider both internal and external vehicle, transit, bicycle, and pedestrian access in the planning, design, permitting, and project approval stages. In 2014, staff developed an Access Management Toolkit that can be used by local municipalities and development agents as a guide for smart development. In addition, staff will be cognizant of Access Management techniques when assisting municipalities in their Transportation Improvement Program (TIP) project development.

Economic Development

The Central Mass region today is an area in transition with regard to economic development, closely linked to the fortunes of Massachusetts but struggling to chart its own course. The boom period of the 1990s gave way to a series of recessions in the 2000s that have stubbornly refused to abate, at least in terms of new job creation. Between 2000 and 2010, employment in the region declined 3%, due to the recession, following a trend in Massachusetts as a whole.

TRANSPORTATION LINKAGES

Population growth in the region was more robust than in most areas of the state, due in part to housing prices pushing more people westward and the high overall quality of life factors found in the region. Despite CMRPC projections for healthy future growth, particularly employment growth, the projected rates of growth may not be achieved if the growth of the remainder of the state stalls or declines. This has serious implications for both the state and the region. There are certainly some hopeful signs for improvement, but it will take a concerted and cooperative effort by the communities of Central Massachusetts to provide a brighter future for their residents. A summary of economic conditions and trends is provided below:

- In 2000 the Central Massachusetts Region was home to approximately 245,000 jobs, about 7% of the jobs in Massachusetts. This number has decreased to 224,000 in 2010, and in 2040 the region is expected to host 250,000 jobs, about 7.3% of the total jobs in Massachusetts. This trend seems to be on par with historical data.

- Due to the recent economic recession many economists predict that it will be several years, perhaps between 2017 and 2020, before employment numbers climb back to the 2005 levels.

- Four (4) industries represent nearly 50% of all employment in the region: Health Care, Education, Retail, and Manufacturing[3] with a combined employment of over 125,000. However, the employment sectors with the highest annual wages are not in that group of sectors: Utilities and Management of Companies have annual wages in excess of $110,000. The regional average annual wage in 2010 was $48,332. While Education employment is often more local to the commuter's home base, Retail, Manufacturing, and Health Care are generally congregated in areas farther away from housing, and require more travel. The WRTA system effectively serves these industries, but only from denser population clusters. Because this region is affected by past and present sprawl, it's safe to assume that auto travel will continue to increase, even as transit ridership increases.

- Not surprisingly, the extreme effects of the recent economic recession were quite visible in the employment statistics in the CMRPC region in recent years. While Worcester County fared better than the nation, it did not always track better than the state. Between 2002 and 2008, Worcester County had a higher unemployment rate than both the state and the nation. In 2009 to 2011, the unemployment rate in the region was lower than the nation, but still higher than the state by more than one-half of one percent. As of July 2014, Worcester

[3] North American Industry Classification system (NAICS): http://www.census.gov/epcd/www/naics.html

County's unemployment rate was 0.8% percentage points higher than the state (6.9% versus 6.1%).

- Although at no time during the recession did the region's unemployment rate reach double-digits, it did in several communities however. In 2009 and 2010, ten (10) communities had an unemployment rate of over 10%, but by July 2014 no communities were over 10%. The community that was noted to be over 10% at the end of 2011, Southbridge at 10.1%, has dropped two full percentage points between December 2011 and July 2014, from 10.1% to 8.1%. Unfortunately, Southbridge had the highest unemployment rate of any of CMRPC's communities in July 2014, slightly ahead of the City of Worcester (8.0%).

- By contrast, several communities in the region had considerably lower unemployment rates, with a couple at less than 5% as of July 2014. No community's unemployment rate had increased in 2011, providing some signs at that time that the economy was moving in a more positive direction. However between 2012 and 2013, thirty-one (31) of the forty (40) CMRPC communities experienced an increase in unemployment, with three (3) communities experiencing a 1% increase. The other communities increase was all less than 1% percent. The good news is that by July 2014 only one community's unemployment had increased over the 2013 rate.

- One of the greatest advantages that Central Massachusetts and the state has is the presence of a highly educated workforce. In 1990, 2000, and 2008 no state (except the District of Columbia) had a larger percentage of its over 25-year old population with Bachelor's degrees or higher (38.1% in 2008, according to the US Census). In 2008 Massachusetts had 16.4% of its over 25-year old population with advanced degrees, again second only to the District of Columbia.

Historically the region was a center for agriculture, manufacturing, and education. In recent years both agricultural and manufacturing activity has declined significantly, although still important to the local economy. New, high-tech and biotech firms have come to the region, taking advantage of the well-educated workforce. In addition, healthcare systems are also significant employers. In the manufacturing sector, most new manufacturing jobs are in the advanced manufacturing realm[4].

[4] According to the President's Council of Advisors on Science and Technology Report to the President on Ensuring American Leadership in Advanced Manufacturing: Advanced Manufacturing is "a family of activities that (a) depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or (b) make use of cutting edge materials and emerging capabilities enabled by the physical and biological sciences, for example nanotechnology, chemistry, and biology. This involves both new ways to manufacture existing products, and especially

Most people of working age would prefer a good-paying job that is satisfying and secure, but as the nature of the economy evolves, changes in the makeup of employment will occur. The better jobs in the future will require a technically skilled and knowledgeable workforce and part of this responsibility lies with the community. Results from a survey of 50 North Central Massachusetts manufacturers, released by the Massachusetts Manufacturing Extension Partnership in the summer of 2014, points to the lack of an adequate trained workforce, especially for advanced manufacturing. Thirty-four of the companies said workforce issues are a challenge, with 18 citing a lack of trained, skilled workers and 11 saying low ability levels and a lack of interest in manufacturing among high school graduates create problems. The Commonwealth of Massachusetts has been trying to promote advanced manufacturing through its Advanced Manufacturing Collaborative, realizing that manufacturing jobs tend have higher annual incomes than most people perceive. However, there are capacity limitations within the state's technical schools that currently limit the amount of new students each fall.

While many of the workers in Central Massachusetts work in the town where they live or in a town nearby, an increasing number commute to jobs outside the region, placing an increasing burden on an aging transportation system.

Environmental Consultation Overview

Generally, a discussion consists of potential environmental mitigation activities and potential areas to carry out these activities. These efforts could also have the greatest potential to restore and maintain the environmental functions affected by LRTP as well as projects programmed on the region's TIP. The discussion shall be developed via consultation with federal, state, and tribal land management, wildlife, and regulatory agencies.

"Consultation" means that one or more parties confer with other identified parties in accordance with an established process and, prior to taking action(s), considers the views of the other parties and periodically informs them about action(s) taken. "Environmental mitigation activities" means strategies, policies, programs, actions, and activities that, over time, will serve to avoid, minimize, or compensate for (by replacing or providing substitute resources) the impacts to or disruption of elements of the human and natural environment associated with the implementation of the LRTP Mobility2040.

The human and natural environment includes, for example, neighborhoods and communities, homes and businesses, cultural resources, parks and recreation areas, wetlands and water sources,

the manufacture of new products emerging from new advanced technologies." From http://manufacturing.gov/whatis_am.html

forested and other natural areas, agricultural areas, endangered and threatened species, and the ambient air. The environmental mitigation strategies and activities are intended to be regional in scope.

Further, the MPO shall consult, as appropriate, with state and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation concerning the development of the LRTP. The consultation shall involve, as appropriate:

- Comparison of transportation plans with State conservation plans or maps, if available; or
- Comparison of transportation plans to inventories of natural or historic resources, if available.

Annual CMMPO Environmental Consultation Meeting

Annual Environmental Consultation Meeting was held 4/15/15 as an integral part of the concurrent CMMPO LRTP and TIP development efforts. The meetings are an opportunity to forge long-term relationships with various federal, state and local environmental stakeholders. These annual meetings have been held by the CMMPO since 2007. Staff conducts broad outreach to the environmental community and other interested stakeholders including:

- John H. Chaffee Blackstone River Valley National Heritage Corridor Commission (JHCBRVNHCC)
- Massachusetts Audubon Society
- Massachusetts Department of Conservation & Recreation (DCR)
- Massachusetts Department of Environmental Protection (DEP)
- Massachusetts Water Resources Authority (MWRA)
- Regional Environmental Council (REC)

Notably, past meeting participants have included the US Environmental Protection Agency (EPA), Conservation Law Foundation (CLF), Providence & Worcester Railroad (P&W RR), UMass-Amherst Stream continuity expert and commercial drainage pipe vendors.

The April 2015 Environmental Consultation Meeting was attended by staff from the Massachusetts Department of Environmental Protection (DEP), Town of Dudley Trails & Greenways Committee, the 495/MetroWest Partnership, a number of community engineers and planners as well as private consulting engineers. Agenda items for the 2015 meeting included the development of Mobility2040 and the CMMPO TIP, the use of GIS-based Environmental Profile Maps as well as regional efforts to measure the Greenhouse Gas (GHG) reduction

potential of all projects reflected in the LRTP and programmed on the CMMPO TIP. *A PowerPoint presentation from the 2015 Environmental Consultation session is included in the LRTP's Technical Appendix.*

Environmental Profile Maps

The region contains a wide variety of natural features and resources. Transportation improvement projects often cross or are situated near environmentally sensitive areas. Transportation infrastructure poses a measurable impact on the natural environment, by affecting changes to:

- Forest fragmentation
- High levels of noise
- Impacts to water quality (contaminated runoff)
- Increased air pollution
- Land cover

As part of the regional planning process, MAP-21 guidelines encourage early consultation with host communities to address the environmental challenges associated with transportation improvement projects. Early assessment of existing conditions provides the opportunity for environmental agencies to discuss potential mitigation activities during the preliminary planning process, seeking avoidance or minimization of anticipated of impacts.

The compilation of "Environmental Profile Maps" on the regional level is simply an early indication of benefits and challenges associated with a particular transportation improvement project. Other established formal environmental processes through federal NEPA and state MEPA must often be followed. The compilation of Environmental Profile Maps occurs at the very early stages of project conception. It should be noted that the CMMPO is not a permitting entity, it relies on MassDOT to enforce environmental compliance when planning and constructing improvement projects.

Regional efforts to compile Environmental Profile Maps for the areas in proximity to transportation improvement projects are based on MassGIS spatial data, which visually depicts key information. The screening conducted by the CMMPO as part of early Environmental Consultation efforts is based on the detailed expertise of other regulatory agencies, specifically Mass DEP, Mass DCR and National Heritage & Endangered Species Program (NHESP). Data in these Geographic information Systems (GIS) layers identify:

- Conservation lands

- Cultural features
- Highly sensitive avoidance areas
- Recreation areas
- Water supply protection areas
- Wildlife habitat for endangered & protected species

Environmental Profile Maps provide detail of the environmental features within a ½ mile buffer zone of a proposed transportation project. This regional ecosystem approach allows for the identification of areas susceptible to possible impacts and assists in the consideration of context sensitive solutions for mitigation of impacts. This effort focuses on identifying various environmental systems, an example being a system of streams and connecting waterways, as opposed to simply looking at only where a single stream crosses under a roadway. *A detailed list of the MassGIS layers, parent agencies and data sets used for the region's early Environmental Consultation are included in the LRTP Technical Appendix.*

The CMMPO has been refining this effort to identify Planning and Environment Linkages (PEL) in the region by participating in the FHWA's PEL initiative to identify sensitive subareas in the region in consultation with federal, state, and local agencies. The CMMPO intends to continue working with applicable environmental agencies and other interested stakeholders, seeking to improve early environmental consultation procedures to helping to meet the planning region's overall conservation efforts.

Brownfields

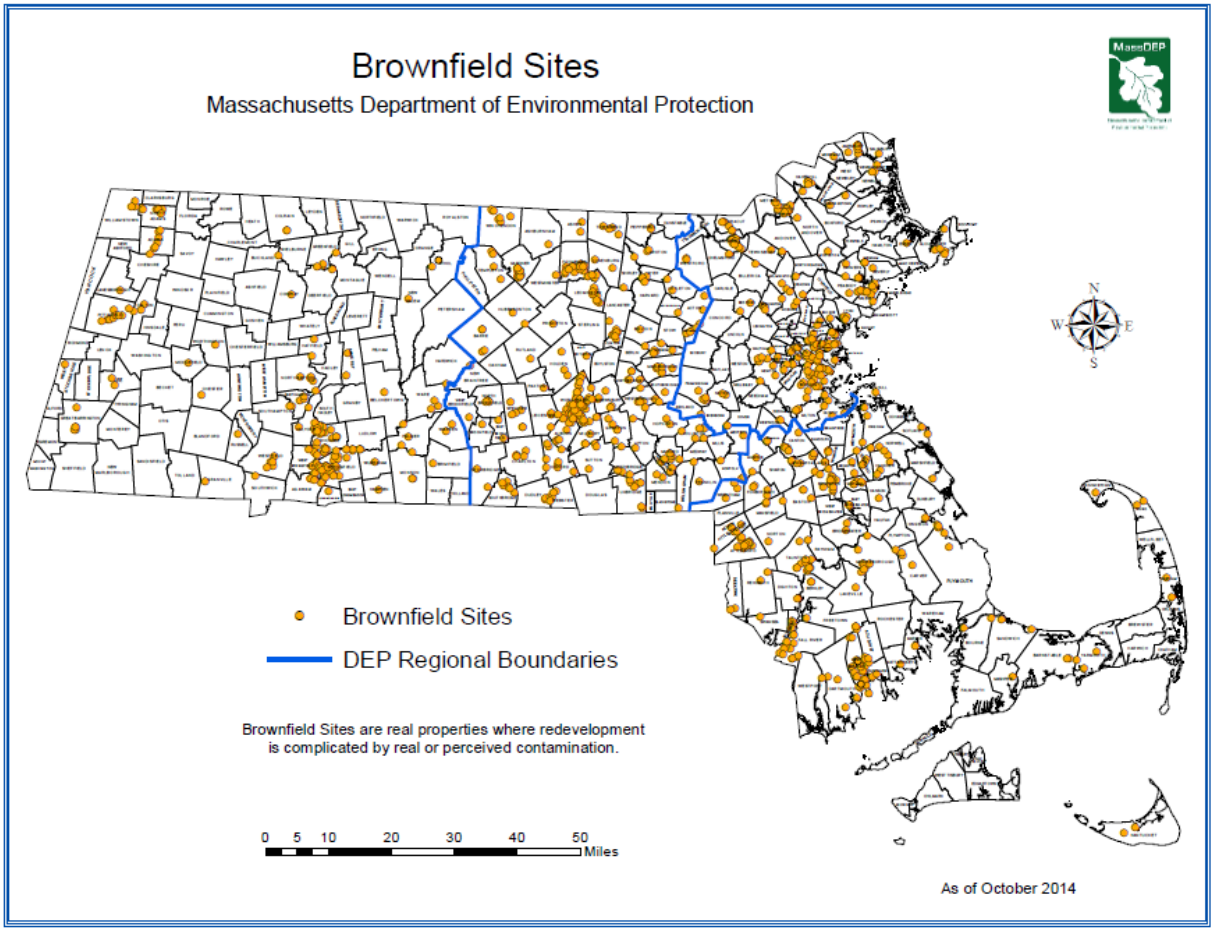
The presence or potential presence of a hazardous substance, pollutant, or contaminant can have possible impacts to human health and the environment. Most of the time, brownfields, or polluted properties could be cleaned up to support certain uses. This can be crucial to limit sprawl and spur redevelopment in derelict areas.

Under the previous governor's administration, a multi-agency MA Brownfields Support Team (BST) was created to identify and provide technical assistance and funds for brownfields clean-ups. The South Worcester Industrial Park (SWIP) and the Fisherville Mill in the Town of Grafton were both included for assistance in the BST round of projects. The SWIP is located in an Environmental Justice area and the use of the properties included foundry, cast metal manufacturing, and auto salvage. Underground storage tanks were removed and Gardner Street was extended. The parcels will be suitable for light industrial and manufacturing use. The SWIP property is located along a heavy freight corridor which is the subject of an ongoing effort to review Management Systems data (i.e. safety, congestions, pavement, etc) to determine potential

improvements that can be made. In the case of Grafton, the Fisherville Mill property is located along the Blackstone River. The 35-acre property had oil contamination, mostly from a fuel oil-laden canal that runs through the property. Remediation was completed and oil-contaminated sediments were dredged from the canal. Also a containment structure was built on the property. Given the fact the canal is open, a greenhouse and floating platforms were added as a stormwater control measure. The 13-acre park is open to the public and allows public access to the Blackstone River.

In the region, there are more properties identified as brownfields and under MassDEP or EPA oversight. See Figure III-2.

Figure III-2: MassDEP Brownfield Sites



Source: http://www.mass.gov/eea/docs/dep/cleanup/bfmap1014.pdf

A more recent opportunity for brownfield redevelopment in the region is the WRTA Maintenance and Operations Facility site, formerly an NStar gas plant in Quinsigamond Avenue,

Worcester, MA. Before formal construction started, the 11-acre lot required the removal of 45,000 cubic yards of contaminated soil. An investment of $15 million dollars was necessary for the environmental cleanup and enhancements in the property. This property is also close to the SWIP development noted above. Both of these corridors are considered gateways into the City. The road system is functioning fairly well, but improvements have been and are being identified that will enhance the functioning. Recent and planned improvements include on-road bicycle accommodations along these corridors. These brownfield redevelopment sites are excellent examples of using the existing infrastructure to spur economic development.

Oil spills from transportation-related operations also represent a source of pollution. As a result, MassDEP has a Leaking Underground Storage Tank Release Prevention Program to provide technical assistance and guidance to storage tank owners and operators.

In the region there is only one active superfund site included in the EPA National Priorities List.[5] The 23-acre site is located in Westborough, between Otis Street, Hocomonco Pond, and the Smith Valve Parkway. The site, used in the past for wood-treating and preservation operation, has restricted access and annual monitoring is conducted to ensure long-term protection of human health and the environment.[6] Even though the pollutants are not transportation-related, it does deprive the public access.

Sustainable Transportation, Smart Growth, and Livable Communities

Policy Background

Sustainable Transportation

Sustainable transportation provides exceptional mobility and access to meet development needs without compromising the quality of life of future generations. A sustainable transportation system is safe, healthy and affordable, provides transportation choices, make use of renewable resources while reducing emissions and minimizing short and long term environmental impacts. It is a multigenerational approach which meets the needs of the present without sacrificing the resources in the future, while maintaining or improving the environment. It also considers the long-term economic health and equity of a community. In transportation planning, it translates to addressing environmental management systems, to using funds effectively, to guaranteeing a long life-span of projects through high quality construction standards and to being sensitive to community and environmental needs.

[5] http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0100751
[6] http://www.epa.gov/region1/superfund/sites/hocomonco/559782.pdf

The sustainability approach focuses on three interrelated and sometimes conflicting main areas: environment, economy and community. This triad is so important that the Federal Highway Administration (FHWA) promotes the Sustainable Highway Initiative to improve sustainability in the Nation's roadway network. As part of this initiative, the FHWA had released a scoring tool known as INVEST, the acronym for "Infrastructure Voluntary Evaluation Sustainability Tool", which is intended to assist the state's and local agencies' decision making process by introducing sustainability best practices as the new standard into highway and roadway projects.

The Commonwealth of Massachusetts has been a promoter of sustainability for several years. Moreover, MassDOT sustainability vision for the Commonwealth's transportation system is laid out in GreenDOT. The vision encompasses all modes and all projects phases, from planning to design, construction and operations. GreenDOT's three main goals are: (1) to reduce Greenhouse Gas (GHG) emissions; (2) to promote healthy transportation options, like walking, bicycling and public transportation; and (3) to support "Smart Growth" development.

Smart Growth, Livable Communities and Quality of Life

Most often sustainability and livability are used as synonyms. Even though they are essentially rooted in improving overall quality of life, they are in fact very distinct planning approaches. Present transportation planning efforts are intrinsically defined by both. Sustainability as aforementioned is a multigenerational approach based in the interrelationship of the environment, economy and community. Livability, on the other hand, is about partnerships focused in achieving broader community goals such as access to jobs, affordable housing, quality schools and safer streets. There's no strict recipe for the type of partners, strategies or initiatives, which allows planning agencies to wade through a different array of strategies depending on local characteristics, invested stakeholders, fiscal realities and political climate, and other factors.

Livable transportation strategically connects all modes: bikeways, pedestrian facilities, transit services and roadways into an intermodal and interconnected system. These strategic connections are dependent on land use policies. Smart Growth is in essence a land use planning approach that promotes higher densities and mix of uses and activities as a way to reduce traffic congestion, preserve natural areas, avoid environmental degradation, promote economic development and refrain from predatory sprawl. Sustainability lies at the heart of Smart Growth theory and livability principles.

In 2009, the U.S. DOT recognizing the role of the transportation sector in achieving Smart Growth, announced an Interagency Partnership for Sustainable Communities. The partnership members are DOT, EPA, and HUD. The partnership established six interagency livability

principles: (1) provide more transportation choices; (2) promote equitable, affordable housing; (3) enhance economic competitiveness; (4) support existing communities; (5) coordinate policies and leverage investment; and (6) value communities and neighborhoods. In transportation planning, livability translates to addressing road safety and capacity issues, maximizing and expanding new technologies such as ITS, developing fast, frequent and dependable public transportation, integrating health and community design considerations as well as maximizing the use of Transportation Demand Management (TDM) measures.

At the state level, Smart Growth is one of GreenDOT key goals. Since GreenDOT implementation, MassDOT has worked with other state agencies on programs that support land development projects through the Massachusetts Environmental Policy Act (MEPA) permitting process. Another example is the Planning Ahead for Growth Program, in which MassDOT worked directly with the Executive Office of Housing and Economic Development (EOHED), and local agencies and officials to identify potential areas for growth and preservation. To further MassDOT's GreenDOT Implementation Plan, the Commonwealth's Healthy Transportation Compact and statewide Mode Shift Goal, *the Healthy Transportation Policy Directive* was issued in September of 2013 to ensure that all MassDOT projects are designed and implemented in a way that all network users have access to safe and comfortable healthy transportation options at all MassDOT related facilities and in all services provided.

Performance Management

Sustainability is at the forefront of Mobility2040. Even though the goals included in Mobility 2040 represent a concerted effort to achieve sustainability and livability goals, in this section the following performance measures are predominantly addressed:

- Each four year TIP will include at least one project that supports development of a regional PDA.
- Include criteria to the TIP scoring system to consider the effects of proposed projects on regional PDAs and PPAs.
- Discourage capacity building in low density areas (less than 4,000 persons per square mile or 1,000 jobs per square mile.
- All proposed projects must be included as part of a TIP Environmental Analysis and consultation processes.

Accomplishments

In an effort to avoid environmental impacts, the CMMPO references maps using MassGIS datalayers to identify environmental features within a mile of all TIP projects. The early identification of possible environmental impacts has become a standard procedure in the TIP development process and overall readiness for funding. Also, the CMMPO facilitates an Environmental Consultation Session on projects included in the TIP. The consultation sessions have proven to be an effective way to bring partners to the table to discuss best practices, new methodologies or tools to improve impact analyses and the identification of avoidance / minimization / mitigation alternatives.

Related to Smart Growth in the region, the CMRPC worked on several planning efforts for the CMMPO sub-regions in coordination with local officials, stakeholders and general public in the identification of Priority Development Areas (PDA) and Priority Preservation Areas (PPA), and priority infrastructure needs (including transportation infrastructure) within the region. Also, CMMPO staff provided comments on major development projects and infrastructure improvements consistent with GreenDOT's policy directive. An extensive effort has been placed in increasing the healthy, active transportation modes for "last mile trips". In that regard, the recently inaugurated WRTA Transit Hub and the opening of the Front Street segment from Front Street to Worcester Common has improved accessibility and transit connectivity to Downtown Worcester and the region, showing the synergy of several partners working in tandem for the livability overarching goal.

In relation to livability in the TIP, the CMMPO developed a draft TIP livability scoring criteria that proved useful in evaluating potential 2016-2019 TIP project candidates. Also, the CMMPO has been involved with several livability-related projects and initiatives, including Safe Routes to School Activities, Neighborhood SAFE and "Complete Streets", among other initiatives.

Planning Ahead

The CMMPO is applying FHWA's INVEST tool and identifying possible uses during the TIP development process. The CMMPO is charged with promoting sustainability in every transportation project that goes through the annual selection process. Special attention is placed on those projects where sensitive environmental areas had been previously identified. The CMMPO will continue annual Environmental Consultation Sessions as part of the TIP development process. In addition, the CMMPO will continue to work on the following projects and initiatives:

Safe Routes to School (SRTS) Activities

The Massachusetts Safe Routes to School program promotes healthy, active transportation modes for children and their parents in their travel to and from school. It educates students, parents and community members on the benefits of walking and bicycling for travel to and from school. Over the past two years, CMMPO staff has worked with Walk Bike Worcester on a pilot program for Safe Routes to School in the Worcester Public School System. This work is an integral part of the livability program for the CMMPO; it has a multimodal focus on the safety of schoolchildren in the City of Worcester.

Upcoming Safe Routes to School Taskforce efforts will include working with Woodland Academy/Claremont Academy in the City of Worcester. This unique school is housed in a single building, allowing for the integration of efforts across elementary and middle school levels. Special focus will be paid to incorporating student participation into the development of the project.

Neighborhood SAFE

Neighborhood SAFE is a new, proactive approach that the CMMPO is undertaking in order to provide communities with small area infrastructure assessments from a pedestrian and bicyclist safety perspective. The CMMPO has launched this effort to achieve the following objectives:

- Increase awareness of walkability in communities throughout the region
- Identify safety issues that pedestrians and bicyclists face
- Provide neighborhood safety analysis for all users of the transportation system
- Generate enthusiasm for healthy, active modes of travel

CMRPC is always looking for new communities to incorporate into Neighborhood SAFE. Upcoming work in this program will include a review of the Westborough Rotary area in the Town Center. Staff is optimistic that further studies will result from the development of the Regional Bicycle & Pedestrian Plan due in 2016.

Complete Streets

Through ongoing efforts with Walk Bike Worcester, the Safe Routes to School Taskforce, and Neighborhood SAFE, CMMPO staff has been working toward the incorporation of Complete Streets policies and techniques in all Transportation Planning products and initiatives.

Cross-collaboration with the Land Use staff of CMRPC is currently underway to achieve the Mobility2040 goal of 10% of the communities in the region adopting a Complete Streets policy within the next ten years.

Healthy, Active Transportation

Policy Background

Achieving major livability goals and healthier communities requires a transportation policy progressive enough to include health as a vital component. The focus on vehicle travel in transportation policy throughout the years has had a detrimental spillover effect on community health. Research shows that obesity, cardiovascular diseases, diabetes and other chronic health conditions can be associated with lack of physical activity. The Massachusetts Behavioral Risk Factor Surveillance Survey (BRFSS) 2008-2011 estimates that 61% of adults in the City of Worcester were overweight or obese, compared to 59% of Massachusetts adults, and lowest income residents in Worcester County had the highest prevalence of overweight (72%) and obesity (33%) in 2010.

Moreover, higher rates of asthma and other respiratory conditions can be found in locations with poor air quality that can be traced to Greenhouse Gas emissions. According to BRFSS, 11% of persons aged 18 and older in Worcester County have asthma. In Worcester County, Hispanics have the highest prevalence, followed by non-Hispanic Whites.

Injuries and fatalities as a result of crashes are also health effects related to transportation. Data from the Fatality Analysis Reporting System (FARS) show that fatalities as a result of a motor vehicle crash decrease 22% during the period from 2007 to 2011. Moreover, the fatality rate by a hundred million vehicle miles traveled (VMT) in 2011 was 0.62. Interestingly, in rural areas the rate was higher than urban areas, 1.10 versus 0.57. The percent of pedestrian fatalities in Massachusetts in 2011 was 17%, higher than the U.S. Bicyclists fatalities were 1%, whereas in the U.S. the proportion was 2% of all fatalities.

The Center for Disease Control and Prevention believes the topic is of major significance, and issued the report “Recommendations for Improving Health through Transportation Policy”. Key highlights in the report include the following: (1) reduce injuries associated with motor crashes; (2) improve air quality; (3) expand public transportation; (4) promote active transportation; (5) encourage healthy community design; (6) design to minimize adverse health effects and safety consequences, among others. Furthermore, the U.S. Department of Health and Human Services recommends using the Health Impact Assessments (HIA) as a planning tool to identify the impact of a new policy, program or major transportation project on community and individual health.

The Commonwealth of Massachusetts has been a national pioneer incorporating health into transportation policy. The Massachusetts Healthy Transportation Compact (HTC) was a key requirement of the landmark transportation reform legislation signed into state law in June 2009

and is an inter-agency initiative designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment and create stronger communities. In December 2013, MassDOT released the Healthy Transportation Policy Directive to include design directives to promote healthy design guidelines and active transportation modes as included in GreenDOT.

Moreover, a HTC Advisory Council was formed to help coordinate the activities of the Compact. The HTC-AC identified five areas to focus moving forward: (1) help inform the Project Selection Advisory Council in health related topics; (2) prioritize asset planning as included in WeMove Massachusetts capital planning process; (3) develop guidance to consultants on how to incorporate health analysis in their projects; (4) enforce Complete Streets and Active Streets legislation and municipal training; and (5) assist new administration in capitalizing on progress achieved and continue with initiatives already in place.

Also, the HTC worked on two HIA's on major transportation projects. The first one was the Grounding McGrath HIA, which became the example to follow on future transportation HIA's, and in May 2014 an HIA for the Logan Airport was completed to investigate the association of airport noise and emissions with adverse health outcomes.

In January 2009, Massachusetts launched the Mass in Motion project which aims to promote wellness and to prevent overweight and obesity in Massachusetts with a particular focus on the importance of healthy eating and physical activity. Mass in Motion provides grant funding to cities and towns in the state to make wellness initiatives a priority. In the CMMPO region, the City of Worcester was that grantee. The project team included state and local departments of public health, public and private health care providers, health researchers, city, regional and state transportation staff (including CMRPC), economic development staff, and local non-profit organizations. The project is a multi-year partnership to address overweight, obesity and chronic disease through access to healthy food and physical activity opportunities at the local level.

Performance Management

Mobility2040 has set the goal to "***Increase Transportation Options and Promote Healthy Modes***." As such, the following performance measures are of particular importance for the CMMPO:

- 10% of communities in the region have a local Complete Streets policy over 10 years.
- Expand bicycle infrastructure in the region by 50 miles by 2040.
- Increase bicycle parking at public facilities in the next five years.

- Improve pedestrian network within ½ mile of high activity transit stops.

Accomplishments

A result of the aforementioned partnership was the publication of the Greater Worcester Region Community Health Improvement Plan (CHIP). The CMMPO is actively working in the implementation of several strategies included in the CHIP, especially those in the area of Healthy Eating and Active Living. The strategies in which the CMMPO had been involved are the following: (1) increase the consideration of pedestrian and bicycle accommodation in routine decision-making through the adoption of Complete Streets transportation policy throughout the region. (2) establish four joint use agreements with schools in low-income neighborhoods to allow the use of both indoor and outdoor facilities by the public during non-school hours on a regular basis. (3) establish a district wide Safe Routes to School task force for ongoing identification and implementation of systems, policies and school-level changes to support increased walking and biking to school.

Also, the CMMPO participated in the development of Union Hill's Health Impact Assessment (HIA) Report, an effort lead by the City of Worcester Division of Public Health and funded by the Massachusetts Department of Public Health to assess the health effects of a future neighborhood's revitalization. The Union Hill neighborhood experiences higher crash rates, especially involving pedestrians, and higher rates of pedestrian injury than the city as a whole, for which the implementation of a Complete Streets program was recommended to guide street and sidewalk investments in the neighborhood.

More recently, the staff participated in a statewide Health Impact Assessment Workshop for regional planning staff facilitated by the Healthy Community Design Initiative, the Massachusetts Department of Public Health and the Metropolitan Area Planning Council. In addition, Regional Transportation Managers received a presentation about the Grounding McGrath Highway (Route 28 including McCarthy Overpass in Somerville) Health Impact Assessment as part of their monthly working meetings.

The CMMPO worked with Mass in Motion in the identification of transit stops close to "Corner Stores", an initiative developed to assist store owners sourcing local produce. Also the Worcester Regional Transit Authority (WRTA) has been a supporter for more access to healthier foods and active living. This summer the Regional Environmental Council Mobile Market had a spot at the WRTA Hub, the City of Worcester DPH held a vaccination clinic at the WRTA Hub as part of the flu season awareness program, and the TV screens at the WRTA Hub lobby present

informational slides with parks, and places to hike and bike located at walking distance to WRTA stops.

Planning Ahead

Health is definitely an area that will shape transportation policy in the immediate future. MassDOT is already working on how to incorporate health in the transportation planning process, from corridor planning to funding and final permitting. Most likely consultants will have the biggest share in terms of developing reports and studies, but there is a growing consensus that transportation agencies should lead some efforts, like HIA's for those projects with a large impact on the community. Not every TIP project will be a candidate for a HIA. As such, MassDOT is developing guidelines to assist regional and local officials in the evaluation of transportation projects.

The CMMPO will continue to work on the CHIP implementation and will provide support to initiatives related to transportation that improves the health of the region's population, especially those that are centered in improving and expanding the pedestrian and bicycle infrastructure in the region. The work done so far has helped to strengthen the organization's network with the City Division of Public Health, local non-profits, service providers and the community at large, expanding the CMMPO's stakeholder base.

The CMMPO foresees more staff training in the future related to these matters since it is an evolving topic. As standard procedure, the CMMPO will continue analyzing regional and local data through our local partners. Particular attention will be placed in education and information sessions as a way to reduce fatalities and serious injuries.

Climate Change

Policy Background

Greenhouse Gases (GHG) are considered to be detrimental to overall air quality due to their long-term effects. There is broad scientific consensus that our climate is likely changing both regionally and globally and a growing concern that this may largely be due to the combustion of fossil fuels and other human activities that increase atmospheric concentrations of Greenhouse Gases, including the following: Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), and other heat-trapping gases. These gases form a "blanket" of pollution that traps heat in the atmosphere that may cause climate instability characterized by severe weather events such as

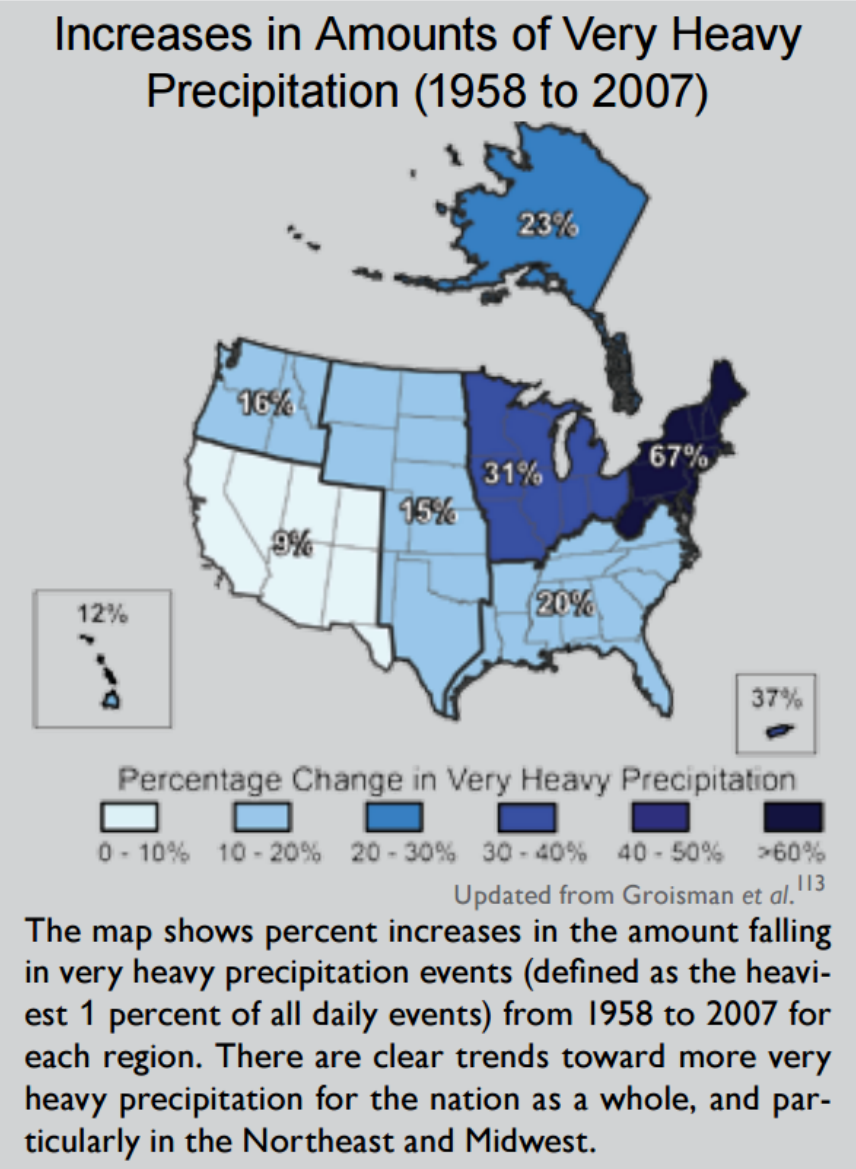
storms, droughts, floods, heat waves and rising sea levels creating significant impacts on people, natural resources and economic conditions around the globe.

The transportation system is the second-largest contributor to Greenhouse Gas emissions in the United States, and the majority—approximately 72 percent—of the transportation sector's emissions are generated by road transportation, including both passenger and freight travel. In 2011, the percentage of total Greenhouse Gas emissions in Massachusetts from the transportation sector was 39% of all emissions conducive to climate change.[7] Additionally, research studies have identified the serious impacts climate change poses for transportation. Increases in very hot days will compromise pavement integrity, and deform rail lines; increased flooding will inundate roads, bridges, and rail lines. Heavier rainfall may require redesign and replacement of local drainage structures; and more frequent and more severe hurricanes and snow storms will disrupt service in affected areas and require devoting more resources to evacuations. Research shows that climate change impacts are already happening, as a matter of fact, the Northeast region of the United States had the highest increase in the nation of heavy rain events from 1958 to 2007[8] (See Figure III-3).

Recognizing the importance and impacts of global warming, the Commonwealth passed the Global Warming Solutions Act (2008), which set the goal of a 25% reduction in Greenhouse Gases below 1990 levels by 2020, and 80% by 2050. Since then, several efforts have been developed across agencies. MassDOT in representation of the transportation sector developed the GreenDOT Policy and Implementation Plan which is geared towards the attainment of this goal. GreenDOT includes mode-shift as one of the key aspects of Greenhouse Gas and set a goal of tripling the amount of travel by walking, bicycling, and public transportation between 2010 and 2030. It requires a threefold strategy: (1) to increase the investment in transit, biking and walking facilities, (2) to promote traveler education and encouragement to use healthy, active transportation modes, and (3) to enhance the roadways and transit systems performance.

[7] Source: MassDEP (2014). Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990 through 2011 with partial 2012 data. Retrieved at: http://www.mass.gov/eea/docs/dep/air/climate/maghginv.xls.
[8] U.S. Global Change Research Program. *Global Climate Change Impacts in the United States*. Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009. Retrieved at: http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf.

Figure III-3: Increases in Amounts of Very Heavy Precipitation



U.S. Global Change Research Program. *Global Climate Change Impacts in the United States*.

Performance Management

Reduction in Greenhouse Gases requires a multidimensional approach. It pertains to sustainable practices, congestion management strategies, mobility improvements, expansion of multi-modal, healthy, active modes of transportation. Mobility2040 focuses its climate change goals to three areas: (1) increasing mode share and reduction of VMT, (2) emphasizing traveler information thru technology, and (3) identifying vulnerabilities in major regional infrastructure that is susceptible to climate change.

- Triple walk/bike/transit share in Worcester and double walk/bike/transit share in urbanized areas outside of Worcester by 2040.
- Identify vulnerable infrastructure susceptible to climate change now and add scoring criteria in the TIP for future years.
- One percent VMT reduction in each 5-year period.
- Institute one new Park & Ride lot in each 5-year period where adequate future year demand has been modeled for Transit & TDM along congested corridors.
- Install 5 Transit Signal Priority every 5 years.
- Expand I-290 ITS Real Time Traffic Management (RTTM). RTTM on I-395 and Route 146 also. Install 2 Variable Message Boards (VMB) every 5 years.

Accomplishments

While the magnitude of potential changes related to global warming are difficult to predict, transportation planners are called to assess potential harms related to these climate effects in order to better address infrastructure vulnerabilities and better plan for adaptation. In this regard, the CMMPO included the reduction of Greenhouse Gas generated by auto and transit as one of the core Mobility2040 goals. VMT reductions, TDM strategies and Park & Ride facilities are all included in Mobility2040 as Greenhouse Gas reduction measures. In addition, the CMMPO evaluates air quality impacts for all regionally significant transportation projects in conformity with federal and state's regulations that are included in the TIP and the LRTP.

Also, the CMMPO has taken steps to identify criteria to evaluate the vulnerability of existing infrastructure and main corridors as part of the region's Evacuation Plan. The criteria include flood-prone areas based on historical information, local hazards and location of primary services, along with Environmental Justice areas and other vulnerable populations that could be disproportionately impacted by an extreme weather event. Recent Corridor Profile planning studies have been successful in identifying critical infrastructure at stream crossings that could be affected by extreme flood events.

Related to transit, the CMMPO aims to maintain FTA age standards for transit vehicles. In addition to this, the WRTA has committed to acquiring hybrid vehicles as the common practice and to improve the performance of their all-electric vehicles. In recent years, the WRTA had added new routes to the system (including in and to surrounding towns) and the new Hub and all

fixed-route vehicles have bike racks, which provide more options for last mile trips. The WRTA has implemented several rider tools like system maps, schedules (print and digital), and real-time arrival and departure information from the Hub, or at the stops by using text or by QR codes. The website has been improved to include all the information readily available to their passengers. Another strategy used to improve transit operations is the use of Transit Signal Priority (TSP) systems. The WRTA analyzed several intersections with the intention to improve on-time performance by using TSP technologies.

To expand pedestrian and bicycle accommodations, the CMMPO has worked on several efforts, including the construction or development of new facilities like the new WRTA HUB and strengthening the network base with local organizations. In this regard, the CMMPO has been involved in walkability assessments and pedestrian and bicycle counts in coordination with local communities. Also, the CMMPO has partnered with MassRIDES to promote healthier commuting options. One example is the Safe Routes to School Program, which has been successfully offered to at least 5 schools in Worcester in the last 2 years. Further, the CMMPO joined MassRIDES in several activities, including the annual BayState Bike Week.

Information technology is a great ally to alleviate congestion, while in turn reducing harmful emissions, providing fuel savings and improving roadway efficiency. ITS technologies are planned for deployment in the Central Mass region on the length of I-290 interchange between I-495 and the MassPike (I-90). It is hoped this effort will result in travel time savings and improve the capacity along this corridor.

Planning Ahead

The CMMPO will continue evaluating the air quality impacts of all TIP projects. Federal and state regulations have specific methodologies to measure Greenhouse Gas in transportation projects. The CMMPO will continue its efforts in the development of key criteria to identify and address infrastructure vulnerabilities related to climate change as part of the TIP process.

At the same time, the CMMPO is committed to achieving at least one percent VMT reduction in each 5 year period, which will continue strengthening the links with state and local partners in traveler's education efforts as a way to encourage mode change. The institution of at least one Park & Ride lot every 5 years is also a strategy that the CMMPO will pursue in its effort to reduce the region's VMT.

In the same fashion, the CMMPO will pursue the development of more pedestrian and bicycle accommodations throughout the region with the objective to triple walk/bike/transit share in

Worcester by 2040 and double it in urbanized areas outside of Worcester by 2040. In this regard, the CMMPO will continue to work on the inventory of pedestrian and bicycle gaps and needs in the region with the intention of addressing these needs during the TIP development process. The CMMPO is committed to expand the bicycle infrastructure in the region by 50 miles by 2040. Also, it will continue promoting Complete Streets practices in the region's municipalities.

Reliance on ITS technologies will continue, and the CMMPO will facilitate the installation of information systems or kiosks at major intermodal locations, at least 2 locations every 5 years. Also, the CMMPO will work on the expansion of the I-290 ITS Real Time Traffic Management (RTTM), to include I-395 and Route 146 in the future as well. The CMMPO has committed to promote the installation of at least 2 Variable Message Boards (VMB) every 5 years.

Related to transit, the WRTA is committed to maintain their fleet in state of good repair and has a fleet rotation plan in place as a way to keep the age standard of its fleet to no more than 6 years for buses or 5 years / 100,000 miles for passenger vans. Also, WRTA's Advisory Board has pledged to acquire efficient buses, for which any new purchase will be either high performance hybrid buses or all-electric buses. In terms of planning, the WRTA will work on an accessibility plan to identify the needs for pedestrians and bicycling accessibility in a ½ mile radius of the top high boarding / alighting stop locations. In addition, the CMMPO envisions to install at least 5 Transit Signal Priority signals in the next 5 years along main transit corridors.

Transportation Security

Policy Background

Transportation security refers to both personal and homeland security. It includes the vulnerability to intentional attack and natural disasters as well as the associated evacuation procedures. The goal is to increase the security of the transportation system for both motorized and non-motorized users. In order to achieve that goal, CMRPC staff in conjunction with Montachusett Regional Planning Commission (MRPC) under the guidance of the Central Region Homeland Security Advisory Council (CRHSAC) is working on an evacuation plan for all of Worcester County.

The overall goal of the Evacuation Plan is to provide Worcester County emergency management personnel with a comprehensive Regional Evacuation Plan. Phase 1 was primarily a data gathering procedure. Phase 2 is anticipated to include identification of evacuation scenarios, modeling of evacuation impacts against current conditions, and identification of

recommendations for prioritization and implementation of a County-Wide Evacuation Plan. Phase 3 is anticipated to be development of a County-wide Evacuation Plan based on Phase 2 data and recommendations, as well as involvement of stakeholders. Phase 3 would include establishment of communications protocol, and implementation of publicity of such outcomes, including perhaps coded signage and development of standard messaging systems.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning on federal emphasis area of Safety and Security. Mobility2040 recognizes the importance of the Transportation Security and measure progress to achieve the following goals and objectives:

Goal: Improve the Safety and Security of the region
Objective: Enhance Transportation Security Coordination regionwide
Performance Measure:

- Conduct one regional workshop/tabletop exercise every year to advance evacuation planning
- Continue involvement with Montachusett Regional Planning Commission (MRPC) and statewide evacuation planning efforts

Accomplishments

CMRPC and MRPC under the guidance of the CRHSAC have completed Phase 1 of the Worcester County Evacuation Plan. Phase 1 was primarily a data gathering exercise which consisted of two sub-phases (Phase1a and Phase1b). Phase 1a provided an initial data inventory and assessed readily accessible data and conditions. The data that was compiled of the Phase 1a is:

Key Demographics

- Populations
- Identify and describe daytime and nighttime populations
- Major employment centers
- Hospitals

- Population densities
- Special populations
- Group quarters institutions
- Environmental Justice populations
- Natural Features
- Flood Plains
- Critical Dams
- Any other features identified by the Council

Transport Systems

- Overall Current Travel Patterns (to assess change needed in specific scenarios)
- Roadway Characteristics/Condition
- Transit (bus/rail/charter):
  - Capacity
  - Lines (rail has fixed routes)
  - Private operators/charters
- Private Auto
- Congestion (Volume-to-capacity; Intersection Ratings)
- Bridge Characteristics/Condition
- Major water bodies (for example, Lake Quinsigamond presents impediment to E-W travel in area)

Communication Systems

- Message boards
- Intelligent Transportation Systems
- Key travel corridors
- Traffic cameras
- Shelter locations

Phase 1b was a continuation of the work completed in Phase 1a, filling any data voids and working with municipalities to identify evacuation zones, evacuation routes, and traffic control points.

Between January 2013 and August 2013, CMRPC and MRPC met with emergency personnel from all 65 communities in Worcester County to gather information that would fill any data voids from Phase 1a related to the municipality; and to seek initial input on the identification of evacuation routes, traffic control points and evacuation zones.

Meetings with multiple towns within the CMMPO region, as clustered below, were then facilitated to review the draft maps and check for potential conflicts or incongruities that might require resolution across town borders. Holden, Paxton, Leicester, Auburn, Millbury, Worcester, West Boylston (Rutland and Hubbardston invited as well)

- Northborough, Boylston, Berlin, Bolton, Westborough, Shrewsbury, Southborough
- Barre, Hardwick, New Braintree, Oakham, Princeton, and Rutland
- Grafton, Sutton, Northbridge, Upton, Milford, Hopedale, Mendon, Blackstone, Millville, Uxbridge, Douglas
- Charlton, Sturbridge, Southbridge, Dudley, Webster and Oxford
- East Brookfield, West Brookfield, North Brookfield, Brookfield, Spencer, and Warren.

In the MRPC region conflicts or discrepancies that requires resolution across town borders was handled on a case-by-case basis with emergency personnel from each respective community.

It is important to note that evacuation related data was also gathered from abutting Massachusetts RPAs (Regional Planning Agencies) and states where available. This data was incorporated into the planning process to ensure that any evacuation routes feeding into the region from abutting areas matched up with routes in Worcester County communities ensuring inter-agency consistency.

Planning Ahead

In the many meetings held, as staff sought to work with municipal officials to identify routes, inevitably, someone would ask "What type of event are we planning for?" Staff found it hard to be scenario neutral. We often indicated that though a likely scenario would be a major coastal event such as a hurricane, we wanted to identify corridors or conduits to move large populations of people. Even as we discussed evacuation planning, we often found that with the exception of local disasters, Worcester County was likely to be a "pass through" community (such as Boston area residents moving as far west as possible) or a "receiving or host" community (Boston area or coastal communities, heading to and stopping in Worcester County).

Electronic Comprehensive Emergency Management Plan (eCEMP) Data Inconsistencies
Though stakeholders were generally eager to provide local information and insight, staff found that level of accuracy between local data and data drawn from the state's eCEMP Database varied widely. Some communities were meticulous about keeping the information up-to-date, while other communities found this to be a lower priority for available resources.

Communication Across Municipal Borders
Across the board municipal officials were concerned about how emergency personnel would communicate with each other across the town boundaries, across the region and across the state. There was a widespread concern about overall coordination and direction, specifically with regard to communication and guidance from MEMA, MassDOT and the Mass State Police.

Massachusetts Turnpike
For the nine (9) communities in Worcester County that the Massachusetts Turnpike (I-90) passes through, a consistent concern was raised about gaining access to Mass Turnpike "snow" gates to add additional entry points on the Turnpike.

Primary Care Shelters

Most Primary Care shelters are high schools or senior centers. On the other hand, eCEMP lists many more facilities; some that have no generator or will not be opened. It is important to clearly communicate about which shelters will open, when, and providing what services. This can be communicated with multiple tools - town website, message board, reverse 911, and Code Red (if available).

Communication with Residents

Communication with residents was generally a concern. 29 communities have contracted with Code Red, two (2) communities were considering contracting for Code Red services, and the 32 communities have either no emergency or a different emergency communication service.

Communication with Public Transportation Authorities

Communication with public transportation authorities will be extremely important. AMTRAK, WRTA, MBTA and MART will be needed to move concentrated populations, hospitals, etc. Scenario planning needs to address day-time and night-time populations, employment centers, residential developments, institutions hospitals, etc.

Communication Across State Borders

Communities bordering other state and counties were justifiably concerned about evacuation planning efforts in their neighboring communities and regions. 24 of the participating communities abut New Hampshire, Connecticut, Rhode Island, or an adjacent Massachusetts County.

Gas Stations

Since gasoline will be a highly valued resource by evacuees and emergency personnel alike, as part of this project the existing locations of public gas stations were mapped. Many more rural communities do not have gas stations located within their boundaries. For this and many other pieces of information gathered in this project there was tremendous concern about keeping information and tools current and up-to-date.

Additional Needs

In many meetings, officials identified additional needs such as Opticom[9], bridge repairs, facility repairs, staffing needs, and evacuation route signs that would be needed to affect an orderly

[9] The Opticom System provides traffic signal priority override for a high level of safe traffic management for emergency vehicles travelling through an intersection.

evacuation. There is a need for MassDOT to prioritize bridge repair on the primary and secondary evacuation routes.

Local disasters most often identified were train derailment, truck rollover, pipeline explosion or deficient dams. In addition, power plants/transformer stations, waste water treatment or sewage treatment plants, and a few big chemical plants were also identified. The Quabbin and Wachusett reservoirs and aqueduct systems that supply water to Boston area residents and the various reservoirs that supply the City of Worcester were indicated as vulnerable infrastructure. 49 communities have the potential to be directly affected by a train derailment or other railroad accident in their community. Only 19 of the communities are not intersected by State Routes 2, 9, 146, US-20 or I-84, I-90, I-190, I-290, I-395, or I-495. Every other community sees significant cross state or interstate traffic that has a high potential for truck rollover or other accident that could complicate a regional evacuation.

In addition, the region's communication towers (i.e. summit of Wachusett in Princeton, Ragged Hill in North Brookfield, or Asnebumskit in Paxton) were determined to be important vulnerable infrastructure.

Private emergency communication systems, such as Code Red,[10] are important means of communication with residents in situations such as weather related events or evacuations.

Next Steps

In 2015 staff will continue Phase 2 Evacuation planning efforts. Phase 2 will aid jurisdictions in practical application and use of the "Tool Kit'. This will be accomplished through the development and delivery of training workshops and exercises to assure jurisdictions have the knowledge and capabilities to utilize this data during an actual event. Planners will interview municipal and regional stakeholders in advance of the workshops to identify communication concerns. Based on planner/facilitator understanding, workshop agendas will be designed that interactively develop and test a communications protocol between local and regional emergency personnel.

Phase 2 will continue to align the Central Region Homeland Security Advisory Council Evacuation Plan strategies and goals with state evacuation plans. During this phase efforts to

[10] Code Red is designed to enable local government officials to record, send and track personalized messages to thousands of citizens in minutes. http://www.ecnetwork.com/codered/

identify and resolve conflicting response actions between all stakeholders will be undertaken. Phase 2 will continue to utilize the Evacuation Advisory Council that helped coordinate and facilitate planning efforts in the first two phases of the evacuation planning project.

Title VI, Linguistic Isolation & Environmental Justice Population

Policy Background

Transportation planners have processes to determine how, when and where federal monies should be invested in regards to mobility, such as highway projects, roadway improvements, railway expansion, port development, freight movement, transit projects and bike and pedestrian accommodations. But also, transportation planners analyze accessibility to employment opportunities, health care, housing, education and entertainment. These tasks take into consideration public involvement and the needs of the community, with special attention to those that are most vulnerable, like the elderly, people with disabilities, low – income and minority population. As such, equal access and opportunity are embodied in transportation planning. The CMMPO, assisted by the 3C planning framework, recognizes that a multimodal transportation system levels the playing field, and minimizes mobility and accessibility disparities in our community.

Notwithstanding, there are regulations in place to guarantee that all transportation agencies operate its programs, services and activities in full compliance with federal nondiscrimination laws, including Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency", Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”, U.S. DOT policy and guidelines and state regulations including the Massachusetts Public Accommodation Law.

Title VI prohibits discrimination in federally assisted programs and requires that no person in the United States of America shall, on the grounds of race, color, or national origin, including limited English proficiency, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal assistance. The Federal Highway Administration and the Federal Transit Administration regulations expand Title VI rule to prohibit discrimination on the basis of age, sex, and disability. Additionally, Massachusetts Public Accommodation Law prohibits making any distinction, discrimination, or restriction in admission to or treatment in a place of public accommodation based on race, color, religious creed, national origin, sex, sexual orientation, disability, or ancestry.

Environmental Justice primarily aims to identify and address disproportionately high and adverse human health and environmental effects of programs, policies and activities on minority and low-income population. Research has shown that households in poverty spend a higher proportion of their income in transportation expenses and suffer from limited vehicle availability.[11]

Performance Management

Transportation projects shall accommodate all users, regardless of their income, national origin, language barriers, disabilities, age, sex, ability to drive, or any other special needs. In that regard, Mobility2040 has a goal to achieve ***"Equitable Transportation for all Populations."*** The measures established to achieve it are:

- Increase the number of ADA-compliant intersections by 10% over 10 years
- Improve outreach efforts by facilitating at least one open house/community sessions across the region every year.
- Increase multimodal access to job opportunities, health care, education, recreation, healthy food and affordable housing in two Environmental Justice or vulnerable population neighborhoods in 5 years.
- Inventory the bicycle and pedestrian network within a ½ mile of top boarding transit locations in the next two years.
- Expand transit/paratransit coverage in areas that lack adequate transit service with Environmental Justice population and other vulnerable populations. 2 routes every 5 years.

Accomplishments

The CMMPO has been repeatedly in compliance with federal and state regulations and is fully committed to address the needs of all in the Central Mass region. In 2013, the CMMPO received a "good standing" approval from a major Federal Certification Review of its programs, services and activities. Furthermore, the CMMPO had submitted Title VI reports (annual reports, triennial reports, among others) on time, and has assisted subrecipients in their compliance with Title VI regulations.

CMRPC website has been updated to reflect recent changes in the policy and to include complaint procedures and the "Discrimination Complaint Form", making them readily accessible

[11] 2014. FHWA NHTS Brief. Mobility Challenges for Households in Poverty. Available in: http://nhts.ornl.gov.

to download either in word or in PDF formats. The CMMPO developed a Public Outreach Plan (POP) with input from a wide variety of transportation stakeholders, and an LEP Plan, both documents are also available to download on the agency website. CMMPO staff also assists the WRTA in providing Title VI information and procedures to its bus riders through flyers, "car cards", public hearings/workshops, and area newspapers. Also, staff assists the WRTA in transit planning activities and Title VI provisions in the planning process.

Moreover, in order to facilitate the implementation of the 3C process and to expand citizens' involvement in the CMMPO functions, an advisory committee was established for the CMMPO. The Advisory Committee provides a forum for broad public participation, technical and citizen input in the transportation planning process. It brings together public agencies, elected and appointed officials, transportation providers, environmental interests, technical experts, specialists, business persons and citizens concerned with transportation plans and programs.

The CMMPO has historically made a concerted effort to involve the region's disabled, elderly, low-income and minority populations. A number of advocacy groups serving these populations are included on the TPAG Elderly and Disabled Technical Task Force. These advocacy groups distribute information and materials to their associates, including local community organizations. Recently, the CMMPO has been working to address the region's needs through the Regional Coordinating Council.

The CMMPO has also updated his Environmental Justice definition based in the region's characteristics. New criteria were added to the CMMPO Environmental Justice definition recognizing those who are the most vulnerable. The CMMPO vulnerable populations are: minority and low-income populations, zero-car households, elderly population, linguistically isolated households and Hispanic or Latino population. Maps were developed identifying areas with Environmental Justice population and vulnerable population (see Figure III-4). Also, the maps show the degree of vulnerability (number of meet criteria in each Census Block Group). The CMMPO completed a Benefits and Burdens Analysis for projects included in the TIP.

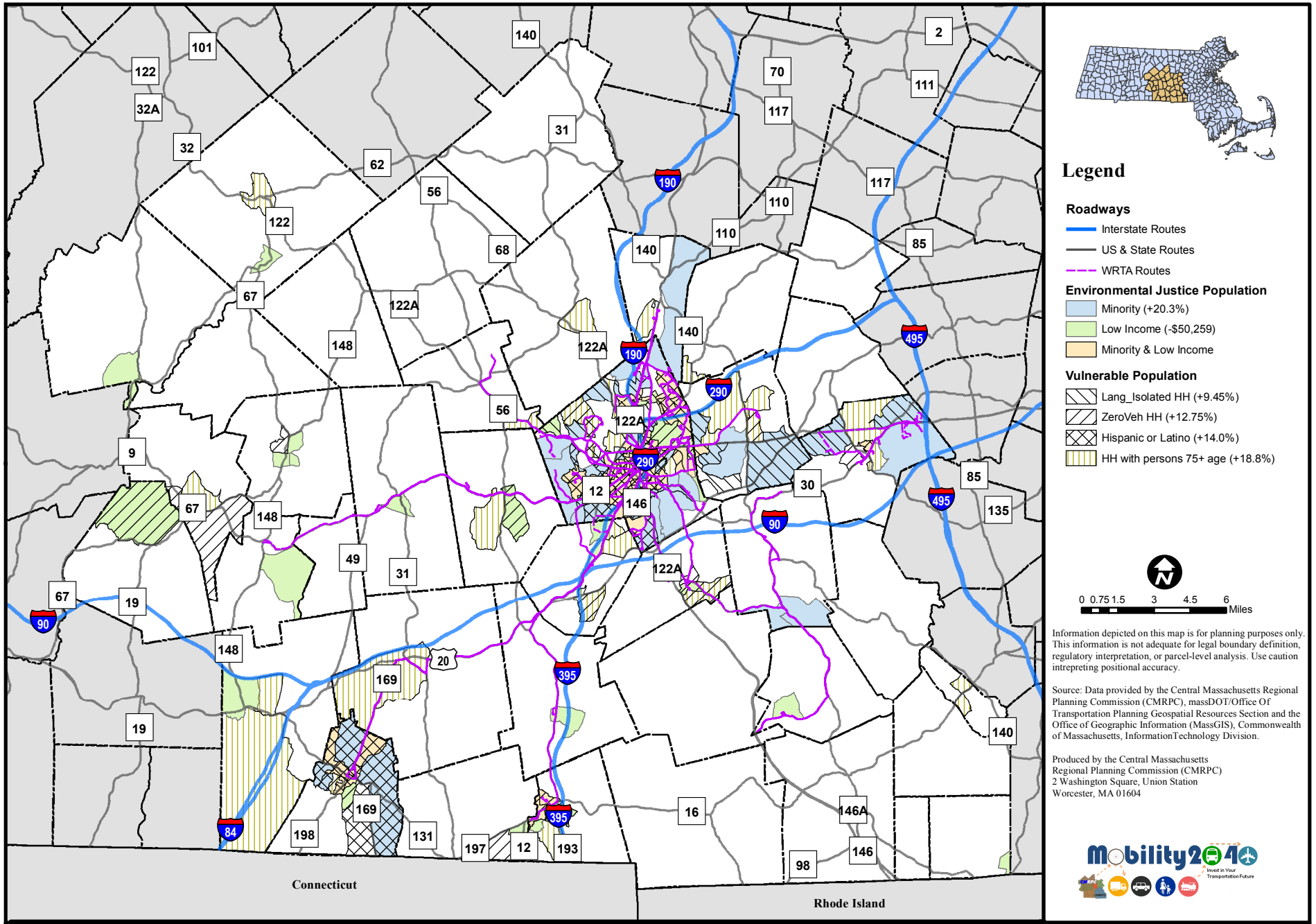


Figure III-4: Environmental Justice and Vulnerable Population

Planning Ahead

By recognizing the region's characteristics and its diversity, the CMMPO has been effective in reaching out to vulnerable populations, reinforced its outreach process, provide better accommodations and translations of vital documents to non-English speakers. In the same fashion, the CMMPO has advised developers and consultants regarding the region's characteristics improving the public participation process. The CMMPO will continue working to improve its outreach strategies. An integral part of this evolution has been the trainings in cultural diversity which has helped tailor outreach strategies to the region's cultural variances.

Also, the CMMPO will continue its work on transit and paratransit planning, ensuring the compliance with federal and state's policies and guidance. More emphasis will be placed on improving accessibility for those who are the most vulnerable in the region, improve service quality and guaranteeing a fair fare structure. CMMPO staff will work together with the WRTA to identify "transit deserts"[12] in the region in those areas where vulnerable or Environmental Justice populations and high demand for transit service exists.

The CMMPO will continue its work on identifying the gaps in pedestrian and biking accommodations, especially in areas identified as Environmental Justice neighborhoods. Also, the CMMPO will continue working to increase ADA-compliant intersections throughout the region. Major effort will be placed on increasing accessibility using healthy, active modes of transportation to major employment areas, affordable housing, health care, healthy foods, education and recreational areas.

[12] The concept of "Transit Deserts" was first introduced by Jiao and Dillivan (2013). See "Transit Deserts: The Gap Between Demand and Supply," *Journal of Public Transportation*, Vol. 16, No. 3, pp. 23-35. Retrieved at: www.nctr.usf.edu/wp-content/up;oads/2013/JPT_16.3.pdf.

Access to Essential Services

Policy Background

The U.S. DOT in coordination with FHWA and FTA issued Planning Emphasis Areas (PEA) to guide state's DOTs and MPOs' transportation planning work. One of the main PEA for federal FY2015 is Access to Essential Services, specifically the identification of connectivity gaps in access to essential services. Under MAP-21, accessibility, or the ability to reach essential services, is fundamental in a sustainable, equitable and multi-modal transportation system.

Essential services or activities include: emergency services, health care, public services, education, employment opportunities, access to food and to social and recreational activities.

Performance Management

Mobility2040 includes goals and objectives directly related to improving accessibility to essential services in the region. ***Goal 1: Reduce congestion and improve mobility for all modes*** includes ***Objective 4 - Improved Transportation Accessibility for all modes***, with the following measures:

- Increase the number of ADA-compliant roadways and intersections. 2 locations every 5 years.
- Improvement in the bicycle and pedestrian network within ½ mile of transit stations – for the top 10 high boarding and alighting locations. 2 locations every 5 years.
- Increase average frequency on core-routes to 10 minutes. 2 routes every 5 years.

Moreover, as previously discussed, access to essential services is related with transportation equity. As such, accessibility measures were included in ***Goal 6: Equitable Transportation for all populations.***

Objective 1 - Provide access to essential services; minimize burdens and maximize benefits associated with low-income and minority areas.

- Increase multimodal access to job opportunities, health care, education, recreation, healthy food and affordable housing in two Environmental Justice or vulnerable population neighborhoods in 5 years.

In addition, in ***Goal 7: improve Economic Vitality and Freight Movement***, there is a specific objective related to accessibility to major employment centers and related measures.

Objective 2 - Increase access to major employment centers.

- Improve the bicycle and pedestrian network near 2 major employment centers every 5 years.
- Increase frequency of bus routes traveling to/from 2 identified major employment centers every 5 years.

Accomplishments

The CMMPO has been working on the identification of transportation connectivity gaps for several years now as part of major livability undertakings. One example is the work the CMMPO is doing related to regional bikeways, trails and pedestrian networks. The CMMPO recognizes the suitability to complete the Bay State Greenway (BSG), as such, the staff started to identify state highways with wide shoulders as an option for on-road routes. Also, staff is involved in the Blackstone River Valley Bikeway initiative, a key segment in the BSG Nashua River – Buzzards Bay Corridor. In the same fashion, staff works in coordination with DCR on projects relevant to the Mass Central Rail Trail (104 miles connecting Boston to Northampton), the Midstate Trail (92 miles connecting New Hampshire to Rhode Island through Worcester County), and the East Coast Greenway (3,000 miles connecting Maine to Florida).

In addition, CMMPO staff has been responsive to local needs assisting local communities in the identification of walkability and bicycling gaps through the Neighborhood Safe program or through project-specific assessments. Another major endeavor has been the regional sidewalk inventory. Since 2012, staff is collecting data on sidewalk condition along federal-aid eligible roads in tandem with the regional pavement data collection schedule.

An effort related with the identification of transit gaps, primarily led by the WRTA, is the completion of the WRTA Service Standards. The service standards include performance measures to evaluate service efficiencies. One of the measures is route directness. This measure includes a maximum threshold of 300% of auto-travel time to essential services as a trigger for route's stop data evaluation. Also, the service standards include criteria to evaluate potential new services. The criteria included access to employment centers, education, and presence of vulnerable populations along proposed route, among other criteria. This methodology proved effective for the implementation in 2013 of Route 29, which provided new transit service to the towns of Southbridge, Charlton, Oxford, Auburn and Worcester.

Public meetings are also a great way to identify transit gaps. The WRTA receives public comments all year long through the Customer Service Office, scheduled Advisory Board meetings and additional public meetings to discuss service changes. Recently, the WRTA had a series of "Listening Sessions" to hear from transit riders and public at large their opinions about

the service and how they would like to see the service improved. The comments from these sessions were then included in the process of the Comprehensive Service Analysis, which is still in the works. In addition, every year, the WRTA administers a survey to transit users and include several origin and destination questions, frequency and travel time among others.

WRTA member towns and major employers also had a voice in the identification of transit gaps. As an example, community vans are now providing fixed-route transportation in the towns of Northbridge, Grafton and Westborough as the result of an existing need to connect local services and jobs with the commuter rail and the WRTA fixed-route. The schedule is synchronized with the commuter rail in peak hours as the result of formal consultation and completed surveys by human resources personnel from major employment centers.

Furthermore, the Commonwealth's Executive Order 530, related with quality and efficiency of paratransit and community transportation, recommended the creation of Regional Coordinating Councils (RCC). The RCC is a voluntary advisory body that represents regional stakeholders with an interest in improving community mobility and developing collaborative solutions to existing gaps and barriers. The Central Mass RCC is working in the identification of unmet needs in the region, with special attention to access to jobs and services in rural areas.

Related with auto-travel, MassDOT recently released the Massachusetts Travel Survey 2010-2011 (MTS). The survey collected information about travel patterns, preferences and behavior on a total of 15,033 households, of which 1,148 were completed in the CMMPO region.[13] The results of the survey are currently being analyzed. The CMMPO will input this data into the Travel Demand Model together with the Census Transportation Planning Package (CTPP) to identify future needs and assist in the prioritization of transportation investments, with regard to access to essential services.

Planning Ahead

As a result of the renewed focus on accessibility, the CMMPO is gearing its efforts to perform an incremental accessibility gap analysis for all modes with special attention to Environmental Justice areas while continuing current efforts. Future tasks include the development of the Central Mass Walk and Bike Plan, the completion of WRTA's Comprehensive Service Analysis and the travel study data input to the Travel Demand Model.

[13] Some of the measures included in the survey were related to how far people travel, what mode they take, number of daily trips, trip purpose, among other questions. For more information visit projects' website: http://www.massdot.state.ma.us/planning/Main/MapsDataandReports/Reports/TravelSurvey.aspx

As an initial step for the accessibility gap analysis, the CMMPO analyzed density patterns within the region, with special attention to employment and population density (see Figure III-5). Both, population and employment densities are higher in the Worcester area which gravitates towards the Eastern part of the region along major corridors like I-290, I-495 and Route 9. Also, throughout the region there seems to be a relationship between densely populated areas and employment concentration mostly located on or in proximity to major corridors (ie. Routes 9, 12 and 20). As a result, the western portion of the region is more dependent on these corridors as a lifeline for their communities.

Higher proportions of low income and minority population are mostly concentrated in locations with both high population and employment densities. Other vulnerable populations, like elderly or zero vehicle households are spread out throughout the region, making their accessibility to essential services even more difficult. Also, is noteworthy that in the northwestern section of the region, although not densely populated the employment locations are spread out and are mostly located along local roads, not necessarily federal-aid roads or major regional corridors.

Another relevant observation derived from the density analysis is that in the southeastern section of the region, densities gravitate towards the Route 146 corridor. Route 16 is one of the major corridors in this subregion providing the East-West connection between densely populated areas and employment centers.

As mentioned before, the CMMPO will continue its work assessing the accessibility gaps in the region with a special attention to main corridors.

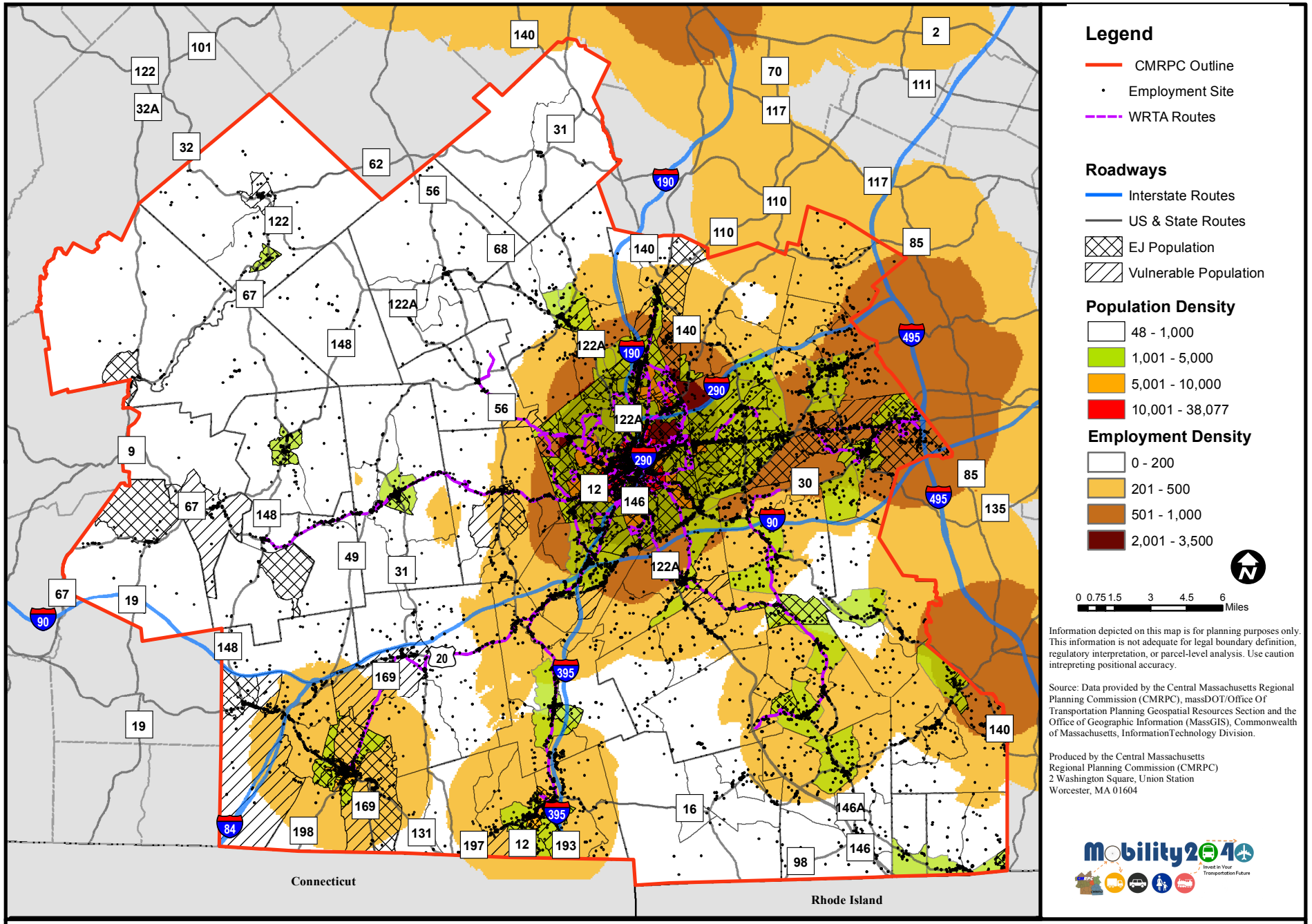


Figure III-5 Access to Essential Services

CHAPTER IV

Transportation Modes

Introduction

The transportation system in the CMMPO region is a multimodal network of roads, bridges, transit services, freight facilities, bicycle routes, pedestrian facilities and intermodal connections that need to work as an integrated system throughout the 40 communities and beyond.

The transportation system is maintained by a number of different entities, including MassDOT, the Worcester Regional Transit Authority (WRTA), Massachusetts Bay Transportation Authority (MBTA), Massachusetts Port Authority (MassPort), private intercity bus carriers, private freight rail carriers, Department of Conservation & Recreation, Army Corps of Engineers, various local/regional/state entities and local communities. Mobility2040 recognizes that all of these stakeholders must work in a coordinated fashion to ensure seamless accessible connections between modes, with the result of providing access to the essential services of employment, health care, education, and recreation for all modal users.

In 2009, transportation reform legislation containing the Massachusetts Healthy Transportation Compact was signed into law. The Healthy Transportation Compact was designed to create a balance in transportation decisions so that all network users would have expanded mobility, access to essential services, a cleaner environment, and improved public health. MassDOT formalized its commitment to the Healthy Transportation Compact in September of 2013 when it issued a policy directive supporting the statewide mode shift goal. The *Healthy Transportation Policy Directive* ensures that all MassDOT projects are designed and implemented in a way that all customers have access to safe and comfortable healthy, active transportation options at all MassDOT facilities and in all services provided. This directive reflects USDOT's *Accommodating Bicycle and Pedestrian Travel: A Recommended Approach*, a policy statement that calls for expanded focus on bicycle and pedestrian accommodation.

On 2010, the Massachusetts Department of Transportation launched GreenDOT; a comprehensive environmental responsibility and sustainability initiative making MassDOT a national leader in "greening" the state transportation system. One of the three primary goals of GreenDOT is to *promote the healthy transportation options of walking, bicycling, and public transit*. GreenDOT contains a section related to Complete Streets, which requires bicycle and pedestrian accommodation as part of the MassDOT *Project Development and Design Guide.*

The following sections provide a brief background of each mode and the associated performance management goals. For each mode, an analysis of gaps was performed and an assessment of

need (including an analysis of how well it provides access to essential services) was completed. Finally, a prioritization strategy to address the needs is presented.

Pedestrian

Background

Healthy, active transportation options are becoming increasingly important in the United States, especially among younger residents. According to *Millennials and Mobility* (APTA), nearly seventy percent (70%) of people 18 to 34 use multiple travel options several times or more per week. Even residents who travel primarily by private automobile are, at some point throughout the day, a pedestrian. Pedestrian travel is a healthy activity that is beneficial to the environment and low cost. It is imperative that safe, easy to use facilities are available where there is a high level of pedestrian activity. For CMRPC planning purposes, a pedestrian is any person travelling on foot or wheelchair (manual or motorized). According to the 2010-2011 Massachusetts Household Travel Survey, approximately 3.2% of CMRPC planning region residents commute to work by walking, while 10.1% of students travel to school via the same mode. Walking can be more efficient, affordable, and convenient than travelling by vehicle on congested streets. Furthermore, there are populations within the region that do not have access to a vehicle as a primary mode of transport, making walking a necessary part of their travels.

Adequate pedestrian infrastructure is essential to providing residents access to essential services. Not only does infrastructure need to exist in areas where there is demand, it also needs to be maintained in a proper manner so that it is accessible to the entire population. Maintenance is especially important in an area such as Central Massachusetts, which experiences harsh winter weather, impairing the travel of pedestrians. In addition, the connection of bicycle and pedestrian infrastructure with transit systems is essential to increasing the mobility of Central Massachusetts residents. The interconnection with the Worcester Regional Transit Authority and the Massachusetts Bay Transportation Authority provides residents with a higher level of multi-modal transportation options, as well as greater opportunities for active living.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning related to federal emphasis areas. CMRPC has adopted goals and objectives related to pedestrians for the Mobility2040 Long Range Transportation Plan.

Goal: Reduce Congestion and Improve Mobility for all modes

Objective 4 – Improved Transportation Accessibility for all modes

- Increase the number of ADA-compliant roadways and intersections. 2 locations every 5 years.
- Improvement in the bicycle and pedestrian network within ½ mile of transit stations – for the top 10 high boarding and alighting locations. 2 locations every 5 years.

Goal: Increase Transportation Options and Promote Healthy Modes

Objective 1 - Increase the share of transit, bicycling & walking in the region

- Triple walk/bike/transit share in Worcester by 2040
- Double walk/bike/transit share in urbanized areas outside of Worcester by 2040

Objective 2 - Expand the walk/bike network in the region

- Improve pedestrian network within 1//2 mile of high activity transit stops
- Identify bicycle/pedestrian/transit gaps in the region

Objective 3 - Work with member communities to implement Complete Streets policies

- 10% of communities in the region have a local Complete Streets policy over 10 years.

Goal: Equitable Transportation for all populations

Objective 1 - Provide access to essential services; minimize burdens and maximize benefits associated with low-income and minority areas

- Increase the number of ADA-compliant intersections by 10% over 10 years
- Inventory the bicycle and pedestrian network within a ½ mile of the top ten boarding/alighting transit locations in the next two years

Goal: Improve Economic Vitality and Freight Movement

Objective 2 – Increase access to major employment centers

- Improve the bicycle and pedestrian network near 2 major employment centers every 5 years.

Analysis

Regional Count Program

As part of the Central Massachusetts Regional Bicycle and Pedestrian plan, completed in 2011, staff initiated a pilot bicycle and pedestrian count program to monitor biking and walking trips within the region's existing trail network. The intent of the inaugural count program was to

collect raw data and monitor regional trail usage. In 2012 and 2013, the program was expanded to include specific roadways within the City of Worcester that have marked on-road bicycle lanes. The purpose of including these roadways was to determine overall usage and commuting patterns from various points in Worcester. In 2014, the program was broadened to conduct counts at a community requested location. Staff selected locations that would allow the host community to make full use of the data; to assist a project design with bicycle and pedestrian elements, to complement communities' future plans for enhancements such as adding a sidewalk or a crosswalk, or for general knowledge.

Neighborhood SAFE

Neighborhood SAFE is a new, proactive approach that CMRPC is undertaking in order to provide communities with small area infrastructure assessments from a pedestrian and bicyclist safety perspective. CMRPC has launched this effort to achieve the following objectives:

- Increase awareness of bicycling and walkability in communities throughout the region
- Identify safety issues that pedestrians and bicyclists face
- Provide neighborhood safety analysis for all users of the transportation system
- Generate enthusiasm for healthy, active transportation options

Additional Efforts

- WalkBike Worcester: Staff collaborates extensively with WalkBike Worcester to promote pedestrian projects and policy in the City of Worcester, and increasingly, the CMRPC region. Technical support and analysis is provided for initiatives, including snow removal efforts during the winter and Complete Streets promotion.
- Safe Routes to School: Staff is a key member of the Worcester Safe Routes to School Taskforce, has participated in extensive fieldwork and technical support efforts for the last two years of planning and execution.
- PARK(ing) Day: Staff participated in the first PARK(ing) Day celebration in Worcester, along with WalkBike Worcester, Worcester Department of Public Health, and other organizations.

Needs Assessment

The Central Massachusetts Regional Bicycle and Pedestrian Plan was last updated in 2011, this plan serves as a starting point for bicycle and pedestrian network development in the region. Since the completion of the previous plan in 2011, the region has seen significant interest and growth in improving existing facilities and providing new pedestrian and bicycle facilities. CMRPC staff will update the Regional Bicycle and Pedestrian Plan during 2015-2016 with

further analysis and extensive stakeholder/public outreach. For the purposes of Mobility 2040, preliminary analysis has taken place regarding bicycle and pedestrian related crash clusters as well as sidewalk condition and shoulder width on Federal Aid Eligible roadways in the region.

Safety

The Massachusetts Department of Transportation generates a listing of Highway Safety Improvement Program (HSIP) eligible Auto, Bike, and Pedestrian clusters for the Commonwealth. A list of HSIP eligible locations for the CMRPC planning region was derived from the statewide list. Ten (10) pedestrian crash clusters have been identified as HSIP eligible for the region. (It should be noted that mainline Interstate crash clusters have been removed from consideration due to jurisdictional issues.) Communities that wish to pursue HSIP funding for a project to improve safety at any of these locations will need to perform a Road Safety Audit (RSA). The Federal Highway Administration defines a Road Safety Audit (RSA) as the formal examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. Communities can contact CMRPC for further assistance regarding this requirement.

Sidewalk Inventory & Management

In conjunction with CMRPC's regional bicycle and pedestrian planning and pavement management efforts, staff has launched the development of a regional sidewalk inventory. Data collection efforts are performed in tandem with the regional pavement data collection schedule and are observed through a visual inspection. The inventory includes detailed information such as the location of sidewalks along federal-aid eligible roads, direction along the roadway, sidewalk width, type of material, and general condition. In 2012, staff established the criteria and conducted a pilot study for one of the regions communities and as a result refined the data collection process to gather future sidewalk condition data. The regional sidewalk inventory will be updated on a three-year cycle, with the initial data of the entire region to be completed during the 2015 data collection season. Ongoing efforts include the digitization of observed sidewalk segments into GIS, including ramps and crosswalks and an updated table to "score" the overall condition of each segment.

In 2009, CMRPC staff conducted a visual survey of the existing walking and bicycling infrastructure and accommodations in the city and town centers of the MPO's 40 community region. The purpose of the survey was to acquire a base inventory of these facilities within higher density areas and to take a cursory examination of what accommodations exist within the region.

Prioritization

In the CMRPC Region there are ten (10) High Priority HSIP Eligible Pedestrian Crash Locations (See Table IV-1). For the purposes of the Long Range Transportation Plan, the crash clusters that are HSIP eligible are considered highest priority. There is a large concentration of bicycle and pedestrian HSIP clusters within a half mile of the intersection located at Main Street and Chandler Street/Madison Street in Worcester. This intersection is also located within feet of the highest ranking automobile cluster in the region (#8 Statewide). A recent Road Safety Audit concerning the Main Street/CBD project in Worcester analyzed this high crash location. Furthermore, a MassDOT project to reconstruct the Belmont Street Bridge over Interstate 290 is currently underway. A Road Safety Audit was performed at this location, and the results of that exercise have been incorporated into the reconstruction effort. The only HSIP eligible pedestrian cluster outside of the City of Worcester is located in the center of the Town of Spencer. Figure IV-1 has been provided on the following page to provide additional information regarding HSIP eligible clusters in the Worcester Central Business District. Please see the *2009-2011 CMRPC Regional Safety Report* for expanded discussion regarding other non-HISP eligible bicycle crash clusters.

Table IV-1: 2009-2011 High Priority Pedestrian Clusters in the CMRPC Region

Crash Count	# Fatal	# Injury	# Non-Injury	EPDO	Street #1	Street #2	Town	Rank
103	0	79	24	419	MAIN STREET	SOUTHBRIDGE STREET	WORCESTER	3
37	0	26	11	141	MAIN STREET	CAMBRIDGE STREET	WORCESTER	
26	0	20	6	106	MAIN STREET	HAMMOND STREET	WORCESTER	
25	0	20	5	105	MURRAY AVENUE	MAIN STREET	WORCESTER	
24	1	17	6	101	MAIN STREET	MECHANIC STREET	SPENCER	
22	0	18	4	94	GRAFTON STREET	ORIENT STREET	WORCESTER	
24	1	14	9	89	BELMONT STREET	INTERSTATE 290	WORCESTER	
18	0	16	2	82	BELMONT STREET	EASTERN AVENUE	WORCESTER	
18	1	11	6	71	PARK AVENUE	PLEASANT STREET	WORCESTER	
19	0	12	7	67	INTERSTATE 290	VERNON STREET	WORCESTER	

Access to Essential Services

CMRPC is working toward promoting interconnected, multimodal transportation networks for all road users. FHWA has made bicyclist and pedestrian safety a high priority, along with providing a network that allows for access to essential services in an efficient manner. FHWA provides the following guidance in regards to this initiative: As part of the transportation planning process, identify transportation connectivity gaps in access to essential services. Essential services include housing, employment, health care, schools/education, and recreation. This emphasis area could include identification of performance measures and analytical methods to measure the transportation system's connectivity to essential services and the use of this

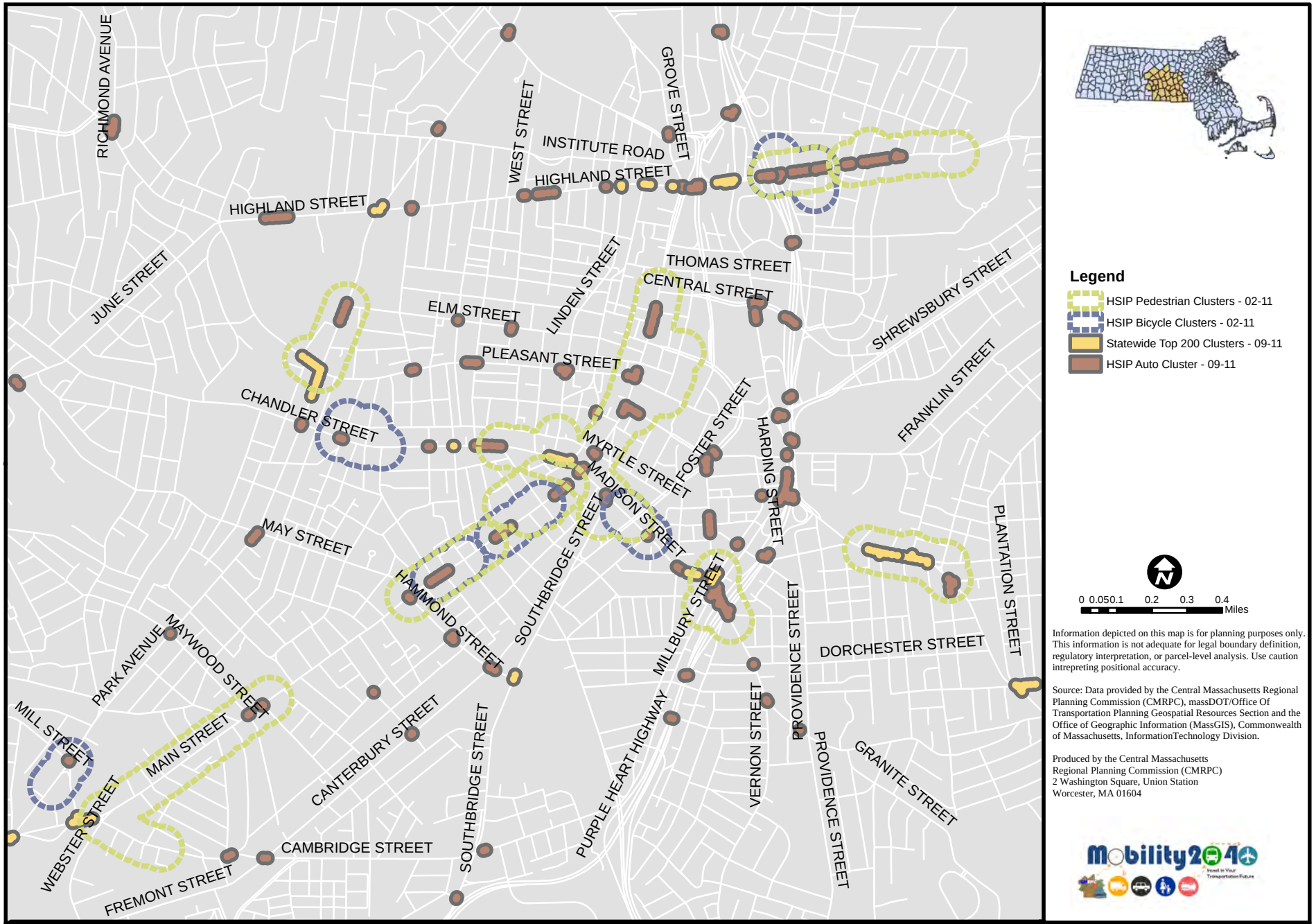


Figure IV-1 Central Worcester HSIP Clusters

information to identify gaps in transportation system connectivity that preclude access of the public, including traditionally underserved populations, to essential services. It could also involve the identification of solutions to address those gaps.

Next Steps

CMRPC staff will begin working on the update to the Regional Bicycle and Pedestrian Plan in the summer of 2015. This update will coincide with the completion of data collection related to sidewalk conditions along federal aid eligible roadways in the region. With Federal Planning Emphasis (PEA) Area Access to Essential Services as an overarching guide, staff will work with regional stakeholders to identify areas where gaps are present in the system. The updated Regional Bicycle and Pedestrian Plan will serve as the foundation for the development and expansion of a multimodal network that provides for all users. Gaps or deficiencies in the pedestrian network will be identified and prioritized in order to develop a listing of potential projects that could be funded with Congestion Mitigation Air Quality (CMAQ) or Transportation Alternative Program (TAP) funding sources.

Bicycle

Background

While recreation has been the preferred use for bicycling in the past, it is increasingly becoming the primary mode of transportation for everyday activities. As mentioned in the previous section, millennials are increasingly using multiple modes, including cycling, to travel on a daily basis. Nationwide, communities large and small are turning to bicycling to complete short trips, this holds true for the CMMPO region. According to the 2010-2011 Massachusetts Household Travel Survey, approximately 0.5% of CMRPC planning region residents commute to work via bicycle, while 0.2% of students travel to school via the same mode. Cycling can be more efficient, affordable, and convenient than travelling by vehicle on congested streets. Furthermore, there are populations within the region that do not have access to a vehicle as a primary mode of transport, making cycling a necessary part of their travels. The connection of bicycle and pedestrian infrastructure with transit systems is essential to increasing the mobility of Central Massachusetts residents.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning related to federal emphasis areas. CMRPC has adopted goals and objectives related to bicycling for the Mobility2040 Long Range Transportation Plan.

Goal: Reduce Congestion and Improve Mobility for all modes

Objective 4 – Improved Transportation Accessibility for all modes

- Improvement in the bicycle and pedestrian network within ½ mile of transit stations – for the top 10 high boarding and alighting locations. 2 locations every 5 years.

Goal: Increase Transportation Options and Promote Healthy Modes

Objective 1 - Increase the share of transit, bicycling & walking in the region

- Triple walk/bike/transit share in Worcester by 2040
- Double walk/bike/transit share in urbanized areas outside of Worcester by 2040

Objective 2 - Expand the walk/bike network in the region

- Expand bicycle infrastructure in the region by 50 miles by 2040
- Increase bicycle parking at public facilities in the next five years
- Identify bicycle/pedestrian/transit gaps in the region

Objective 3 - Work with member communities to implement Complete Streets policies

- 10% of communities in the region have a local Complete Streets policy over 10 years.

Goal: Equitable Transportation for all populations

Objective 1 - Provide access to essential services; minimize burdens and maximize benefits associated with low-income and minority areas

- Inventory the bicycle and pedestrian network within a ½ mile of the top ten boarding/alighting transit locations in the next two years

Goal: Improve Economic Vitality and Freight Movement

Objective 2 – Increase access to major employment centers

- Improve the bicycle and pedestrian network near 2 major employment centers every 5 years

Analysis

Regional Count Program

As part of the Central Massachusetts Regional Bicycle and Pedestrian plan, completed in 2011, staff initiated a pilot bicycle and pedestrian count program to monitor biking and walking trips within the region's existing trail network. The intent of the inaugural count program was to collect raw data and monitor regional trail usage. In 2012 and 2013, the program was expanded to include specific roadways within the City of Worcester that have marked on-road bicycle lanes. The purpose of including these roadways was to determine overall usage and commuting patterns from various points in Worcester. In 2014, the program was broadened to conduct counts at a community requested location. Staff selected locations that would allow the host community to make full use of the data; to assist a project design with bicycle and pedestrian elements, to complement communities' future plans for enhancements such as adding a sidewalk or a crosswalk, or for general knowledge of the importance of bicycle commuting within a community.

Neighborhood SAFE

Neighborhood SAFE is a new, proactive approach that CMRPC is undertaking in order to provide communities with small area infrastructure assessments from a pedestrian and bicyclist safety perspective. CMRPC has launched this effort to achieve the following objectives:

- Increase awareness of bicycling and walkability in communities throughout the region
- Identify safety issues that pedestrians and bicyclists face
- Provide neighborhood safety analysis for all users of the transportation system
- Generate enthusiasm for healthy,
- active transportation options

Bicycle Parking Program

The Central Massachusetts Metropolitan Planning Organization (CMMPO) has committed $100,000 in Transportation Alternatives Program (TAP) funding for installation of bicycle parking racks in the 2015-2018 Transportation Improvement Program (TIP). This program will allow municipalities to expand bicycle parking at a reduced cost. Currently in the planning stage, this program is expected to roll out in 2015 and 2016.

Needs Assessment

The Central Massachusetts Regional Bicycle and Pedestrian Plan was last updated in 2011, this plan serves as a starting point for bicycle and pedestrian network development in the region.

Since the completion of the previous plan in 2011, the region has seen significant interest and growth in improving existing facilities and providing new pedestrian and bicycle facilities. CMRPC staff will update the Regional Bicycle and Pedestrian Plan during 2015-2016 with further analysis and extensive stakeholder outreach. For the purposes of Mobility 2040, preliminary analysis has taken place regarding bicycle and pedestrian related crash clusters as well as shoulder width on Federal Aid Eligible roadways in the region.

Shoulder Width

Preliminary shoulder width analysis via the CMRPC Pavement Management Program has identified over 150 miles of roadway in the region with shoulders wide enough for bicycle accommodation. Staff will use this along with safety-related data to develop baseline analysis for the upcoming update of the Regional Bicycle and Pedestrian Plan.

Safety

The Massachusetts Department of Transportation generates a listing of Highway Safety Improvement Program (HSIP) eligible Auto, Bike, and Pedestrian clusters for the Commonwealth. A list of HSIP eligible locations for the CMRPC planning region was derived from the statewide list. Six (6) bicycle crash clusters have been identified as HSIP eligible for the region. (It should be noted that mainline Interstate crash clusters have been removed from consideration due to jurisdictional issues.) Communities that wish to pursue HSIP funding for a project to improve safety at any of these locations will need to perform a Road Safety Audit (RSA). The Federal Highway Administration defines a Road Safety Audit (RSA) as the formal examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. Communities can contact CMRPC for further assistance regarding this requirement.

Other Efforts

- Walk Bike Worcester: Staff collaborates extensively with Walk Bike Worcester to promote bicycle projects and policy in the City of Worcester, and increasingly, the CMRPC region. Technical support and analysis is provided for Walk Bike Worcester initiatives, including snow removal efforts during the winter and Complete Streets promotion.
- Safe Routes to School: Staff is a key member of the Worcester Safe Routes to School Taskforce, has participated in extensive fieldwork and technical support efforts for the last two years of planning and execution.

Prioritization

In the CMRPC Region there are six (6) High Priority HSIP Eligible Bicycle Crash Locations (See Table IV-2). For the purposes of the Long Range Transportation Plan, the crash clusters that are HSIP eligible are considered highest priority. There is a large concentration of bicycle and pedestrian HSIP clusters within a half mile of the intersection located at Main Street and Chandler Street/Madison Street in Worcester. This intersection is also located within feet of the highest ranking automobile cluster in the region (#8 Statewide). A recent Road Safety Audit concerning the Main Street/CBD project in Worcester analyzed this high crash location. Furthermore, a MassDOT project to reconstruct the Belmont Street Bridge over Interstate 290 is currently underway. A Road Safety Audit was performed at this location, and the results of that exercise have been incorporated into the reconstruction effort. Please see the *2009-2011 CMRPC Regional Safety Report* for expanded discussion regarding other non-HISP eligible bicycle crash clusters.

Table IV-2: 2009-2011 High Priority Bicycle Clusters in the CMRPC Region

Crash Count	# Fatal	# Injury	# Non-Injury	EPDO	Street # 1	Street #2	Town
10	0	8	2	42	INTERSTATE 290	BELMONT STREET	WORCESTER
9	0	7	2	37	MAIN STREET	OREAD STREET	WORCESTER
10	0	6	4	34	MAIN STREET	MURRAY AVENUE	WORCESTER
6	0	6	0	30	FRANCIS J. MCGRATH BOULEVARD	MADISON STREET	WORCESTER
9	0	5	4	29	CHANDLER STREET	AUSTIN STREET	WORCESTER
8	0	5	3	28	PARK AVENUE	MILL STREET	WORCESTER

Access to Essential Services

CMRPC is working toward promoting interconnected, multimodal transportation networks for all road users. FHWA has made bicyclist and pedestrian safety a high priority, along with providing a network that allows for access to essential services in an efficient manner. FHWA provides the following guidance in regards to this initiative: As part of the transportation planning process, identify transportation connectivity gaps in access to essential services. Essential services include housing, employment, health care, schools/education, and recreation. This emphasis area could include identification of performance measures and analytical methods to measure the transportation system's connectivity to essential services and the use of this information to identify gaps in transportation system connectivity that preclude access of the public, including traditionally underserved populations, to essential services. It could also involve the identification of solutions to address those gaps.

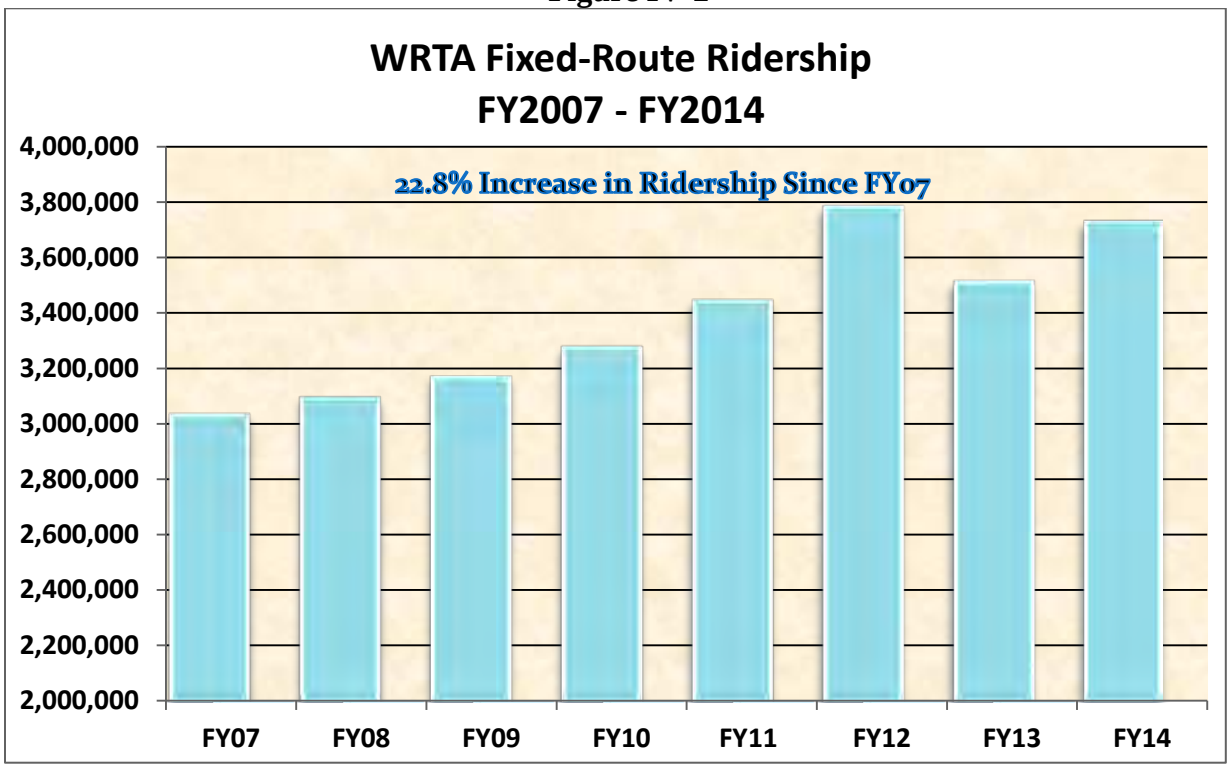
Next Steps

CMRPC staff will begin working on the update to the Regional Bicycle and Pedestrian Plan in the summer of 2015. This update will coincide with the completion of data collection related to shoulder width conditions along federal aid eligible roadways in the region. With Federal Planning Emphasis (PEA) Area Access to Essential Services as an overarching guide, staff will work with regional stakeholders to identify areas where gaps are present in the system. Addressing gaps could include the development and funding of a bicycle sharing program with Congestion Mitigation Air Quality Improvement Program (CMAQ) or Transportation Alternatives Program (TAP) monies. The update Regional Bicycle and Pedestrian Plan will serve as the foundation for the development and expansion of a multimodal network that provides for all users.

Public Transit and Passenger Rail

Public transportation options serve the needs of both commuters and transit-dependent populations. In addition to riders who can choose transit or auto travel, for the transit-dependent populations (those who do not drive or cannot afford a car), public transportation is the only option and it is vitally important to their quality of life. Public transportation includes fixed route bus service, public and client-based paratransit services, taxi and livery services. Intercity public transportation options include intercity bus, commuter rail, and intercity passenger rail. While commuters in the CMMPO region had become less reliant on public transportation over the past 20 years, in recent years that trend appears to be reversing, first associated with improved frequency of commuter rail service, and now commuters returning to local public transit (see Figure IV-2). The trend of associated with this renewed interest in public transit are an aging population, increased cost of gas, and a nationwide trend in being healthy and using sustainable transportation. While there is a national trend toward millennials using more public transportation, that trend has not yet borne out in local transit. The WRTA is intensively working with colleges and schools, but there is not yet data to suggest a shift in mode by these groups. In addition, it is important to recognize the importance that transit can play in making communities more livable.

Figure IV-2



The demand for increased multi-modal healthy, active travel options are being heard by the state and local officials. State operating assistance for local transit service has begun to stabilize after years of cutbacks in service, and local transit officials have made strides in upgrading infrastructure and service features. The state is also in the process of completing transactions with CSX Corporation that will allow for more rail capacity to be available between Worcester and Boston, and plans for more passenger trains in the near future.

Fixed Route Congestion / On-Time Performance

Background

Transit's impact on traffic is greater than its small 0.5% share of total travel would indicate due to the fact that the fixed route system is radially oriented and concentrated along the traffic corridors leading into the Worcester Central Business District (CBD). Given the eastern Massachusetts area's maintenance status for air quality, the City of Worcester's maintenance status for carbon monoxide, and the recent development activities in Downtown Worcester (including the City Square project and the recent MBTA commuter rail service expansion), transit is a viable alternative to auto travel for trips destined to this potentially congested area. The nature of the market segment served by transit is the second reason for transit's important role in the regional transportation system.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning related to federal emphasis areas, one of which is congestion. The CMMPO has drafted a number of goals for the Mobililty2040 Long Range Transportation Plan, one of which is congestion related. The objectives for these goals are as follows:

Goal: Reduce Congestion and Improve Mobility for all modes

Objective 1 – Coordinate Improved Incident Management

- Facilitate 1 meeting per year with identified agencies to improve incident detection and clearance time

Objective 2 – Improve Corridor Management Integration

- Reduce average travel delays along 2 identified congested major roadway segments every 5 years
- Improve 2 of the top 20 congested intersections every 5 years to a Level of Service of

"D" or better

Objective 3 – Reduce GHGs Generated by Motor Vehicles in the Region

- Institute one new Park-and-Ride lot in each five year period for Transit & TDM along congested corridors

Analysis

Current Conditions/Congestion Causes

There are many causes of congestion. Some are recurring, such as insufficient capacity, unrestrained demand, or poor signal timing, and some are non-recurring, such as collision incidents, poor weather, work zones, or emergencies. Most of the congestion in the CMMPO region is concentrated in the City of Worcester and the neighboring urban towns. Congestion can be found on local roads, highways, and Interstates.

As stated in the Auto Travel Section on page IV-56, CMMPO staff has completed over 30 Travel Time and Delay studies, analyzed 150 intersections, monitored five Park-and-Ride lots, conducted over 500 traffic counts, and studied nine identified local "Bottleneck" roadway segments since 2010. The analyses of all these data collection activities are compiled and included in yearly progress reports.

Traffic Volumes: Traffic volumes are a major cause of congestion in the region. The highest traffic volumes are on the Interstate highways, especially Interstates 90, 290, and 495. Daily volume surpasses 115,000 vehicles a day on sections of Interstate 290 in Worcester and over 90,000 vehicles a day use Interstate 90 between Sturbridge and Hopkinton. Routes 9, 20, and 146 are lower volume roadways, but still carry between 20,000 and 40,000 vehicles a day on some sections in the urban towns. Rural towns in the western part of the CMMPO region have no roadways with over 10,000 vehicles per day. Transit travels mostly on local roads but Route 9 through the city is a major transit route and congestion is exacerbated by narrow street widths in this area. Transit outside of Worcester also includes use of Routes 9, 20 and 146.

Travel Time Data: Using CMMPO staff's Travel Demand Model, a number of roadway segments throughout the region were identified as "congested" or "projected" to be congested by 2040. Travel Time and Delay studies analyze the speeds on the roadways and how long it takes to get from one place to another. Slower travel speeds are most often located in urban and densely built up areas where congestion occurs. Vehicle speeds fluctuate at different times of the

day as well as different days of the week. When roadway usage exceeds capacity, travel speeds tend to slow significantly, impacting the ability of transit to meet on-time performance.

Turning Movement Counts (TMCs): AM & PM peak periods are analyzed to determine the amount of delay for vehicles traveling through the intersection. A Level of Service (LOS) is calculated for each studied intersection, with an "A" being given to the location with minimal delay progressing downward to an "F" assigned to an intersection with excessive delays or where the demand far exceeds capacity. Many intersections in the planning region have a poor LOS during peak travel periods in the morning and evening. These locations are concentrated in communities with high volume roadways: Auburn, Shrewsbury, Westborough, and Worcester. In addition to regular SUV travel, the amount of heavy vehicles traveling through intersections and on roadway segments can at times decrease speeds while increasing delays.

Bottlenecks: CMMPO staff has analyzed a total of nine bottleneck areas in our Localized Bottleneck Reduction Program with the help of our Transportation Management Systems and Transportation Model. A "traffic bottleneck" is a localized constriction of traffic flow, often on a highway segment that experiences reduced speeds and inherent delays, due to recurring operational influence or a nonrecurring impacting event. A bottleneck can be on high or low volume roadways. Between 2011 and 2014, nine bottleneck locations were analyzed in the region and all of them are served by transit (see Table IV-4 on page IV-62 in the Auto Travel Section).

Weather conditions and construction projects also generate non-recurring congestion and incidents in the region and can greatly affect the daily performance of the local transit system.

Relationship to On-Time Performance (OTP)

The WRTA monitors on-time performance utilizing outside auditors, street supervisors, Automatic Vehicle Locator (AVL) technology and through periodic checks of the on-board vehicle camera surveillance system. The WRTA staff shares its current performance with the WRTA's Advisory Board on a monthly basis.

As noted earlier, several elements contribute to the on-time performance, or non-performance, of transit service:

- General traffic delays
- Mechanical failures
- Poor schedule design
- External emergencies

- Inclement weather
- Construction projects
- Inadequate operator training and control

The WRTA often has little control over external emergencies, inclement weather and construction projects. However, it does have direct responsibility for mechanical failures, schedule design, and operator training and control.

Although traffic delays are beyond its immediate jurisdiction, route schedules are constructed so that sufficient time is available under normal traffic conditions to complete the trip on time. Where street traffic varies, either seasonally or by day of the week and hour of the day, schedules are adjusted accordingly. In addition, MassDOT sponsored projects are becoming increasing sensitive to the needs of transit along congested corridors, as evidenced by the addition of bus bulbs included on the recent Route 12/20 project. MassDOT can also assist in community sponsored projects in helping to make the design more friendly to the needs of transit to travel in congested areas.

In instances where schedule adherence becomes difficult during peak periods by reason of general traffic volume, modifying the schedules for that particular situation or taking steps to avoid the traffic problems causing the congestion are applied. Disruptions due to mechanical failure of equipment cannot be eliminated but should be minimized within the economic limits of sound maintenance practices.

Short headway, heavily traveled routes are less likely to adhere to schedule than longer headway "off peak" service. Accordingly, as headways increase, service should operate closer to scheduled times. This standard, therefore, provides for different schedule adherence based on headway.

Table IV-3 Schedule Adherence
(Targeted Percent of On-Time Service – WRTA Service Standards)

Operating Period	30 Minutes and Less Headway	Over 30 Minutes Headway
Total Peak Period	85%	95%
Base (Non-Peak)	95%	95%
Saturday, Sunday and Holiday	95%	95%

While this is the current standard for schedule adherence, this standard may change now that the WRTA has moved to a real-time data to measure schedule adherence. As such, because of the down to the minute accuracy for on-time performance and the factors described earlier like

traffic delays and others, it is difficult for a small system like the WRTA to maintain 95 percent accuracy in off-peak service.

Action Steps to Address On-time Performance and Congestion

Actions to be taken to maintain or improve on-time performance include:

- Continue to improve method of data collection to accurately monitor and report on the standard for different operating periods of the day
- Enforcement of rules and regulations currently in existence
- Improving initial and continuing operator training
- Consideration of route and scheduling changes
- Changes in equipment assignments (e.g. vehicle rotation)
- Continue to improve communication protocols between WRTA dispatchers, inspectors and operators, as well as local public works departments and local police departments, to minimize service disruptions due to external emergencies, inclement weather and/or construction projects

Needs

There are many congestion improvement options to consider in an effort to maintain on-time performance. Short-term improvements include adjusting signal timing and phasing, maintaining traffic control signage and pavement markings, maintaining good pavement, trimming overgrown vegetation along roadways that impair vehicle sight lines, maintaining roadway drainage structures, and access management techniques. For communication purposes, upgrading or developing electronic systems (radio, telephone, internet) to communicate within the WRTA and among various organizations, as well as developing/updating protocols for how internal and external communications should occur. These improvements can be quickly implemented at a lower cost.

Long-term options that are more costly and take longer to implement include intersection realignment, installation of a modern roundabout, lengthening existing dedicated turn lanes, and incorporating Intelligent Transportation Systems (ITS) capabilities or tools.

Prioritization/Monitoring of Roadways with Fixed Bus Routes

In concert with the goals and objectives drafted by the CMMPO, there are certain roadways and intersections that should be improved first. These prioritized locations should have improvements that will alleviate congestion and reduce travel time, particularly where they impact high transit routes. Performance Measures help determine if a project should be

undertaken as a result; a project that benefits multiple modes or management systems will get a higher priority over a proposed project that only helps one element.

Using various data acquired by the WRTA through its manual and AVL technology will assist in maintaining or improving schedules that meet on-time performance. Identifying the location of critical peak hour delay intersections can help determine which roadway segments should undergo improvements to reduce travel time and potential bottlenecks. Most of the critical locations are in the city of Worcester and the town of Shrewsbury. The remaining few are in the towns of Sutton, Upton, and Webster, of which only Webster is served by fixed route transit.

Improvement of existing Park-and-Ride facilities and the possible addition of more facilities that are connected to transit can help meet the goals of a 5% total automobile VMT reduction and the long term creation of five new Park-and-Ride locations. Further, rideshare programs such as MassRIDES and NuRide will also help with VMT reduction by encouraging travelers to use healthy, active options such as public transit. Travel demand management (TDM) is another way to reduce traffic congestion by including transit options for commuters.

The following are high volume corridors for fixed-route transit as well as primary corridors for roadway congestion during peak travel hours: Main Street, West Boylston Street, Belmont Street, Lincoln Street, Gold Star Boulevard, Grove Street, Highland Street, Chandler Street, Southbridge Street and Pleasant Street. Park Avenue is also a high volume corridor that is not currently used by fixed-route transit in its entirety, but has been identified in the CSA for potential transit service.

Fixed-Route Safety and Security

Background

Safety and security are the two most important aspects of transit service in the region. Safety and security are paramount in all WRTA activities. The WRTA is committed to developing, implementing, and improving strategies, management systems and processes to ensure that all their public transportation activities uphold the highest level of safety and security performance.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning with a federal emphasis area of Safety and Security. Mobility2040 recognizes the importance of the Transportation Security and measure progress to achieve the following goals and objectives:

Goal: Improve the Safety and Security of the region

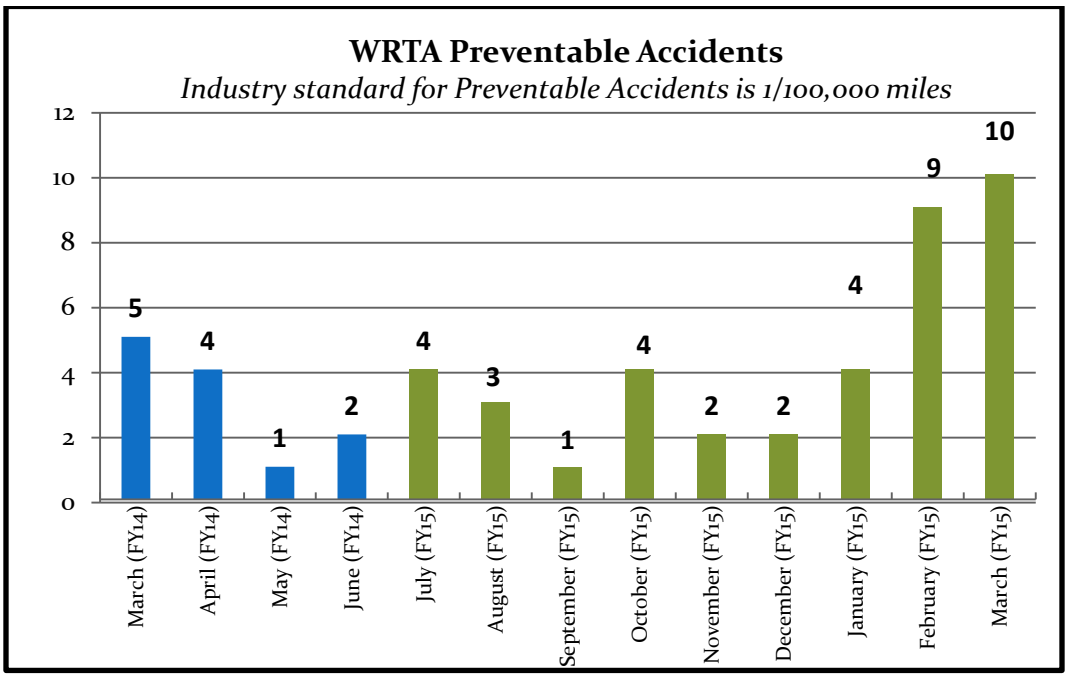
Objective 2: Achieve Industry standards for preventable accidents for transit

- Reduce preventable accident rate (accidents per 100,000 miles) by 10% in 5 years. A preventable accident is defined as one where a driver did not do everything reasonable to avoid the accident.

Objective 3: Enhance Transportation Security Coordination Region wide

- Conduct one regional workshop/tabletop exercise every year to advance evacuation Planning
- Continue involvement with MRPC & Statewide Evacuation Planning efforts

Figure IV-3:



Current Conditions

WRTA Safety Management System (SMS)

The SMS is an organized approach to managing safety, including the necessary organizational structures, safety goals and performance targets, responsibilities and authorities, accountabilities, policies, and procedures for integrating safety into day to day operations.

The SMS has three defining pillars

1. A comprehensive approach to safety that sets the tone for the management of safety, embraces the organization's safety goals, objectives and policies, and, most importantly, senior management's commitment to safety.
2. Structure and tools to deliver the necessary activities and processes to advance safety.
3. A formal system for safety feedback to confirm continuing fulfillment of safety goals, objectives, policy, and standards.

The WRTA fixed route operator, Central Mass Transit Management, Inc. (CMTM), has developed a SMS. The SMS offers a means of preventing accidents by integrating safety into all aspects of CMTM's activities, from planning to operations to maintenance. SMS builds on the following four elements:

- A planned approach to system safety program tasks
- Qualified personnel to accomplish the tasks.
- Authority to implement the tasks through all levels of management.
- Appropriate financial and personnel resources to accomplish the tasks.

WRTA Safety and Security Program Plan (SSPP)

To establish the importance of security and emergency preparedness in all aspects of its organization, the WRTA has developed a Safety and Security Program Plan (SSPP). The SSPP outlines the process to be used by the WRTA to make informed decisions that are appropriate for operations, passengers, employees and communities regarding the development and implementation of a comprehensive security and emergency preparedness program.

The purpose of the plan is to help establish and maintain the Safety and Security Program. It serves as a detailed blueprint for all security activities by:

- establishing how security activities are organized;

- outlining employee and department responsibilities with respect to security;
- instituting threat and vulnerability identification, assessment, and resolution methodologies; and
- setting goals and objectives (including periodic drills and audits of the plan).

Elements included in the SSPP are Emergency Action Plan, Homeland Security, Relocation Procedures, Evaluation of Emergency Preparedness, and Security Committee. The plan is updated continually to record and evaluate past security performance of the system, to identify modifications that are needed, and to establish objectives for the upcoming year.

a) See Something, Say Something™

The "See Something, Say Something™" campaign provides direction on detecting and reporting suspicious behaviors or objects around transit stations and equipment. It is a national campaign that is funded by the Department of Homeland Security and partners with transit agencies to bring awareness to transit users about strange and suspicious activity at stations, platforms and on vehicles. Various media, including public service announcements, posters, pamphlets and videos, are used to spread the message of the campaign and promote a safer and secure transit experience.

Continuity of Operations (COOP) Plan

The Continuity of Operations (COOP) plan for the WRTA presents a management framework, establishes operational procedures to sustain essential functions, and guides the restoration of full functions if normal operations in one or more of the WRTA's locations are not feasible.

The plan was prepared in accordance with Department of Homeland Security (DHS) Headquarters Continuity of Operations (COOP) Guidance Document, dated April 2004, which provides a structure for formulating a COOP plan; Presidential Decision Directive–67, "Ensuring Constitutional Government and Continuity of Government Operations," which requires all Federal departments and agencies to have a viable COOP capability; and Commonwealth of Massachusetts Executive Order No. 144, which requires all Commonwealth agencies to prepare for emergencies and disasters and to provide emergency liaisons to Massachusetts Emergency Management Agency/Organization for coordinating resources, training, and operations.

The document focuses on the basic COOP elements: essential functions, critical systems, alternative facilities, orders of succession, delegations of authority, and vital records. Development of procedures that address the basic COOP elements and work in concert with business continuity and disaster recovery plans allows for uninterrupted delivery of the WRTA's essential functions. This document applies to the full spectrum of threats and emergencies that

may affect the WRTA. Specifically, this COOP plan is based on an event scenario that disrupts the WRTA's essential functions.

Worcester County Evacuation Plan

CMRPC staff, in conjunction with Montachusett Regional Planning Commission (MRPC) under the guidance of the Central Region Homeland Security Advisory Council (CRHSAC), is working on an Evacuation Plan for all of Worcester County. The overall goal of the Evacuation Plan is to provide Worcester County emergency management personnel with a comprehensive Regional Evacuation Plan. Phase 1 was primarily a data gathering procedure. Phase 2 is anticipated to include identification of evacuation scenarios, modeling of evacuation impacts against current conditions, and identification of recommendations for prioritization and implementation of a County-Wide Evacuation Plan. Phase 3 is anticipated to be development of a County-wide Evacuation Plan based on Phase 2 data and recommendations, as well as involvement of stakeholders. Phase 3 would include establishment of communications protocol, and implementation of publicity of such outcomes, including perhaps coded signage and development of standard messaging systems.

Analysis

Safety/Security

As outlined in the Highway Safety section, thirty six (36) of the region's top forty four (44) Highway Safety Improvement Program (HSIP) eligible auto/bike/pedestrian clusters are located in the City of Worcester. Fourteen (14) of the thirty six (36) clusters located in the City of Worcester are along the MA-9 corridor. An additional twelve (12) clusters are located along the MA-122/122A corridor. These three (3) state routes contain "super clusters" of auto/bike/pedestrian crashes that have been collated into the three top crash corridors for the CMRPC region. Within these "super clusters", 22 of the WRTA's 31 fixed-route buses either operate along the corridors or crossover at specific intersections:

- *MA-9 (Belmont/Highland St): West St to Rodney St* (WRTA Routes 3, 24, 24A, and 34 operate along Belmont and Highland Streets for their primary routing. WRTA Routes 8, 14, 18, 23, 26, 30, and 31 cross this corridor at Lincoln Square)
- *Main Street: MLK to May Street* (WRTA Routes 8, 18, 19, 27, and 33 operate along Main Street for their primary routing. WRTA Routes 2, 3, 6, 7 and 9 cross Main Street at various intersections within this cluster)
- *MA-9/12 (Park Ave): Elm St to Chandler St* (No WRTA route operates along Park Avenue, however Routes 2, 6 and 9 cross Park Avenue at the Pleasant Street and Chandler Street intersections)

- *MA-122/122A (Vernon/Madison/Chandler): I-290 to Park Ave* (No WRTA route operates along Madison Street. WRTA Routes 11 and 22 operate through Kelley Square and along Vernon Street. WRTA Routes 6 and 7 operate along Chandler Street. WRTA Routes 4 and 25 cross this cluster at Kelley Square and Madison/Southbridge Streets)

Future Needs

Safety

In 2015, the WRTA will be updating its Safety and Security Program Plan (SSPP). In addition, the WRTA will also update its COOP Plan from its last update in 2009, as well as its SMS to include not only the fixed route system, but also the paratransit system, fixed facilities and vehicle fleet. Development of a full Emergency Response Plan will also be started in 2015. Lastly, implementation of Complete Streets techniques that may occur with roadway projects in the region that will also address safety improvement at bus stop waiting areas will be reviewed as part of a potential project design.

Security

CMRPC and MRPC staff will continue Phase 2 Evacuation planning efforts. Phase 2 will aid jurisdictions in practical application and use of the "Tool Kit'. Phase 2 will continue to align the CRHSAC Evacuation Plan strategies and goals with state evacuation plans.

Fixed Route State of Good Repair

Background

Keeping the regional transit system in a State of Good Repair (SOGR) requires good people, efficient use of funding and management of assets that provide reliable and safe service year-round. SOGR is a key priority at the WRTA and for the CMMPO and both are committed to ensuring the best in safe, reliable, cost-effective and responsive transit services.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning on federal emphasis area of Safety and Security. Mobility2040 recognizes the importance of the Transportation Security and measure progress to achieve the following goals and objectives:

Goal: Achieve State of Good Repair

Objective: Maintain fixed route and paratransit vehicles in state of good repair

Performance Measure:

- Replace WRTA fixed route vehicles on a 12-year replacement schedule
- Replace WRTA paratransit vehicles on a five-year replacement schedule

Asset Inventory

Vehicle Fleet

The fixed route provider under contract to the WRTA is Central Mass Transit Management, Inc. CMTM currently operates 53 full size (30', 35' and 40') buses along with an additional 50 vans which are used for paratransit purposes. Of these 53 full size buses, six are brand new Proterra all-electric vehicles. These vehicles are owned by the WRTA.

Figure IV-4: WRTA Proterra All-Electric Bus

Fixed Facilities

a) Union Station Hub

The WRTA constructed a new "hub" next to Worcester's Union Station. The opening of the Hub completed the vision of Union Station being a true intermodal campus where connections between MBTA commuter rail, Peter Pan/Greyhound bus service, Amtrak and local taxi service could be made with ease. The new Hub has an enclosed waiting area, restroom facilities, next bus arrival and departure displays and announcements, ticket vending machines, a Customer Service window, and a Dunkin' Donuts. The building also houses WRTA Administration and PBSI paratransit brokerage staff. The platform area can accommodate up to eight buses at a time and also includes seating, and ticket vending machines.

Figure IV-5: WRTA Union Station Hub in Worcester

b) Maintenance and Operations Center

The WRTA's existing maintenance and operations facility is at 287 Grove Street. In operation since the late 1920s when it was built as a trolley barn, the existing facility performs all of the requirements to keep the fleet in operation. The single-story facility houses CMTM operations, dispatch and maintenance staff offices, six bay bus storage for all 53 buses internally, has 14 Garage Bays and body shop additions, two fuel bays, two wash bays and a van storage facility.

In 2007, state and federal transportation officials discouraged the WRTA from undertaking any large-scale capital improvements on the property and instead encouraged the WRTA to pursue other options. The Federal Transit Administration (FTA) has also told the WRTA that the facility is far outdated and that any additional large-scale capital maintenance should not be undertaken. In August 2007, the WRTA applied to participate in the FTA sponsored Environmental Management System (EMS) Implementation Institute at Virginia Tech seeking EMS ISO 14001 Certification. In June 2010, the WRTA EMS was audited by representatives of the Institute and deemed ready for the ISO Certification process, a testament to the WRTA commitment to environmental accountability.

Figure IV-6: Architect's Rendering of Future WRTA Maintenance and Operations Facility

c) Bus Shelters and Stops

The WRTA has 1,377 bus stops and 42 shelters in its system. Bus stops and shelters are the first physical access points to the bus system. Their placement and condition either entice or deter passengers from using the system.

Figure IV-7: WRTA Bus Shelter

Technology

The WRTA has invested in new technologies for improved service performance and customer information. These technologies include automated passenger counting (APC), automated vehicle announcements (AVA), automatic vehicle locators (AVL) and automatic vehicle maintenance (AVM).

Analysis

A major concern in past years (as reflected in past Regional Transportation Plans) has been the adequacy of Federal Section 5307 monies to meet WRTA capital needs requirements. However, in contrast with ISTEA and TEA 21 levels, but consistent with SAFETEA-LU levels, MAP-21 apportionment levels have been maintained and have allowed the WRTA to complete a very much needed fixed route bus replacement program. While capital monies available to the WRTA are higher than in past years, it also needs to be recognized that the WRTA has had to program capital funds as much as possible to preventive maintenance in order to make up for limited state and local operating assistance.

Average Fleet Age

One measure of SOGR is the average age of the bus fleet. The Federal Transit Administration (FTA) recommends that a transit authority have an average fleet age of six years. In 2014, the WRTA has an average fleet age of 3.18 years. The average fleet age is low because the WRTA purchased a number of new buses in 2008 and 2009, followed by a second round in 2012, 2013 and 2014.

Fixed Facility Condition

Another measure of SOGR is condition of fixed facilities. Preventative maintenance efforts help maintain these assets in good, operating condition for many years, or decades, of service.

a) Union Station Hub

Because the Union Station Hub is a year and a half old, keeping the facility in a SOGR is minimal with preventative and general maintenance efforts.

b) Maintenance and Operations Facility

Because of the deteriorated conditions of the existing Grove Street maintenance and operations facility, the WRTA's largest effort is the design and construction of a new facility to replace the existing garage. In FY 2010, the WRTA received a federal State of Good Repair grant of $39 million, the second largest in the nation, to build the new facility. This new facility will replace the functionally obsolete existing 86 year old facility and, more

importantly, allow for the increased environmental mitigation at the Grove Street site once they have moved to the new location. The new site is located at 42 Quinsigamond Avenue in Worcester and the new facility will be completed in fall 2016. The new site will also be located closer to Union Station and will decreasing deadhead travel time for more efficient operations.

c) *Bus Shelters and Stops*

Because bus stops and shelters are the first physical access points to the bus system, the WRTA makes sure that the shelters are inspected on a monthly basis and any repairs that are needed are made quickly. Bus stops are inspected less frequently but are reported for repair by riders, drivers and/or inspectors. Examples of repair include sign replacements, pole replacements, glass panel replacement in shelters, benches, and full shelter replacement.

Future Needs

With the completion of the WRTA's new maintenance and operations facility, the major capital improvement projects for the system's operation will be complete. Future SOGR efforts for fixed-facilities will focus on maintaining these for many years, even decades, of good service and system reliability.

Replacement, or possible expansion, of the WRTA's existing bus fleet will be the primary focus of new equipment in the coming years. In FY 2016 and FY 2017, the WRTA has programmed six new buses, three in each fiscal year, for fleet expansion. Beginning in FY 2020, the WRTA is expecting to begin replacing its 2008 fixed-route buses.

Fixed-Route Intelligent Transportation Systems (ITS)

Background

Since summer 2012, the WRTA has implemented a state-of-the-art, Intelligent Transportation Systems (ITS) technology as the result of funding received from the American Recovery & Reinvestment Act (ARRA) in 2009. The new system has been installed for both fixed route and paratransit systems, and includes tools for improving the management of the system and tools for riders to obtain real-time information for trip planning and riding. The tools include:

- Automatic Vehicle Locator System
- Data Communications System
- Automatic Vehicle Announcements
- Automatic Passenger Counter System

- Dynamic Message Signs
- Customer Service Online System
- Maintenance Management System
- Web Interface for Real-Time Information

Taken as a whole, the technology implementation has helped the WRTA improve schedule reliability, reduce federal reporting costs, provide detailed information to assist in route planning, and assist the riding public in obtaining real-time information about their trip. Also, the WRTA has implemented a scheduling software program (HASTUS) to improve efficiency and has upgraded its telephone system to take advantage of new computer technology and improved customer service.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning. Mobility2040 recognizes the importance of ITS and measures progress to achieve the following goals and objectives:

Goal: Reduce Congestion and Improve Mobility for all modes

Objective 2 - Enhanced Traveler Information (ITS)

- Facilitate the installation of information systems/kiosks at major intermodal locations, such as Union Station. 2 locations every 5 years.
- Expand I-290 ITS Real Time Traffic Management (RTTM). RTTM on I-395 and Route 146 also. Install 2 Variable Message Boards (VMB) every 5 years.

Objective 3 - Improve Corridor Management Integration

- Increase % of overall bus trips with an on time % greater than 90% (leaving hub and end of line). 10% increase over 10 years.
- Install Transit Signal Priority – 5 signals every 5 years.
- Reduce average travel delays along identified congested major roadway segments. 2 every 5 years.
- Improve 2 of the top 20 congested intersections every 5 years to a LOS of “D” or better.

Analysis

New Technologies

Assuring that WRTA passengers are kept informed with the latest information and service updates is crucial to maintaining good public relations and attracting new passengers. These technologies have provided improved information dissemination to bus passengers and include the following:

- Automatic Vehicle Announcements (AVA) – AVA provides clear audio and visual messages for specific stops and locations along a bus route. These announcements can be broadcasted in multiple languages and assist passengers with hearing or visual impairments when riding the bus.
- Variable and Dynamic Message Signs (V/DMS) – The signs located at specific WRTA bus stops throughout the WRTA system and at Union Station provide real-time bus arrival notices to passengers waiting for a bus.
- Automatic Vehicle Locator (AVL) – The AVL system allows bus users, operators, and dispatchers to use mobile device and PC software applications to see where buses are located along its route and when it will arrive at specific stops, to improve schedule adherence

Technologies Related to Improved System Operations

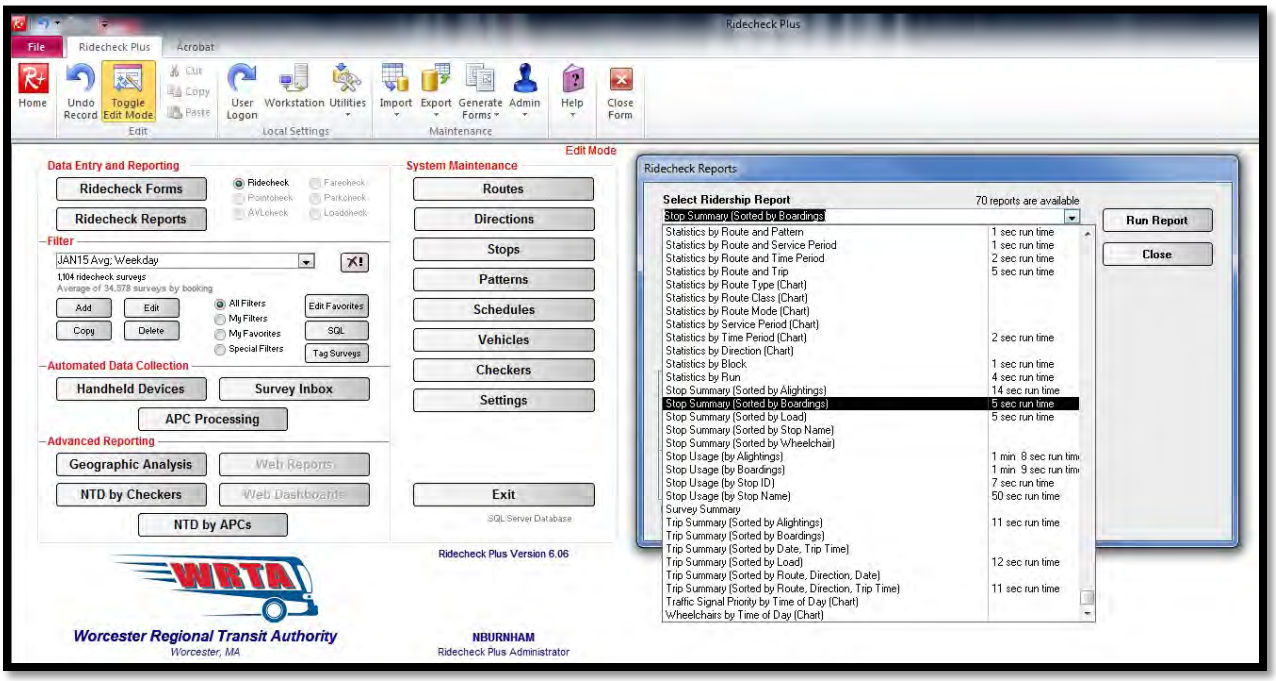
Passengers expect on-time service when using transit. These technologies provide for improved bus operations, on-time performance and reduction in bus passenger boarding times:

- Contactless Fare Collection – Contactless fare collection technology, known locally as "Charlie Card" technology, allows passengers to use pre-paid "smartcards" that can be read by a bus fare box to pay the fare, thereby reducing waiting times to board buses at stops.
- Automatic Vehicle Monitoring (AVM) – AVM measures, monitors, and reports the status of critical systems and components for every bus in the WRTA fleet, allowing the WRTA to meet increased ridership demands through greater operational efficiency.
- Transit Signal Priority (TSP) - TSP technology provides bus service travel time extensions at signalized intersections using devices that communicate with each other. Transit Signal Priority can reduce bus travel times and open congested corridors for future transit service consideration.

Technologies Related to Passenger Data Collection

Obtaining data about the number of passengers on a bus is a crucial performance measure of a specific route. Obtaining this data manually is time consuming and labor intensive. Using Automated Passenger Counting (APC) has allowed the WRTA to obtain accurate data more quickly, counting the number of passengers that board or alight from a bus at a given stop along the route. APC data has provided WRTA planners and operations staff more accurate passenger information by route over a daily, weekly, monthly and yearly period, as well as provide accurate passenger information for National Transit Database (NTD) reporting. This information, along with AVL and other operations data, is being used to determine the performance of a given route and where adjustments may need to occur.

Figure IV-8: WRTA's RideCheck Plus APC Program



Specific Locations for These Technologies

The technologies outlined above were installed on the WRTA's fleet of 52 buses in spring 2013. These include AVA, AVL, AVM, APC and "Charlie Card" technologies. V/DMS technologies were installed at the new Union Station "bus hub" that was completed in May 2013. TSP has a longer planning horizon, but has been tested at a specific intersection in Worcester, and can be expanded, pending funding availability.

Needs

During the update to the Central Massachusetts Regional ITS Architecture in 2011, the regional transportation stakeholders identified key regional needs for fixed route transit among other modes. These needs, specific to Central Massachusetts, are:

- Congestion Management
- Transit Efficiency
- Efficient Use of Existing Infrastructure
- Economic Development
- Safety and Security
- Communications Infrastructure
- Traveler Information
- Use of ITS Data

Multi-function Program Areas were also developed as part of the ITS Architecture Implementation Plan and they include:

- Electronic Toll Collection Integration for Parking – Future initiative for MassDOT, MBTA, and community parking facilities that have controlled access.
- Regional Fare Card Integration for Parking – Future initiative for MassDOT, MBTA, and community parking facilities that have controlled access.
- CAD/AVL (Computer Aided Dispatch/Automated Vehicle Locator) for Transit Vehicles – Currently being deployed by the Worcester Regional Transit Authority (WRTA)
- Traffic Signal Priority – A future initiative for reducing congestion delays for WRTA buses.
- Regional Fare Card – Deployed in spring 2012, this initiative provides an interoperable fare medium allowing riders to use the WRTA, MBTA and other participating RTAs.

It is expected that the recently formed Regional ITS Planning and Coordinating Committee will be actively working to prioritize and explore implementation strategies for these Multi-function Program Areas.

Prioritization

As identified in the 2011 Worcester Regional Mobility Study, Transit Signal Priority (TSP) is a valuable Intelligent Transportation Systems option for Central Massachusetts' urban core. TSP would help reduce vehicle emissions through more efficient bus system operations and added potential for drivers to avoid congested routes thus creating less gridlock for buses that have to

travel these routes. More efficient (and potentially more expansive) bus service provides a benefit to EJ populations along routes where TSP is implemented. Businesses along these corridors could benefit from TSP implementation through added transit service. While additional corridors, such as Park Avenue and Shrewsbury Street, are being assessed by the WRTA, City of Worcester and the CMMPO for future TSP implementation, a final strategy has yet to be determined.

Fixed-Route Access to Essential Services

Background

Transit access to essential services such as employment, education, health care, public services, access to food and recreational activities is one of the WRTA's primary goals. The WRTA's recently revised Service Standards include the following statement: "It shall be the policy of the WRTA to space routes such that within approximately 90% of the densely populated areas of the core city, Worcester, residents shall reside within one quarter (1/4) of a mile from a bus route." In order to accomplish this, the service standards include the guidelines for route design. The following factors are considered essential for route design: population density (4,000 persons per square mile), employment density (200 employees or more), route and corridor spacing, demographics, service equity, interline enhancement, route directness, proximity to trip generators and destinations, and intermodal connectivity.

The CMMPO completed a Coordinated Public Transit-Human Services Transportation Plan (CPT-HST). Since the completion of this plan, MassDOT has been working with CMMPO staff and the Central Massachusetts Regional Coordinating Council (RCC) to implement portions of the CPT-HST plan in the region.

The new WRTA Hub at Union Station provides easier intermodal connections to intercity bus (Peter Pan / Greyhound), intercity rail (Amtrak) and commuter rail (MBTA), expanding transit access within and outside the region. The new Hub has administrative offices for the WRTA, customer service space, waiting areas, ticket / pass machines and restrooms. The facility holds up to eight full-size buses at a time and provides improved accessibility and transfer capabilities between fixed-route and paratransit service from its previous hub location at Worcester's City Hall.

Furthermore, WRTA is actively engaging the community, including riders, community groups, colleges and major employers; as a result, WRTA service is more tailored to patron's identified needs. Also informational materials have been tailored to each group, as an example: (1) routing

information for college students with key destinations; (2) combination schedules showing multiple routes for major employers; (3) employee address matching to provide personalized routing information; (4) improved opportunities for riders to obtain schedules and passes; (5) mapping of social service agencies in relation to the fixed route system; (6) travel training of personnel, particularly human resource and resident advisor staff, in using the bus; (7) surveys, either to employers or riders on how to improve or expand fixed-route service.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning related to federal emphasis areas, one of which is livability and access to essential services. Staff has developed the following goals and objectives that address access to essential services for all of the region's transportation modes:

Goal 1: Reduce Congestion and Improve Mobility for All Modes

Objective 4: Improved Transportation Accessibility for all modes

- Increase the number of ADA-compliant roadways and intersections. Two locations every five years.
- Improvement in the bicycle and pedestrian network within ½ mile of transit stations – for the top 10 high boarding and alighting locations. Two locations every five years.
- Increase average frequency on core-routes to 10 minutes. Two routes every five years.

Goal 6: Equitable Transportation for all populations

Objective 1: Provide access to essential services; minimize burdens and maximize benefits associated with low-income and minority areas

- Increase the number of ADA-compliant intersections by 10% over 10 years
- Improve traveler information at Union Station complex by installing Information Systems/Kiosks
- Increase access to essential services for EJ areas within 45 minutes of travel time by 10% over 10 years
- Inventory the bicycle and pedestrian network within a ½ mile of top boarding transit locations in the next two years

Objective 2: Consider Geographic Equity of transportation projects across the region

- Maintain an average fleet age of 5-6 years for transit vehicles in the region
- Equity (based on distribution of projects) in sub-regional project programming (by mode) at least one TIP project over each five year period

- Equity for Environmental Justice identified areas (by mode). One project that benefits an EJ area over each five year period

Analysis

In 2014-15, the WRTA conducted a Comprehensive Service Analysis (CSA) which was completed by URS Corporation. The CSA included a transit market analysis, which relates socio-economic data with population density, vehicle availability, land use and employment locations within WRTA's service region, as well as a number of service improvement recommendations. A route by route analysis showed that *"overall WRTA's service is deployed to accommodate the transit needs of the region's workforce."* URS recognized that there are areas where service could benefit from modifications to better meet demand and improve access to employment. In that regard, URS mentioned the benefits of having late night service and the desirability to expand weekend service to better suit current employment trends.

The major themes that came from the service recommendations of the CSA were the following:

- Elimination of specific routings (partial segments or full routes) due to low performance and re-focusing existing operating funds into more productive routes
- Development of a concept to better integrate and streamline service along Main Street
- Extended hours and increased frequency to create "clock face schedule", specifically on weekend service days
- Establishment of fixed-route service along Park Avenue
- Establishment of "cross-town" routes from the east and west side of Worcester
- Creating routes with more direct service between origins and destinations (e.g. QCC to UMASS)

As identified in the CSA analysis, the WRTA provides fixed-route service to all but five areas of its region with a current or future potential for high transit demand. These five areas are located in the towns of Barre, Douglas, Dudley, Holden and West Brookfield. All of them exhibit clusters of current or future employment activity, service agencies and schools. Several of these towns have higher than average percentage of households without a vehicle, low income populations and elderly populations. Most of these towns do not meet the density threshold favorable for transit service and will require further analysis to determine when transit service should be implemented in these areas.

Needs

Based on the CSA's recommendations and analysis, there is an expressed need to increase the number of routes operating for weekend service, as well as schedule improvements along mainline corridors for improved access to essential services that are only available now on weekdays. In this regard, the WRTA has identified Main Street and Lincoln Street as mainline corridors that could benefit from higher frequencies. Doing so would require adjusting route schedules of mainline core routes, which are currently interlined/paired together. Also, the WRTA has identified the need for more "cross-town" opportunities beyond the current bus pairings and outside the "hub-and-spoke" alignment of routes.

Other service opportunities exist on the fringe of the current fixed-route system. These options would increase mobility options, provide more access to essential services and create new mode options not currently available. A potential transit corridor has been identified in the southernmost part of the region, connecting the towns of Dudley, Southbridge, Sturbridge and Webster. Input gathered for the CSA from multiple public meetings, surveys and meetings with community organizations coincide with the need to connect these towns.

Other areas with identified needs are the towns of North Brookfield, Ware and West Brookfield. In the CMRPC *Rural 11 Prioritization Project* study, the Town of Warren was identified by community leaders as a potential connection hub for the Pioneer Valley Transit Authority (PVTA) and the WRTA. A rural route connecting Ware and the Brookfields was also identified. Work done by the Central Massachusetts Regional Coordinating Council (RCC) also identified the need for more transit service in the western part of the region, mainly for access to job opportunities. The CSA also supplements this perceived need by also recommending a connection with the PVTA's Ware Shuttle from West Brookfield.

Lastly, improved transit services for college students were also identified as a need in the CSA. The Higher Education Consortium of Central Massachusetts (HECCMA), a consortium of the 10 colleges in the WRTA region, is currently in conversations with the WRTA to improve transit access to select colleges in Worcester.

Next Steps and Prioritization

The travel demand model will be used to analyze recommendations from the CSA. New bus routes, existing route expansions and route changes will be coded into the model to understand the new ridership and the travel behavior of the commuters. The results of the model will be used

to prioritize the implementation of the recommendations. Funding availability will play a major role in the timeframe for implementation.

Paratransit

Overview

Extensive paratransit services are offered in the region by the WRTA. The WRTA offers two types of paratransit services: one is paratransit service as required by the Americans with Disabilities Act (ADA) and the second is non-ADA paratransit service. ADA paratransit service, as required in areas surrounding WRTA fixed route bus services, is offered through the WRTA's van division and through contracts with local Councils on Aging (COAs), private non-profit providers and one for-profit provider (Yellow Cab). The WRTA offers non-ADA paratransit service to elders and people with disabilities outside of the ADA service area that extends to the most rural parts of the WRTA service area through similar contracts. While ADA paratransit service mirrors hours and days of fixed-route service, non-ADA level service is offered on weekdays generally from 8am-4pm. Changes in demographics, housing trends, advances in medical technology, and the passage of the Americans with Disabilities Act (ADA) in 1990 have impacted the availability, need, and value of paratransit to the Central Massachusetts region.

Since 2010, federal New Freedom and state Community Transit Grant funds have allowed moderate expansion of WRTA paratransit service hours in the suburbs including Shrewsbury, Millbury, and Mendon as well as rural areas of central Massachusetts offering midday service to Worcester. Additional transportation services are offered through Rehabilitative Resources Inc. of Sturbridge during periods of time when vehicles are not in use for their own programs. ReadyBus, operated by SCM Elderbus, also offers expanded service hours in their rural service area to accommodate work trips. All of these efforts were grant funded using both New Freedom and Job Access Reverse Commute (JARC) funding. Additional smaller services also exist but they are either client/program based or payment is required for the full cost of service.

Efforts of the South Central Massachusetts Regional Coordinating Council (RCC) are helping to further identify gaps in service by assembling key parties in the paratransit, employment, elder, disability, and other special interest groups to discuss common problems and possible solutions. The RCC has identified both employment transportation and rural transportation as significant service gaps.

The WRTA has also worked with the MetroWest Regional Transit Authority (MWRTA) to provide reciprocal paratransit trips for passengers travelling just over RTA boundaries. This arrangement allowed passengers to maintain employment in areas along neighboring WRTA and MWRTA communities. Similar arrangements can be made with any of the neighboring transit authorities.

Five communities in the Blackstone Valley area are not part of any regional transit authority, but provide limited paratransit service. This service is provided through the local COA during town business hours on weekdays through volunteer or town-employed drivers.

Paratransit Congestion

Background/Current Conditions

Congestion in paratransit often has two meanings; one is congestion to the passenger and the other is congestion of the roadway. Regarding congestion to the passenger, this means that multiple pick-ups or drop offs are done at one location (a hospital for example) with minimal effort made to use the vehicles to their highest potential. While a paratransit system should be using their vehicles to their maximum potential and have (at a minimum) 2.5 passengers per hour, often it is lower than this. Regarding congestion of the roadway, the main causes of this are insufficient roadway widths/lanes, poor signal timing and non-recurring items such as collision incidents, poor weather, work zones or emergencies. These factors contribute to decreased on-time performance for paratransit, while also limiting the number of trips that can be delivered, increasing the cost of service delivery and impacting rider experience.

Analysis

The WRTA has made extensive progress in reducing site congestion of paratransit trips by incorporating more communities into their Mobility Management Model (MMM). Originally piloted by two Councils on Aging, this program has expanded to include eight communities: Auburn, Boylston, Leicester, Northborough, Oxford, West Boylston Westborough, and Worcester. Successes in this effort have helped WRTA to gain efficiencies and reduce overall costs by attempting to maximize use of the existing WRTA infrastructure.

The WRTA has been able to leverage the availability of paratransit service by receiving funding from the New Freedom program to encourage passengers to switch some of their paratransit trips to the more cost-effective fixed route system. The WRTA offers a Travel Training program that is designed to assist a rider's transition to the fixed route system. The one-on-one instruction

program is offered free of charge and available to all members of the public. One goal is to motivate people to try using the fixed route service for some or all of their trips versus paratransit. Fixed-route service fares are less expensive and also offer the convenience of not needing to pre-schedule trips.

Because paratransit trips are scheduled by pick-up and drop off, on-time performance is important to provide good service. As noted earlier and in the fixed-route section, several elements contribute to the on-time performance, or non-performance, of paratransit service:

- General traffic delays
- Mechanical failures
- Poor scheduling/dispatching of trips
- Inadequate operator training and control
- External emergencies
- Inclement weather
- Construction projects

Operators, including the WRTA often have little control over external emergencies, inclement weather and construction projects. However, it does have direct responsibility for mechanical failures, scheduling/dispatching of trips and operator training and control.
Although traffic delays are beyond its immediate jurisdiction, trips are scheduled so that sufficient time is available under normal traffic conditions to complete the trip on time. Since street traffic varies by season, day of week and hour of day, trip times may be adjusted accordingly.

In instances where trip schedules become difficult during peak periods by reason of general traffic volume, vehicles can modify their routing and can take steps to avoid the traffic problems causing the congestion. Disruptions due to mechanical failure of equipment cannot be eliminated but should be minimized within the economic limits of sound maintenance practices.

Steps to Address On-time Performance and Congestion

- Improvements to method of data-collection which monitors and reports on the standard for different operating periods of the day
- Enforcement of rules and regulations currently in existence
- Improvements to initial and continuing operator training
- Prepare schedule for changes in equipment assignments (e.g. vehicle rotation)

- Improve communication protocols between WRTA dispatchers, inspectors and operators, as well as local public works and local police departments, to minimize service disruptions due to external emergencies, inclement weather and/or construction projects
- Encourage reduced use of single occupant vehicles, and increased use of multi-modal, healthy, active transportation options, to reduce overall roadway congestion

Needs

Continued success of the MMM depends on further automation of the scheduling and dispatching responsibilities, in addition to a well trained staff.

There are many congestion improvement options to consider in an effort to maintain on-time performance. These short-term and long-term improvements are explained in detail in other chapters and are will additionally improve the delivery of paratransit service.

Paratransit Safety and Security

Background

Safety and security are the two most important aspects of transit service delivery in the region. Safety and security are paramount in all WRTA activities. Just like for the fixed-route system, the WRTA is committed to developing, implementing, and improving strategies, management systems and processes to ensure that paratransit service is upheld to the highest level of safety and security performance.

Current Conditions

WRTA paratransit drivers are trained to proficiency on Accessible Lift Use and Securement, Defensive Driving and Disability Awareness. This is done by in house trainers or through the Massachusetts Rural Transit Assistance Program. A newly developed program attempts to standardize paratransit driver training throughout the State.

The WRTA Safety Management System, developed by Central Mass Transit Management (Inc.), offers a means of preventing accidents by integrating safety into all aspects of CMTM's activities, from planning to operations to maintenance. Further, the WRTAs Safety and Security Program Plan serves as a detailed blueprint for all security activities. Additionally, the Continuity of Operations Plan (COOP) for the WRTA presents a management framework, establishes operational procedures to sustain essential functions,

and guides the restoration of full functions if normal operations in one or more of the WRTA's locations are not feasible. Finally, the CMRPC staff, in conjunction with Montachusett Regional Planning Commission (MRPC) under the guidance of the Central Region Homeland Security Advisory Council (CRHSAC), is working on an Evacuation Plan for all of Worcester County. The overall goal of the Evacuation Plan is to provide Worcester County emergency management personnel with a comprehensive Regional Evacuation Plan.

More information about these efforts is available in the fixed-route section.

Analysis

As outlined in the Highway Safety and Fixed-Route Transit sections, three state routes contain "super clusters" of auto/bike/pedestrian crashes that have been collated into the three top crash corridors for the CMRPC region. Within these "super clusters", almost all of the WRTA's paratransit services either operate along the corridors or crossover at specific intersections.

Needs

In 2015, the WRTA will be updating its Safety and Security Program Plan (SSPP). In addition, the WRTA will also update its COOP Plan from its last update in 2009, as well as its Safety Management System (SMS) to include not only the fixed route system, but also the paratransit system, fixed facilities and vehicle fleet. Lastly, development of a full Emergency Response Plan will also be started in 2015. CMRPC and MRPC staff will continue Phase 2 Evacuation planning efforts. Phase 2 will aid jurisdictions in practical application and use of the "Tool Kit'. Phase 2 will continue to align the CRHSAC Evacuation Plan strategies and goals with state evacuation plans.

Paratransit State of Good Repair

Background/Current Conditions

Keeping the paratransit system in a State of Good Repair (SOGR) requires efficient use of funding and management of assets that provide reliable and safe service year-round. SOGR is a key priority at the WRTA and for the CMMPO and both are committed to ensuring the best in safe, reliable, cost-effective and responsive paratransit services. The paratransit fleet is operated through a number of sub-contractors with the WRTA including Central Mass Transit Management, Inc., SCM Elderbus and ten local Councils on Aging (COAs). There are 50 vans

which are used for paratransit purposes. All of these vehicles are owned by the WRTA. The average fleet age of a paratransit van in FY 14 was 3.58 years, far below the recommended 5 years.

Figure IV-9: WRTA Paratransit Van

Source: Westborough Patch

The WRTA has invested in new technologies for improved service performance and customer information. These technologies include Strategen ADEPT software for paratransit reservations and scheduling and Mentor Ranger for GPS, vehicle location and communication.

Analysis

Just as for fixed-route service, a major concern in past years (as reflected in past Regional Transportation Plans) has been the adequacy of Federal Section 5307 monies to meet WRTA capital needs requirements. However, in contrast with ISTEA and TEA 21 levels, but consistent with SAFETEA-LU levels, MAP-21 apportionment levels have been maintained and have allowed the WRTA to complete a very much needed paratransit replacement program. While capital monies available to the WRTA are higher than in past years, it also needs to be recognized that the WRTA has had to program capital funds as much as possible to preventive maintenance in order to make up for limited state and local operating assistance.

One measure of SOGR is the average age of the van fleet. The Federal Transit Administration (FTA) recommends that a transit authority have an average fleet age of five years. In 2014, the WRTA has an average van fleet age of 3.58 years. The average fleet age is low because the WRTA purchased a number of new vans in 2008, 2009, 2010, 2011, 2013 and 2014.

Needs

Replacement, or possible expansion, of the WRTA's existing van fleet will be the focus of new equipment in the coming years. WRTA has requested six new replacement vans in 2015 to replace vans that have exceeded their useful life in an effort to keep the fleet age below five years.

The WRTA has a well-established policy of maintaining a state of good repair with their paratransit vans by establishing a schedule for both routine maintenance and vehicle replacement. The WRTA makes efforts to keep the average van fleet age below five years. Funding for replacement vans comes from MassDOT through their Community Transit Grants program or through WRTA 5307 capital funds.

Paratransit Intelligent Transportation Systems (ITS)

Background/Current Conditions

StrataGen ADEPT platform is being used to schedule, route, dispatch and report paratransit service. Additionally, the Mentor Ranger is being used as a GPS for the driver and an automatic vehicle locator. It is also used to provide drivers with real-time and updated passenger pick-up information. The WRTA has also formalized its customer service reporting by using Sales Force as its complaint filing and follow up system.

Analysis

Mentor Ranger, the vehicle location technology, has improved service delivery by allowing reservationists, schedulers and dispatchers the ability to 'see' where the vehicles are so they can redirect vehicles to a pick up location if needed. This is especially useful when there is road congestion. On time pickups can be improved overall using this technology.

StrataGen ADEPT is critical for obtaining data about trips, and hours and miles of service. Obtaining this data manually is time consuming and labor intensive. Using Strategen ADEPT has allowed the WRTA to collect and verify this information in a timely and reliable manner for daily planning and for monthly and annual reporting to National Transit Database.

Needs

Further expansion of the Mobility Management Model to more paratransit providers would allow for more efficiencies. Expansion to neighboring communities should be a priority.

Paratransit Access to Essential Services

Background/Current Conditions

As part of the Governor's Executive Order 530, Massachusetts formed the Statewide Coordinating Council on Community Transportation to address transportation issues. From that Council, regional coordinating councils were formed including the South Central Massachusetts Regional Coordinating Council (RCC). The RCC was able to identify four gaps in service to address: information dissemination, employment transportation, rural transportation, and service with more assistance. The RCC prepared a listing of available transportation resources within its service area and locations of information dissemination.

Paratransit service allows people with disabilities and elders' access to essential services such as medical and employment along with recreational activities. Currently the RCC has formed subcommittees to address the needs of employment transportation and rural transportation while recognizing that there may be overlap in service needs. Without closing these gaps, access to essential services remains limited.

The WRTA recently built a new Hub of operations which serves as the focal point of most WRTA routes and houses the paratransit eligibility, call taking, reservations and scheduling. This is also the home of the customer service center. As the focal point of input from the public, the office is responsible for gathering information and forwarding it to the proper department for follow up. Response time is monitored closely. The Hub is located next to Union Station in Downtown Worcester, which serves as an intermodal transportation center with access to the MBTA commuter rail, intercity bus, and intercity train. Information on these services is discussed in greater detail in the appropriate sections.
In response to public input, WRTA began four deviated fixed route services in Grafton, Northbridge, Paxton and Westborough. These deviations deviate up to ¾ mile for ADA eligible people with disabilities and will soon be deviating for the general population. Deviations are limited to two per trip.

Analysis

Using the StrataGen ADEPT system, tracking performance such as on time performance, late pick-ups, cancelled trips, and no-shows becomes much easier. Using Sales Force, the WRTA Customer Service staff can track and respond to complaints in a more efficient way which reduces duplication of efforts and is particularly helpful in monitoring suggested new service locations.

In 2014-15, the WRTA conducted a Comprehensive Service Analysis (CSA) which was completed by URS Corporation. While the primary focus of the CSA was on the WRTA's fixed-route system, URS included a transit market analysis, which relates socio-economic data with population density, vehicle availability, land use and employment locations within WRTA's service region, as well as a number of service improvement recommendations. URS recognized that there are areas where service could benefit from modifications to better meet demand and improve access to employment, particularly for transportation disadvantaged populations.

As identified in the CSA analysis, the WRTA provides fixed-route service to all but five areas of its region with a current or future potential for high transit demand. These five areas are located in the towns of Barre, Douglas, Dudley, Holden and West Brookfield. All of them exhibit clusters of current or future employment activity, service agencies and schools. Several of these towns have higher than average percentage of households without a vehicle, low income populations and elderly populations. Most of these towns do not meet the density threshold favorable for fixed-route transit service and will require further analysis to determine when and what type of transit service should be implemented in these areas, including possible paratransit type services.

Needs

Currently, the towns of Hardwick and Ware have expressed a need to improve access to essential services and have discussed these issues at RCC meetings. As towns at the edges of RTAs and not within the WRTA, both are isolated from the core of their respective service areas. Additionally, both are rural towns with limited service which significantly adds to the vehicle hours and miles, and reduces efficiencies. Working to change and improve the service will require assistance at the local, regional, and state levels.

Other service opportunities exist on the fringe of the current fixed-route system. These options would increase mobility options, provide more access to essential services and create new mode options not currently available. A potential transit corridor has been identified in the southernmost part of the region, connecting the towns of Dudley, Southbridge, Sturbridge and Webster. Input gathered for the CSA from multiple public meetings, surveys and meetings with community organizations coincide with the need to connect these towns.

The WRTA has also developed five distinct ADA paratransit eligibility applications in an effort to simplify the process for applicants and ask targeted questions about how the applicant's disability prevents them from using the fixed route service. With hope of having one application

for all Massachusetts RTAs, MassDOT has formed a Common Application committee. This application is currently under review.

WRTA is also planning on joining other RTAs on Ride Match software to improve online service information dissemination in a one-stop-shopping model. Ride Match would provide the public information on available public and private alternatives to get from point A to point B within communities and across the state.

Intercity Bus

Transit travel between cities is of great importance to the Central Massachusetts region because of the area's density, and its geography within New England. The Central Massachusetts region is the second largest urbanized area in the state and the third largest urbanized area within New England, behind Boston and Providence, respectively. The region is significant to intercity transit travel as a trip generator with the City of Worcester serving as a focal origin and destination point for travelers. Union Station, located within downtown Worcester, serves as the regional intermodal center for passengers taking the MBTA commuter rail, Amtrak passenger rail, and Peter Pan and Greyhound intercity bus routes. Directly adjacent to Union Station is the WRTA regional transit hub, which links the local public transportation provider to the other intercity transit connections.

Background

The providers of intercity bus service compete for passengers directly against airlines, passenger rail, and single-occupancy vehicles. This service is particularly important to rural areas and smaller communities that lack nearby air and passenger rail service. According to industry officials, intercity bus routes are gaining riders due to lower fares than the alternatives, and bus carriers are responding by adding routes and schedules to accommodate ridership demand. Such as the case with Union Station in Worcester, intercity buses operate from centrally located terminals, offering frequent service between major cities to make bus travel more convenient.

Peter Pan Bus Lines – Background and Current Conditions

Peter Pan Bus Lines, Inc., a private carrier based in Springfield, Massachusetts, is one of two major intercity carriers providing service in the Central Massachusetts region. One of the largest privately owned intercity bus companies in the country, Peter Pan is among the most innovative with express service and passenger amenities such as e-ticketing and online schedules. New buses in its fleet offer enhanced technological equipment that provides passengers with access to

on-board Wi-Fi, electrical outlets, and additional "leg room". The company expanded its ITS capabilities to include on-board GPS, ticket scanners, and security cameras for bus drivers. At its terminals, real-time information updates using scrolling LED signs and monitors and auditory announcements are made for customers to stay informed while traveling.

Figure IV-10: Peter Pan Bus

Source: www.peterpanbus.com

Greyhound Lines – Background and Current Conditions

Greyhound Lines, Inc. is the second major intercity carrier providing service in the Central Massachusetts region and serves over 3,800 destinations throughout North America. Greyhound has partnerships with a number of independent bus lines throughout the country, which provide complementary service to Greyhound's existing schedules and link to many of the smaller towns and rural areas within its national route system.

Figure IV-11: Greyhound Bus

Source: abcnews.go.com

Analysis

Between Peter Pan and Greyhound, service is provided to regional destinations at certain times of the day by either carrier from Central Massachusetts. Service is available to most major cities in the Northeast, with frequency of service varying from hourly service to Boston to only two roundtrip trips per day to Providence. For example, there are 15 one-way trips from Worcester to Boston starting at 5:45am and the last trip departing at 10:35pm. Intercity public transportation bus services are available from Worcester to Fitchburg and Leominster, operated by the Montachusett Regional Transit Authority (MART) utilizing Worcester's Union Station as an origin and destination point.

At the State level, the MassDOT Rail and Transit Division formed the BusPlus+ program, in which MassDOT provides new buses to private operators in exchange for expanding intercity and commuter transportation options. The operators provide improvements to regional transportation services and are responsible for all maintenance and operating costs. Peter Pan and Greyhound, as recipients of BusPlus+ funding, expanded services to increase commuter trips from Sturbridge to Boston in early 2014 and Worcester to Boston in September 2014.

Future Needs

Due to Peter Pan and Greyhound operating as private carriers versus public transportation, the CMMPO is not aware of their most pressing future needs. Like other public transportation, providing funding for maintaining operations is vital and determines system preservation and any plans for potential expansions.

Areas of importance to regional bus mobility are to fill gaps in the existing system and expansion to meet growth in future demand. Some geographic areas and times of day could benefit from bolstered or added service in the Central Massachusetts region, such as:

- Increase service from Worcester to Providence, specifically at times which would benefit potential commuters.
- Alter the current Worcester to Boston schedule to service its Sturbridge stop in the AM for potential commuters in the CMMPO West (the Brookfields, Spencer, Warren) and Southwest (Charlton, Southbridge, Sturbridge) sub-regions; the current schedule provides trips only in the mid-day and evening time periods.
- Consider a 'Park and Ride' stop in Palmer along the Worcester to Springfield route, which would provide access to intercity bus service for communities in the CMMPO West sub-region (the Brookfields, Hardwick, Warren).

Further statewide needs and other potential services for both public transportation and regional bus services were identified in the *Massachusetts Regional Bus Study,* completed by CTPS in 2013.

Intercity Rail

Background

MBTA

Under contract with the MBTA since July 1, 2013, Keolis Commuter Services runs commuter trains throughout Eastern Massachusetts. The MBTA's Framingham-Worcester commuter rail line operates between Worcester's Union Station and Boston's South Station, about 44 miles in length. Worcester's Union Station serves as the hub of passenger rail activity in the Central Massachusetts region. Of the seventeen stations on this commuter rail line, three are located within the CMMPO region in North Grafton, Westborough, and Worcester. In 2012, CSX moved their freight operations from Allston to Worcester and transferred ownership of the Framingham to Worcester track segment to the MBTA. With complete control of the line, the MBTA has increased the amount of trips from Boston to Worcester, implemented a new schedule, installed a third track to allow for the expansion, and announced plans to perform track maintenance to improve on-time performance.

Figure IV-12: MBTA Commuter Rail

Source: Jonathan Wiggs/Boston Globe Staff~~/~~

Amtrak

Amtrak provides intercity passenger rail service nationwide, serving more than 500 destinations in 46 states over 21,000 miles. Similar to other passenger railroad systems, Amtrak receives

public funding for capital costs and operating expenses, but is managed as a for-profit corporation. The only Amtrak service that operates through Central Massachusetts is the *Lake Shore Limited*, which begins its route in Chicago and travels eastbound through Cleveland, Buffalo, Albany, Springfield, Worcester, and concludes in Boston.

Figure IV-13: Amtrak Siemens Electric Locomotive

Source: http://blog.amtrak.com/2013/05/new-amtrak-locomotives-the-facts/0513_siemens_pressday_highrez_img_8746/

Analysis

As noted in the 2012 RTP document, there were a number of issues concerning commuter rail service in Central Massachusetts, from limited opportunities for reverse commuting to poor on-time performance. As part of an overall state effort to continue investing in multi-modal, healthy, active transportation options, the Framingham-Worcester commuter rail line saw an expansion in recent years. In 2014, responding to customer feedback and continuous increases in ridership, the MBTA expanded the amount of round trips between Worcester and Boston to 20 on weekdays and nine on weekend service. The overall schedule was altered to add service during peak times and accommodate reverse commuting (Boston to Worcester).

According to MBTA ridership statistics, in FY2013 the Framingham-Worcester commuter rail line was second out of 14 commuter rail lines for total (inbound and outbound) boardings on a typical day with 16,293 boardings. Worcester's Union Station ranked eighth out of 133 commuter rail stations ranked by inbound (Worcester to Boston) boardings on a typical weekday (1,475). This results in a 22% increase in inbound boardings on a typical weekday from November 2012 statistics (1,206). Between Worcester, Grafton (724), and Westborough (759),

the Central Massachusetts stations represent 26.8% of a typical weekday for inbound boardings on the Framingham-Worcester commuter rail line (11,044)[1].

The *Lake Shore Limited* only serves Worcester's Union Station twice a day, once in the mid-day as it departs from Boston towards Chicago, and once in the evening as it departs from Chicago towards Boston. According to Amtrak ridership statistics, the *Lake Shore Limited* served 373,331 passengers in FY14, a 5.6% decrease versus FY13 adjusted. In FY14, Worcester's Union Station served 8,439 passenger trips (inbound boardings and outbound alightings). Out of the eleven stations in Massachusetts, Worcester ranks ninth in station usage, ahead of Pittsfield (7,541), and Framingham (2,154), respectively[2].

Future Needs

As referenced earlier, providing funding for maintaining operations is vital and determines system preservation and any plans for potential expansions. While the CMMPO does not program funding for either the MBTA commuter rail or Amtrak, they are actively involved in passenger/commuter rail discussions and any future expansion studies/plans.

The Framingham-Worcester commuter rail line continues to have issues with on-time performance. In the past six months (May-October 2014), the line averages an 86% on-time adherence (81.7% May-July, and 90% August-October)[3]. The line suffers from summertime speed restrictions due to the steel tracks "de-stressing", the inability to withstand heat. MassDOT unveiled plans to improve travel times on the line, with work begun in 2014 between Worcester and Grafton and is anticipated to be completed in 2016.

In addition to the MBTA, passenger/commuter rail service between Worcester and Providence has been discussed. The Boston Surface Railroad Co. and the Providence and Worcester Railroad are in the initial stages of conducting a study with the purpose of creating a commuter rail service between the two cities. The projected route would include only one additional stop in Woonsocket, Rhode Island and is anticipated to be a 70-minute trip time.

MassDOT has partnered with its sister agencies in Vermont and Connecticut to initiate a study of the "Inland Route", which would examine a second passenger rail service from Boston to Worcester, Springfield, Hartford, and New Haven, Connecticut. The study would likely include

[1] MBTA, Ridership and Service Statistics: July 2014, http://www.mbta.com/uploadedfiles/documents/2014%20BLUEBOOK%2014th%20Edition.pdf
[2] Amtrak, Amtrak Fact Sheet FY14 State of Massachusetts, http://www.amtrak.com/pdf/factsheets/MASSACHUSETTS14.pdf

[3] MBTA, MBTA ScoreCard Archive, http://www.mbta.com/about_the_mbta/scorecard/default.asp?id=18476

potential improvements and recommendations for upgrades to the existing route for higher-speed standards, similar to Amtrak's *Lake Shore Limited*.

Although the MBTA commuter rail service area covers 175 communities, some geographic areas and times of day could benefit from expanded or added service in the Central Massachusetts region, such as:

- Connections to other Regional Transit Authorities (RTA's) at suburban MBTA commuter rail stations are non-existent and would promote inter-modality in the region. For example, the WRTA operates community shuttles to the Grafton and Westborough stations, and would benefit to foster a connection with the MWRTA at either the Westborough or Southborough station.
- Extension of commuter rail service from Worcester to Springfield.
- Examination of passenger/commuter rail service from Worcester to Providence.
- Improved on-time performance.

Auto Travel

Congestion

Background

MassDOT predecessor agencies, the MPOs, the MBTA, other RTAs and a prior ride share contractor initially developed the Massachusetts Congestion Management Process (CMP) (previously called Congestion Management "System") as a cooperative effort. The team was charged with the responsibility for the overall design of the Commonwealth's CMP as well as the development and evaluation of various strategies or improvement options. The Technical Team also selected standard performance measures and congestion monitoring techniques to be used statewide. Although considered a statewide system, CMMPO staff has been responsible for both developing and maintaining the planning region's CMP within the flexible framework originally established by the Technical Team.

The CMP is a systematic approach, collaboratively developed and implemented throughout a metropolitan region that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies. The CMP provides information to decision-makers on system performance and the effectiveness of implemented strategies. Although major capital investments are still needed to meet travel demand, the CMP also develops lower cost strategies that complement capital investment recommendations. The result is a more efficient and effective transportation system, increased mobility, and a leveraging of resources. The intent of the CMP is not only to address existing congestion, but also to prevent congestion from occurring elsewhere. The CMP includes other programs and activities such as the Localized Bottleneck Reduction Program (LBRP) and MassDOT Park-and-Ride Lot Usage monitoring.

CMMPO staff conducts the preparatory work and scheduling needed to collect all pertinent data necessary to maintain the region's ongoing CMP program. Travel Time and Delay studies are conducted on identified CMP focus roadway segments, defined either analytically or through the public outreach process. Data needed to analyze the operations of the critical intersections identified along the focus roadway segments is also collected through the CMP effort. Peak period Turning Movement Counts (TMCs) are conducted at critical intersections in the planning region.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning related to federal emphasis areas, one of which is congestion. The CMMPO has drafted a number of goals for the Mobililty2040 Long Range Transportation Plan, two of which are congestion related. The objectives for these goals are as follows:

Objective 1 – Coordinate Improved Incident Management

- Facilitate one meeting per year with identified agencies to improve incident detection and clearance time

Objective 2 – Improve Corridor Management Integration

- Reduce average travel delays along 2 identified congested major roadway segments every 5 years
- Improve two of the top 20 congested intersections every 5 years to a Level of Service of "D" or better

Objective 3 – Reduce GHGs Generated by Motor Vehicles in the Region

- One percent vehicle miles traveled (VMT) reduction in each 5 year period
- Institute one new Park-and-Ride lot in each five year period for Transit & TDM along congested corridors

Analysis

Since 2010, CMMPO staff has completed over 30 Travel Time and Delay studies, analyzed 150 intersections, monitored five Park-and-Ride lots, conducted over 500 traffic counts, and studied nine identified local "Bottleneck" roadway segments. The analyses of all these data collection activities are compiled and included in yearly progress reports. The most recent progress reports can be found at http://www.cmrpc.org/transportation-planning-documents.

Traffic Volumes: As shown in Figure IV-14, the highest traffic volumes are on the Interstate highways, especially Interstates 90, 290, and 495. Daily volume surpasses 115,000 vehicles a day on sections of Interstate 290 in Worcester. Also, over 90,000 vehicles a day use Interstate 90 between Sturbridge and Hopkinton. Routes 9, 20, and 146 are lower volume roadways, but still carry between 20,000 and 40,000 vehicles a day on some sections in the urban towns. Rural towns in the western part of the CMMPO region have no roadways with over 10,000 vehicles per

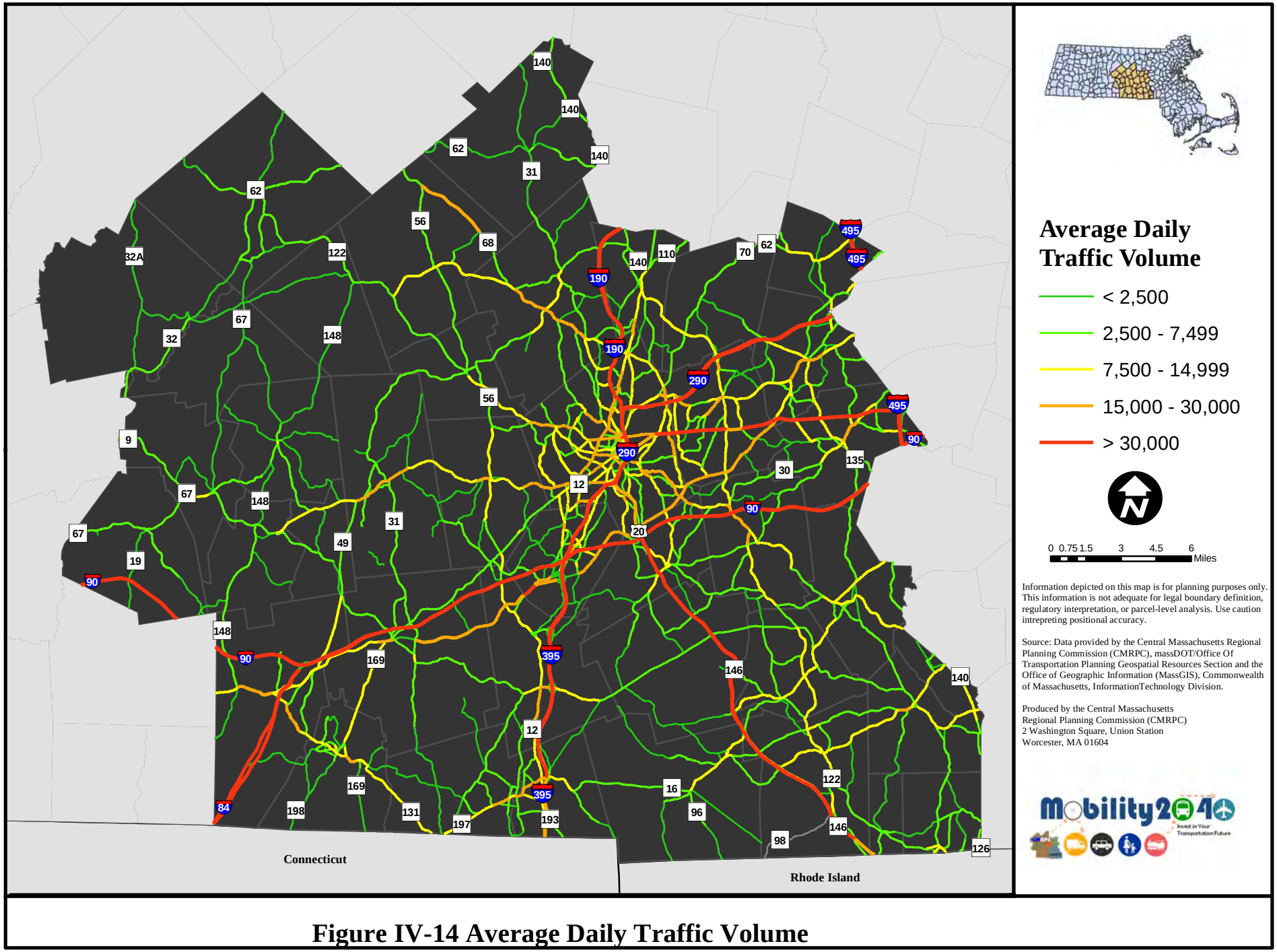


Figure IV-14 Average Daily Traffic Volume

day. For additional traffic volumes see CMMPO staff's Daily Traffic Volume report or visit the MassDOT website.

Travel Time Data: Using CMMPO staff's Travel Demand Model, a number of roadway segments throughout the region were identified as "congested" or "projected" to be congested by 2040. Travel Time and Delay studies analyze the speeds on the roadways and how long it takes to get from one place to another. Slower travel speeds are most often located in urban and densely built up areas where congestion occurs. Vehicle speeds fluctuate at different times of the day as well as different days of the week. When roadway usage exceeds capacity, travel speeds tend to slow significantly. Figures IV-15 & IV-16 show observed travel speeds for roadway segments that were studied between 2010 to 2014.

Turning Movement Counts (TMCs): Numerous intersections have been studied by CMMPO staff over the years. The AM & PM peak periods are analyzed to determine the amount of delay for vehicles traveling through the intersection. A Level of Service (LOS) is calculated for each studied intersection, with an "A" being given to the location with minimal delay progressing downward to an "F" assigned to an intersection with excessive delays or where the demand far exceeds capacity. Many intersections in the planning region have a poor LOS during peak travel periods in the morning and evening. These locations are concentrated in communities with high volume roadways: Auburn, Shrewsbury, Westborough, and Worcester. In addition to regular single-occupant vehicle (SOV) travel, the amount of heavy vehicles traveling through intersections and on roadway segments can at times decrease speeds while increasing delays.

Bottlenecks: In 2008, FHWA and FTA recommended that MPOs identify the top three bottleneck areas in their region. Since then, CMMPO staff has analyzed a total of nine bottleneck areas in our Localized Bottleneck Reduction Program with the help of our Transportation Management Systems and Transportation Model. A "traffic bottleneck" is a localized constriction of traffic flow, often on a highway segment that experiences reduced speeds and inherent delays, due to recurring operational influence or a nonrecurring impacting event. A bottleneck can be on high or low volume roadways. Table IV-4 shows the bottleneck locations that CMMPO staff has studied since 2011.

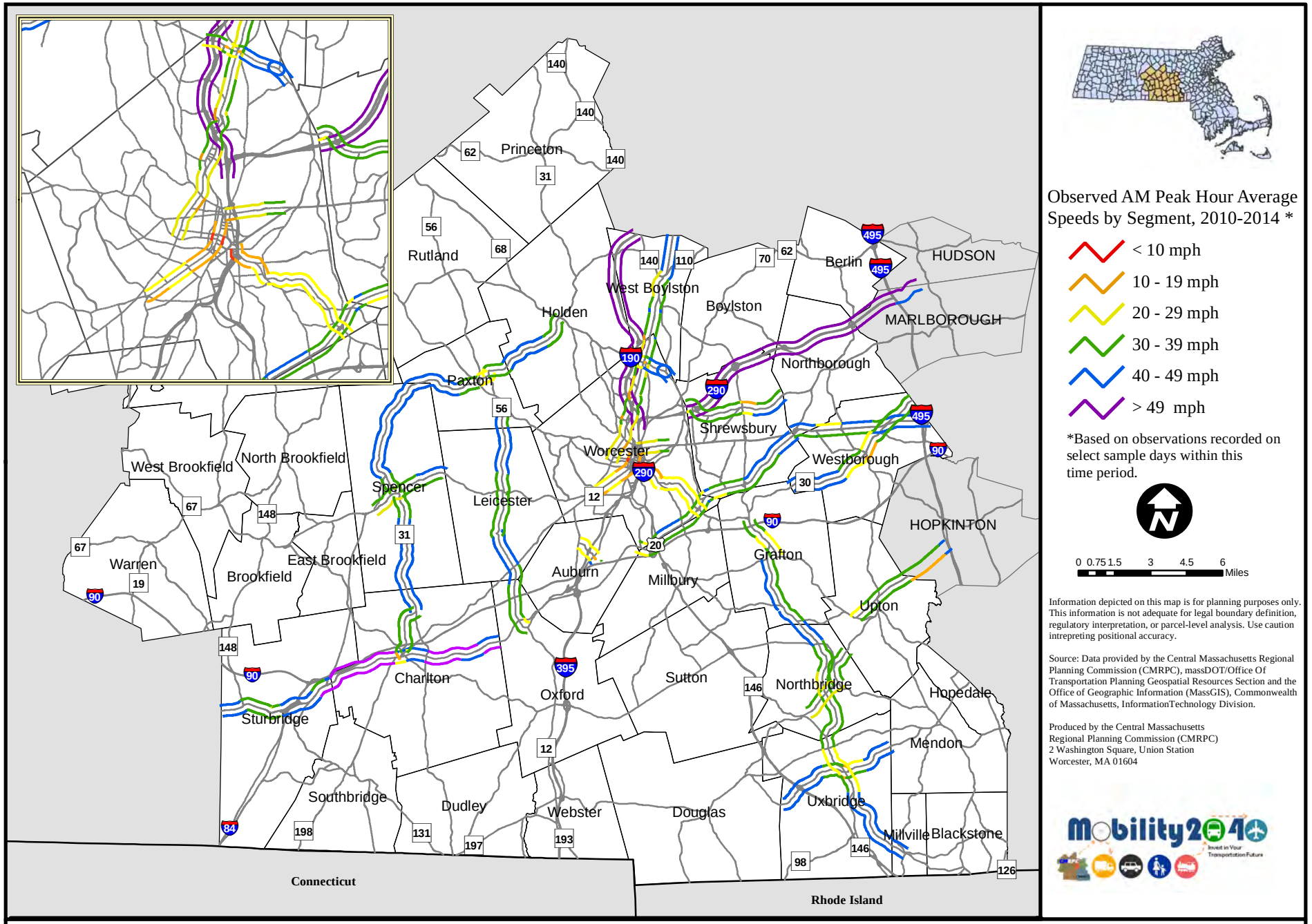


Figure IV-15 Observed AM Peak Hour Travel Speeds

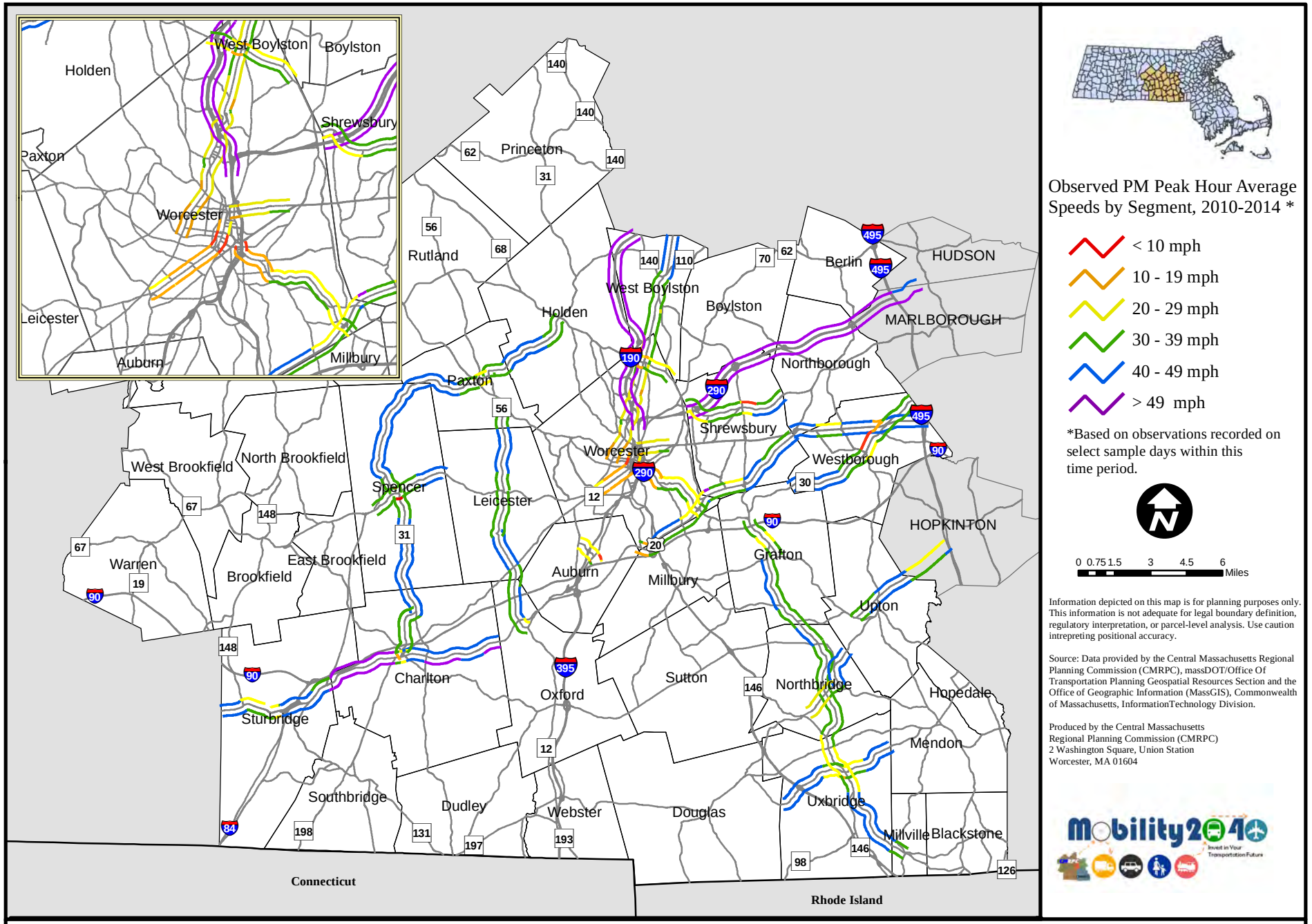


Figure IV-16 Observed PM Peak Hour Travel Speeds

Table IV-4: Localized Bottleneck Reduction Program

City/Town	Location	Year Analyzed
Northbridge	Route 122 @ Church Street	2011
Spencer	Route 9 @ Route 31	2011
Worcester	Belmont Street @ I-290 Ramps (Exit 17)	2011
Charlton	Route 20: Between Route 169 & Route 31	2013
Oxford	Route 12 @ Sutton Avenue @ Charlton Street	2013
Westborough	Route 9 @ Lyman Street	2013
Auburn	Auburn Street: Between I-290 (Exit 9) & Brotherton Way	2014
Grafton	Route 122/140: Between Snow Road & Providence Road	2014
Worcester	Route 12 @ East & West Mountain Street	2014

Park and Ride: CMMPO staff has been monitoring the Berlin Park-and-Ride lot usage since 1999. In 2013, analysis began on an additional four lots. Table IV-5 shows the five Park-and-Ride lots that have been studied. Three of the lots have over 100 spaces and the remaining two have fewer than 50. All lots are well utilized and are located near major highways and interstates. Additional Park-and-Ride information can be found on the MassDOT website at http://www.massdot.state.ma.us/highway/TrafficTravelResources/ParkandRideMap.aspx.

Table IV-5: MassDOT Maintained Park-and-Ride Lots in the CMRPC Region

Community	Location/Address	Capacity
Berlin	Rte 62 at I-495, Exit #26	45
Auburn	Mid State Drive Adjacent to I-90, Exit #10	135
Millbury/Worcester	Rte 20 at I-90, Exit #10A	446
Millbury	Rte 122 at I-90, Exit #11	140
Sturbridge	Rte 131 at I-84, Exit #3 (Bethlehem Lutheran Church Lot)	50

Needs Assessment

As the analysis of intersection and roadway segments are completed, the resulting data is added to CMMPO staff's list of encountered peak hour delay. This table ranks the intersections based on the total number of minutes that drivers as a group wait at the intersection during the AM + PM hours. Currently, 287 intersections are included in the list. The average total peak hour delay calculated from the list is 1,588 in-car minutes per hour. 74 of the 287 intersections caused delays that were above average. Based on the above mentioned data collection activities, there

are various roadway deficiencies that need to be further analyzed and improvements that should be made, whether they are short-term or long-term in nature. The complete list of encountered delays for the 287 intersections can be found in the latest CMP Progress Report,

Park-and-Ride lots are used to reduce the number of vehicles on the roadways. The more people that carpool, the fewer vehicle miles traveled. The Auburn, Berlin, and Sturbridge lots are heavily used and are usually near capacity. The remaining two lots in the town of Millbury are only half utilized.

There are many causes of congestion. Some are recurring, such as insufficient capacity, unrestrained demand, or poor signal timing, and some are non-recurring, such as collision incidents, poor weather, work zones, or emergencies. Most of the congestion in the CMMPO region is concentrated in the City of Worcester and the neighboring urban towns. Congestion can be found on local roads, highways, and Interstates. There are many improvement options to consider. There are short-term improvements such as adjusting signal timing and phasing, maintaining traffic control signage and pavement markings, maintaining good pavement, trimming overgrown vegetation along roadways that impair vehicle sight lines, maintaining roadway drainage structures, and access management techniques. These improvements can be quickly implemented at a low cost. Also for consideration are other options that are more costly and take longer to implement. Some of these are intersection realignment, installation of a modern roundabout, building additional lanes to increase capacity, and incorporating Intelligent Transportation Systems (ITS) capabilities or tools. See CMP Mitigation Toolbox for other ideas on relieving congestion (http://www.cmrpc.org/congestion-management-process), all of which may be considered in the region from time to time.

Prioritization

In concert with the goals and objectives drafted by the CMMPO there are certain roadways and intersections that should be improved first. These prioritized locations should have improvements that will alleviate congestion and reduce travel time. Performance measures help determine if a project should be undertaken as a result; a project that benefits multiple modes or management systems will get a higher priority over a proposed project that only helps one element.

Using the peak hour delay table for critical intersections in the planning regions, we find the top 20 locations that should be considered top priority for the region. Figure IV-17 shows the locations of these top 20 congested intersections as well as the Park-and-Ride lots and bottleneck locations. The location of these intersections can also help determine which roadway segments

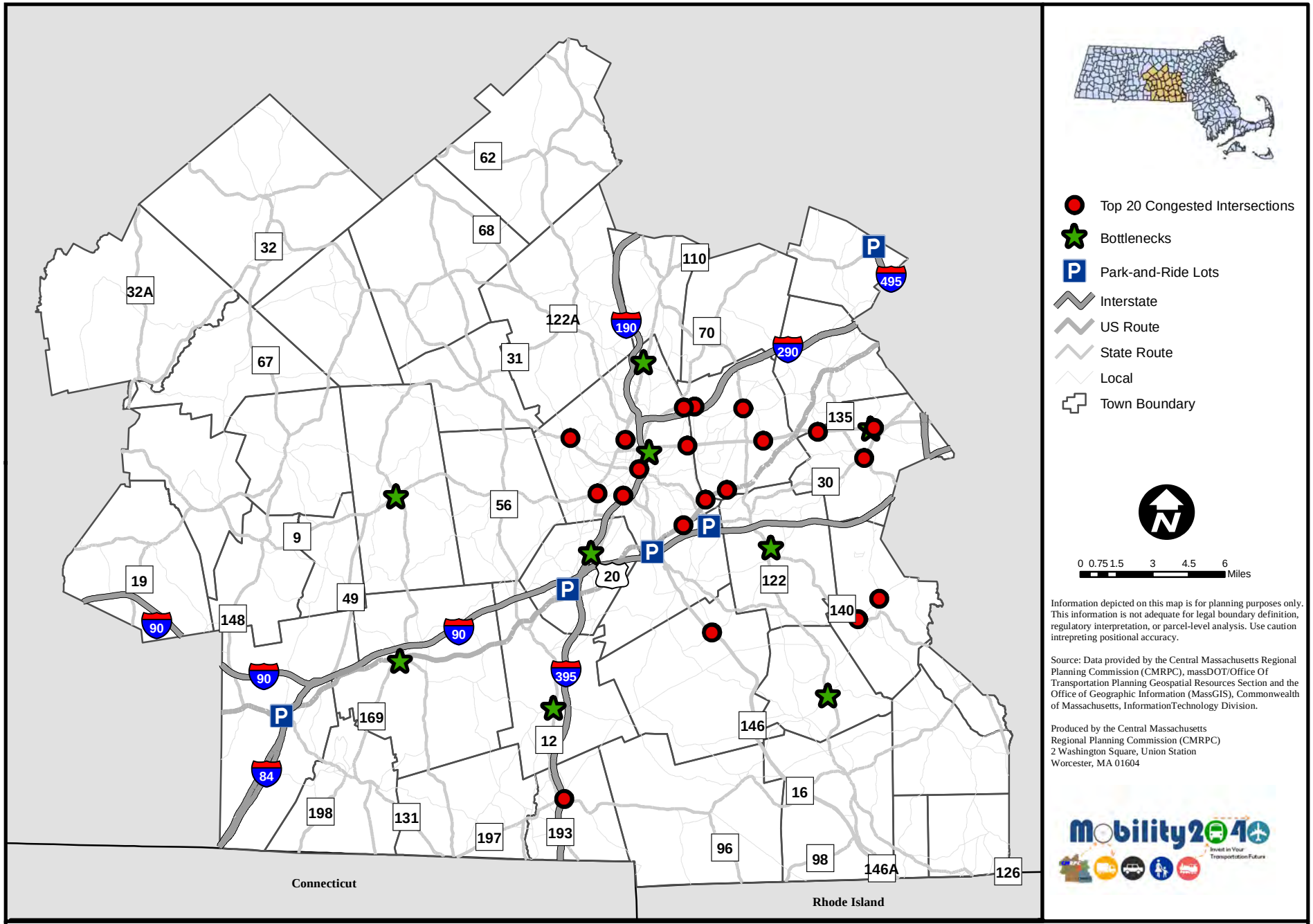


Figure IV-17 CMP Focus Locations

should undergo improvements to reduce travel time and potential bottlenecks. The following table only includes what CMMPO staff has analyzed to date. There could potentially be other congested intersections in the region that will be on a future priority list. Most of the critical locations are in the City of Worcester and the town of Shrewsbury. The remaining few are in the towns of Sutton, Upton, and Webster. Ten of these locations should be addressed by 2040 along with ten nearby congested roadway segments. Table IV-6 is the list of the top 20 congested intersections. The total peak hour delay included in the table represents the total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours. By addressing the congestion issues at these intersections, travel flow for the nearby roadway segments would potentially be alleviated.

Table IV-6: Top 20 Congested Intersections Included in Regional CMP

Community	Intersection	Total Peak Hour Delay
Worcester	Belmont St/Lake Ave	12275
Webster	I-395 NB Ramps/Route 16/Sutton Rd	12080
Worcester	Foster St/Francis J McGrath/Franklin St/Green St	10908
Upton	High St/Hopkinton Rd/School St/Westboro Rd	10862
Worcester	Chandler St/Mower St/Pleasant St	10656
Upton	Route 140/Hartford Ave/Maple Ave	10601
Worcester	Cambridge St/Southbridge St	10501
Shrewsbury	Route 9/South St	9819
Worcester	Park Ave/Salisbury St	9388
Sutton	Route 146/Boston Rd	9340
Westborough	Route 9/Lyman St	8907
Worcester	Cambridge St/Main St/Webster St	8800
Shrewsbury	Main St/N Quinsigamond Ave/Holden St	8563
Worcester	Route 20/Massasoit Rd	8381
Westborough	Route 30/Church St/School St	7795
Worcester	Route 20/Sunderland Rd	7611
Worcester	Plantation St/Lincoln St	7306
Westborough	Route 9/Otis St	6976
Shrewsbury	Route 140/Main St	6802
Shrewsbury	Route 20/Lake St	6803

Improvement of existing Park-and-Ride facilities and the possible addition of more areas can help meet the goals of a 5% total VMT reduction and the long term creation of five new Park-and-Ride locations. Further, rideshare programs such as MassRIDES and NuRide will also help

with VMT reduction by encouraging travelers to use options such as ridesharing, vanpooling, public transit, bicycling, and walking. Travel demand management (TDM) is another way to reduce traffic congestion. Managing traffic demand is about providing travelers, regardless of whether they drive alone, with travel choices, such as work location, route, time, mode, and variable pricing.

Safety

Background

The Central Massachusetts Metropolitan Planning Organization recognizes the importance of transportation safety planning for all agencies and users of the regional transportation system. The organization's transportation safety planning efforts employ a multi-modal strategy: encompassing roadway, transit, bicycle, pedestrian, and rail travel throughout the Central Massachusetts region.

Starting in 2007, states were required to have a State Highway Safety Planning Program (SHSP) that identified and analyzed safety problems and opportunities in order to use Highway Safety Improvement (HSIP) funds for new eligible activities under 23 USC 148. Moving Ahead for Progress in the 21st Century (MAP-21), the current Federal transportation appropriations bill, continues HSIP in order to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State owned public roads and roads on tribal lands. The HSIP program requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. According to MassDOT, an HSIP eligible activity is any strategy, activity or project on a public road that is consistent with the data-driven SHSP and corrects or improves a hazardous road location or feature, or addresses a highways safety problem.

The Massachusetts Strategic Highway Safety Plan (SHSP) was developed in consultation with Federal, state, regional, local, and private sector safety stakeholders, and uses a data-driven, multidisciplinary approach involving the 4 Es of safety (e.g., engineering, education, enforcement, and emergency response) to identify the plan's statewide goals, objectives, and emphasis areas. The Massachusetts SHSP was originally released in 2006, as a comprehensive safety plan/framework for reducing fatalities and serious injuries related to the surface transportation network. In 2012, the Commonwealth undertook a revision to expand and improve upon the significant accomplishments in traffic safety and reductions in fatalities and serious injuries Massachusetts has achieved since the plan was first developed.

The updated Massachusetts SHSP is consistent with requirements outlined in the most recent Federal transportation legislation, MAP-21. One requirement in MAP-21 is to establish goals and performance measures. Goals in the Massachusetts SHSP include:

- Reduce motor vehicle fatalities and hospitalizations by 20 percent in the five-year period following adoption of the SHSP (Short-Term Goal);
- Halve the number of fatalities and serious injuries by 2030 (Interim Goal); and
- Move Toward Zero Deaths and eliminate fatalities and serious injuries on the roadways (Long Term Goal).

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning related to federal emphasis areas, one of which is safety. New safety performance measures have been proposed related to MAP-21 as the five year rolling averages for total number of fatalities and serious injuries, and rates of fatalities and serious injuries per one hundred million Vehicle Miles Travelled (VMT), and are applicable to all public roads regardless of ownership or functional classification.

Following in the footsteps of MAP-21 emphasis areas and the Commonwealth's SHSP, CMRPC has adopted draft safety goals for the upcoming Mobility2040 Long Range Transportation Plan.

Objective 1 - Reduce the number & rate of Fatal & Injury crashes in the region

- Reduce number of fatalities by 10% in 10 years
- Reduce number of serious injuries by 10% in 10 years
- Reduce rate of fatalities (fatalities per 100 million VMT) by 10% in 10 years
- Reduce rate of serious injuries (serious injuries per 100 million VMT) by 10% in 10 years

Objective 2 - Achieve Industry standards for preventable accidents for transit

- Reduce preventable accident rate (accidents per 100,000 miles) by 10% in 5 years

Analysis

From 2009-2011 there were approximately 32,500 crashes in the CMRPC region. Forty-two (42%) percent of the region's crashes occurred within the City of Worcester. This compares with forty-five percent (45%) of the region's crashes occurring in Worcester from 2006-2008. Eighty-

six percent (86%) of all crashes were located in the Census designated Urbanized Area. This compares with an urbanized area share of ninety one percent (91%) of all crashes in 2006-2008.

Figure IV-18: Regional Highlights

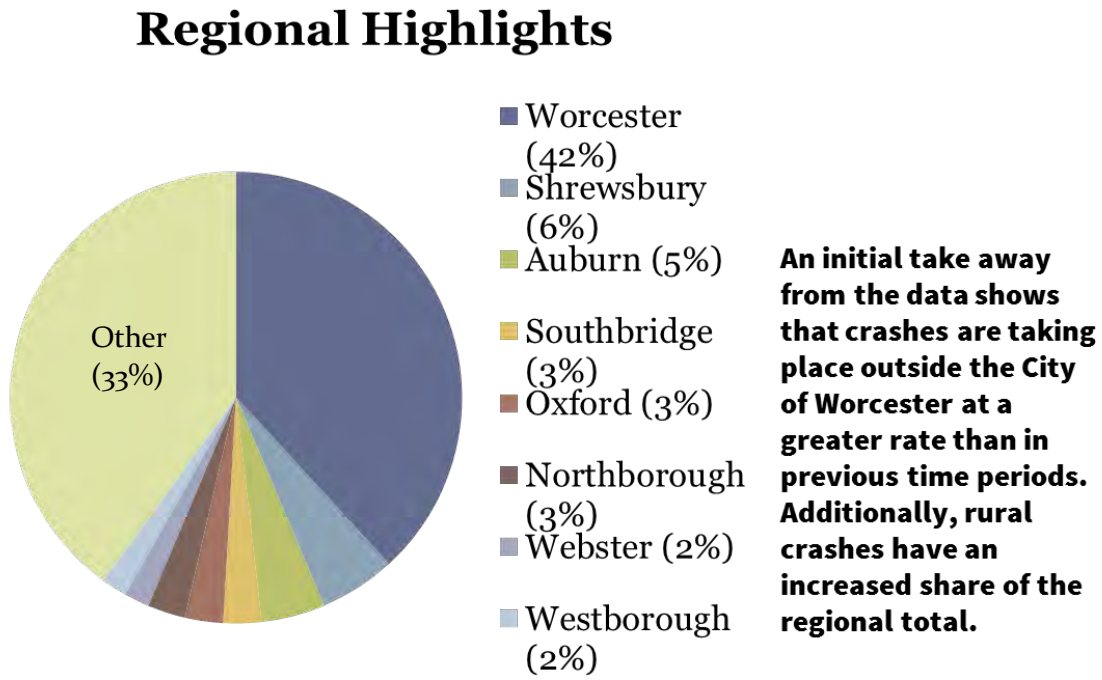
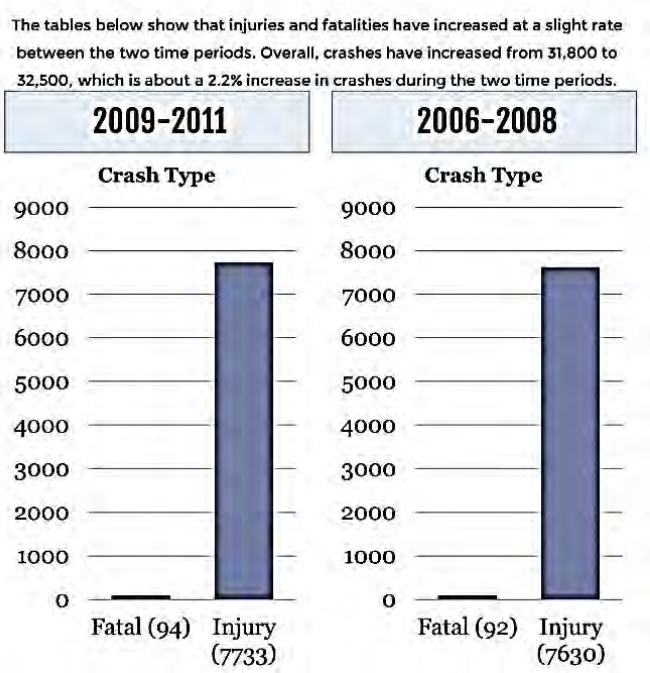


Figure IV-19: Fatal vs. Injury Crashes



Needs Assessment

The Massachusetts Department of Transportation generates a listing of HSIP eligible Auto, Bike, and Pedestrian clusters for the Commonwealth. A list of HSIP eligible projects for the CMRPC planning region was derived from the statewide list. One hundred and seventy six (176) automobile, six (6) bicycle, and ten (10) pedestrian clusters have been identified as HSIP eligible for the region. (It should be noted that mainline Interstate crash clusters have been removed from consideration due to jurisdictional issues.) Communities that wish to pursue HSIP funding for a project to improve safety at any of these locations will need to perform a Road Safety Audit (RSA). Road Safety Audits have been held for all projects receiving HSIP funding in the CMRPC region. Through the RSA process, HSIP funding has been utilized to improve intersection design and safety across the CMRPC region. Current examples of HSIP funded projects can be found in the CMMPO Transportation Improvement Program (TIP). When data becomes available, future efforts will include returning to project locations for a follow-up RSA in order to measure the effectiveness of HSIP driven safety upgrades. Communities can contact CMRPC for further assistance regarding this requirement.

Prioritization

High Priority HSIP Eligible Automobile Crash Locations are as follows:

- CMRPC Region - Statewide Top 200 Automobile Clusters (28)
- CMRPC Region – HSIP Eligible Automobile Clusters Tier II (88)
- CMRPC Region – HSIP Eligible Automobile Clusters Tier III (60)

For the purposes of the Long Range Transportation Plan, crashes from the CMRPC region's share of the statewide Top 200 are considered highest priority. Please see the *2009-2011 CMRPC Regional Safety Report* for expanded discussion regarding Tiers II & III, as well as other non-HISP eligible crash clusters.

A Note on Road Safety Audits:

The Federal Highway Administration defines a Road Safety Audit (RSA) as the formal examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements considering all roadway users.

Pavement and State of Good Repair

Background

CMRPC staff collects pavement condition data on town maintained federal-aid eligible roadways on a three year cycle across the entire region. A team of two technicians perform a windshield survey gathering detailed information in nine categories of pavement distresses. The technicians also collect length and width of a segment and score the drainage infrastructure and the comfort of the ride. Staff entered the data collected in the field into *Cartegraph*, an asset management software package developed and supported by Cartegraph Systems Incorporated, used to inventory, quantifiably rate and analyze pavement distress information. Using *Cartegraph*, staff determined an Overall Condition Index (OCI) for each segment based upon the pavement ratings and nature of the distresses. The OCI is a score used to rate each segment inspected on a scale from 100 to 0. An OCI of 100 indicates optimal pavement conditions, while an OCI of 0 indicates that a road is in very poor condition and in need of extreme repair measures. The score is calculated by subtracting a series of deduct values associated with the severity and extent of the various pavement distresses described above. *Cartegraph's* deduct values are determined through a series of deduct curves, which were developed by pavement engineers using years of research on pavement performance. The resulting OCI is a quantified rating of pavement condition. The state Department of Transportation collects data on state-maintained roads. This data is incorporated into the CMRPC database to create a comprehensive map of all federal-aid eligible roadways condition in the region. The table below depicts the OCI range related to pavement conditions ratings and cost associated with the recommended action for the pavement in each of the categories.

Table IV-7 below shows that the OCI scores are separated into five categories ranging from "excellent" to "very poor." Each category is associated with a general maintenance or repair strategy recommended for pavement segments scored in that range. These recommended actions are used in budget scenarios to create maintenance and rehabilitation plans.

Table IV-7: Overall Condition Index and Recommendations

OCI Range	Pavement Condition	Recommended Action	Cost/ Sq. Yard
0 - 24	Very Poor	**Base Rehabilitation –** represents roads that exhibit weakened pavement foundation base layers. Complete reconstruction and full depth reclamation fall in this category	$50.00
25 - 47	Poor	**Structural Improvement –** when the pavement deteriorates beyond the need for surface maintenance applications, but the road base appears to be sound. These include structural overlays, shim and overlay, cold planeing and overlay, and hot in-place recycling.	$20.00
48 - 67	Fair	**Preventive Maintenance -** slightly greater response to more pronounced signs of age and wear. This includes crack sealing, full-depth patching, and minor leveling, as well as surface treatments such as chip seals, micro-surfacing, and thin overlays.	$8.00
68 - 87	Good	**Routine Maintenance -** used on roads in reasonably good condition to prevent deterioration from the normal effects of traffic and pavement age. This treatment category would include either crack sealing or local repair (pot hole, depression, poorly constructed utility patch, etc.), or minor localized leveling.	$0.75
88 - 100	Excellent	**Do Nothing -** used when a road is in relatively perfect condition and prescribes no maintenance.	$0.00

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning on federal emphasis area, which includes asset management – pavement preservation. Mobility2040 recognizes the importance of pavement preservation and the Goal set by the CMMPO to address this area is ***"Maintain the condition of the regions roadways"***

The performance measures that have been set-up to measure this goal are:

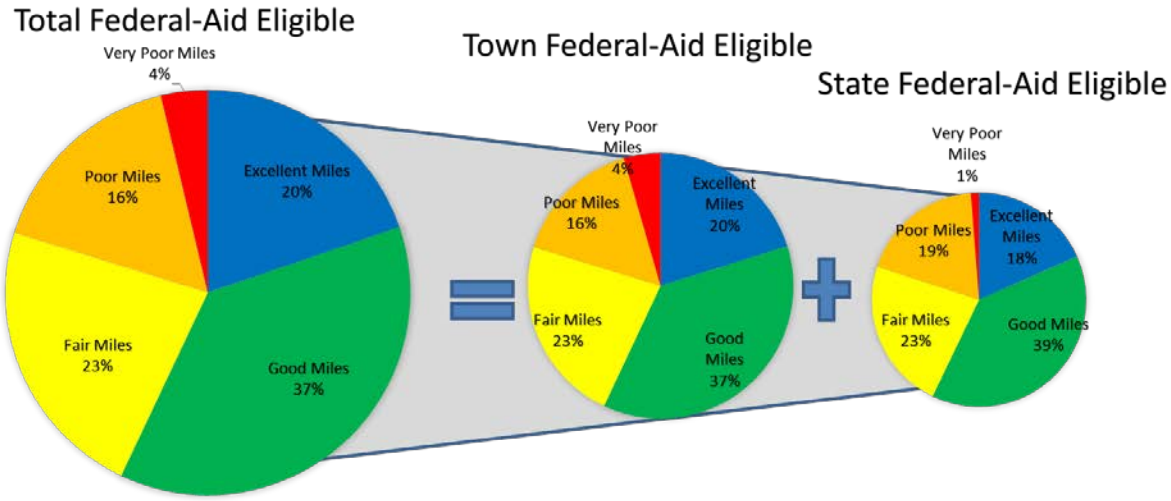
- Rehabilitate 25 miles of pavement that are in poor or failed pavement condition, including roadways that accommodate bicycle lanes.
- Improve sidewalks that are in poor or very poor condition by 10%

Analysis

Existing Condition

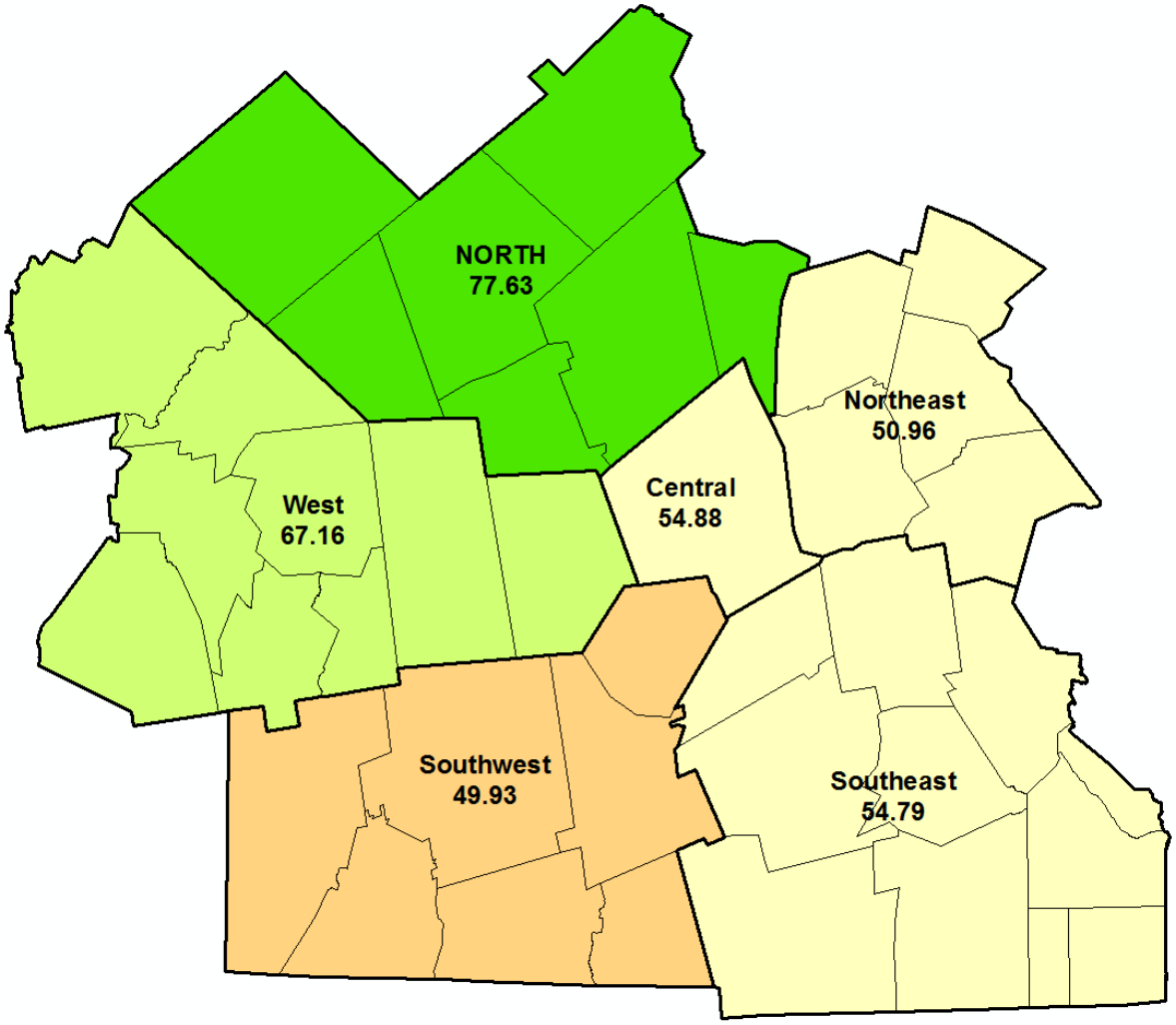
Region: Using the OCI scores calculated from the data collected, CMRPC staff determined that the regional network OCI is 60.06. About 212 miles of the region's 1,103 mile federal-aid eligible road network are in "excellent" condition, 400 miles are in "good" condition, 243 miles are in "fair" condition, 177 miles are in "poor" condition, and 40 miles are in "very poor" condition.

Figure IV-20: Federal Aid Eligible Roads by Condition



Subregion: As mentioned in the previous section, the network OCI for the entire region is approximately 60.06, placing the region's pavement in "fair" condition. The Central Massachusetts planning region is separated into 6 subregions. Figure IV-21 summarizes the OCI score for each of these subregions. The West and North subregions each have a network OCI that is greater than that of the entire region. The Northeast, Southwest, Southeast, Central, and West subregions each have network OCIs below that for the entire region. It is interesting to note that the North has the highest network OCI at 77.63, placing it in the "good" category. All of the other subregions are in the fair category.

Figure IV-21: OCI Score by Subregion



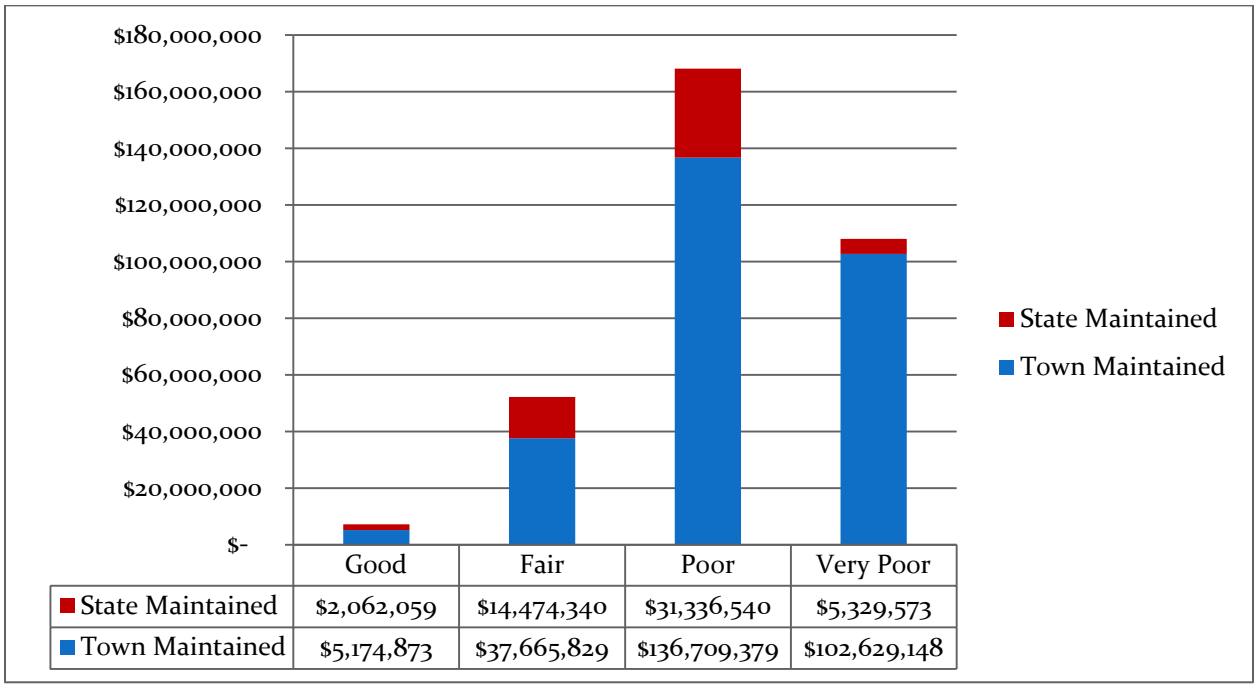
Cost of Repair

Once the condition of the network is established, determining the cost to repair and maintain the network is the next step. In the CMRPC pavement management program, the OCI ranges are associated with a recommended repair action and a repair cost. The table below shows the OCI ranges along with an activity description and the cost. The cost is per square yard and is applied against the area of a segment to determine an estimated repair cost.

Using these tools, staff estimates that it would cost $335.4 million today to bring all of the roads in the federal-aid eligible network to "excellent" condition. To maintain the current network condition going forward would require approximately $38 million per year, while improving the network to a "good" condition would require investing approximately $40-$45 million per year

Figure IV-22 below displays a break down by responsible jurisdiction of the maintenance costs from the previous page. The towns are responsible for 846 miles of roadway with a backlog of $200 million. The state DOT is responsible for 257 miles of roadway with a backlog of $66 million.

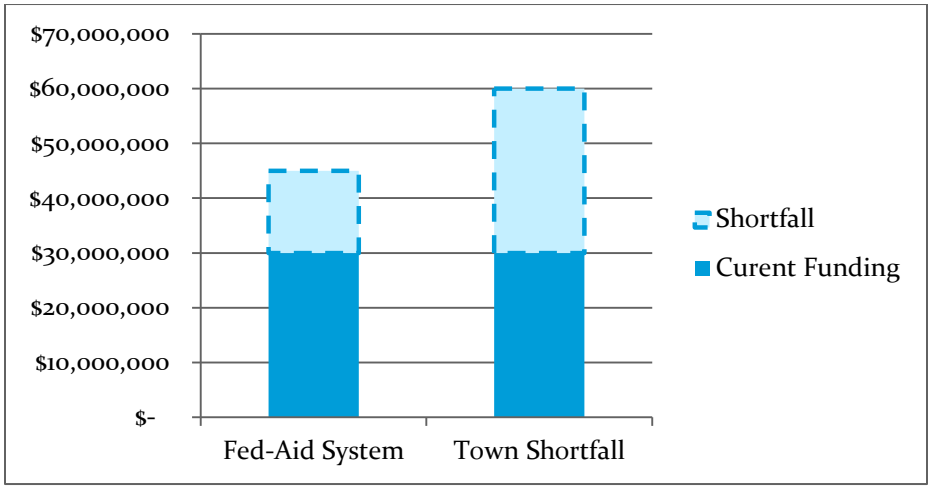
Figure IV-22: Regional Backlog by Condition



	Good	Fair	Poor	Very Poor
State Maintained	$2,062,059	$14,474,340	$31,336,540	$5,329,573
Town Maintained	$5,174,873	$37,665,829	$136,709,379	$102,629,148

In the Central Massachusetts planning region, the largest burden for road maintenance rests with the towns. Funding to maintain these roadways comes through the TIP, Chapter 90 funding, or from the towns themselves. CMRPC staff has identified an approximate $10 million annual funding shortfall to maintain the current federal-aid system, as these same resources are stretched to address congestion, safety, and other transportation issues. The towns have the added burden of local roads that are ineligible for federal aid funding. Even with Chapter 90 apportionment, Massachusetts Highway Association (MHA) identified an approximate $30 million annual funding shortfall for towns to maintain their roadways.

Figure IV-23: Funding Shortfalls

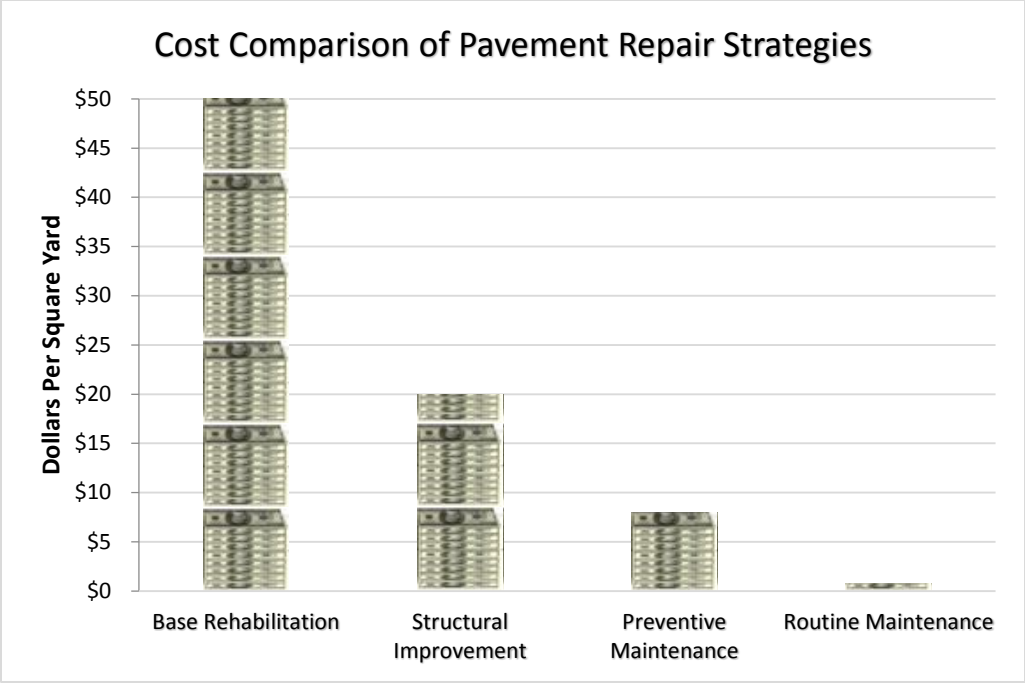


Prioritization

When we think of road repair we tend to think of a "worst first" approach. Our natural inclination is to prioritize the repair of the most beat up roads in our network. However, as Figure IV-24 so clearly displays, a "worst first" approach requires a large portion of available funding. It costs 66 times more money to reconstruct a roadway from the ground up than to perform routine maintenance on roadways. If our approach only prioritizes the repair of the worst roads, our limited funding will not stretch to address maintenance of roads in better conditions. The result will be increased overall cost to repair the entire network as road conditions continue to deteriorate and repair strategies become more intensive.

In order for the region's network OCI to be maintained additional funding must be allocated. Using CarteGraph it was determined that about $30 million dollars per year would be required to maintain an OCI in the "fair" category. To achieve this, 40%-50% of the region's Chapter 90 money would need to be spent on Federal-aid eligible roads. In addition to the needed Chapter 90 money approximately $5-$8 million dollars per year would need to be spent by the state to maintain the current network condition, not including money spent as part of the TIP. Of the money spent on State maintained roads 40%-45% would need to be spent on preventative and routine maintenance activities while the rest would be spent on structural improvement and base rehabilitation activities. Approximately $9 million dollars per year will need to be spent through the TIP. Since roads only requiring maintenance activities have a lower cost burden than those requiring structural improvement or base rehabilitation it is important to prioritize the roadways that will need this type of treatment. The CMRPC staff developed a priority list using the principles that have been highlighted so far in this report. For the current listing of priority, areas please see the reference materials

Figure IV-24: Cost Comparison of Pavement Repair Strategies



.

Intelligent Transportation Systems (ITS)

Background

Technology has found its way into nearly every aspect of our lives, and so it should come as no surprise that it is now being used extensively in ways that improve everyday mobility. From traffic signals to toll collectors to transit fare payment systems, technology is spreading quickly in ways that increase the efficiency of the transportation system. Intelligent Transportation Systems, or ITS, is the use of electronics, communications, or information processing to improve the efficiency or safety of transportation systems.

Because ITS transportation solutions are real-time solutions, they are a natural fit for improving the management and operations of transportation systems. Management and operations encompass daily roadway actions, such as reconstruction and maintenance, snow plowing and salting, providing real time traveler information, and traffic signalization. It also encompasses special circumstances like preparing and responding to accident-related congestion, planned special events, and unplanned security concerns.

By focusing on the evolving technology of ITS and the day-to-day activities of management and operations, transportation planners have a greater opportunity of providing more efficient and effective solutions to the region's transportation problems. In addition, ITS applications used by the WRTA have proven beneficial to riders and have contributed to growth in mode shift to transit.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning related to federal emphasis areas, one of which is congestion. The CMMPO has drafted a number of goals for the Mobililty2040 Long Range Transportation Plan, two of the congestion-related goals and one freight movement goal are focused on ITS. The objectives for these goals are as follows:

Goal: Reduce congestion and improve mobility for all modes

Objective 1 - Coordinate Improved Incident Management (Highway & Transit).

- Facilitate group to improve incident detection & clearance time. Have 1 meeting per year.

Objective 2 - Enhanced Traveler Information (ITS).

- Facilitate the installation of information systems/kiosks at major intermodal locations, such as Union Station. 2 locations every 5 years.
- Expand I-290 ITS Real Time Traffic Management (RTTM). RTTM on I-395 and Route 146 also. Install 2 Variable Message Boards (VMB) every 5 years.

Goal: Improve Economic Vitality and Freight Movement

Objective 1 - Reduce delay along identified Freight Routes.

- Expand ITS Real Time Traffic Management (RTTM) to include identified freight routes. Install 2 VMBs every 5 years.
- Reduce average travel delays along roadway segments of major freight routes. 2 every 5 years.

Analysis

Federal law requires all intelligent transportation systems (ITS) projects funded through the Highway Trust Fund be compliant with a Regional ITS Architecture. Staff participated as part of the Central Massachusetts Regional ITS Planning and Coordination Committee (RIPCC) to implement the Statewide ITS Strategic Plan.

MassDOT has implemented Real Time Travel Message Signs (RTTMs) on the Turnpike through the Central Massachusetts region. These signs have been very helpful in detecting reoccurring and non-reoccurring congestion and help travelers to identify better routes to avoid congestion. MassDOT will be implementing cameras along I-290 from the Masspike to the I-495 which will be monitored at the Highway Operations Center in Boston to alert MassDOT staff and state police of any incidents or congestion issues. State police and local police departments will also be provided access to the live video feed. These cameras will be followed by RTTMs along I-290 in the future. Staff worked with MassDOT Boston and District 3 to facilitate plan the implementation of the cameras for I-290. Staff brought stakeholders together to assist in designing and locating the cameras along this corridor.

Using ITS for automobile parking applications will be reviewed over time as parking becomes more constrained in Worcester. At present, parking is not constrained in terms of availability or price, although downtown Worcester is experiencing tremendous economic growth and that may strain parking in the future.

Needs Assessment

In 2004, the Executive Office of Transportation-Office of Transportation Planning (now MassDOT) led the effort to develop a Central Massachusetts Regional ITS Architecture. This effort was updated in 2010. CMRPC coordinated by building local involvement and support for the effort. During the needs analysis step of the Regional Architecture development process, the Guidance Committee identified key regional needs and major themes for the Regional ITS Architecture. These findings helped shape the architecture to the unique circumstances of Central Massachusetts. The four regional needs, unchanged since 2004, were: congestion management; transit efficiency; efficient use of existing infrastructure; and economic development. The three major themes expressed by participants in 2004 were: transit demand and revenue; traffic congestion and traveler information. In 2010 the use of ITS data was added as a major theme. From these expressed regional needs and major themes came four statewide Near-Term Multi-Agency Initiatives that were recommended by the Guidance Committee for Central Massachusetts. They are:

- **Event Reporting System:** Internet-based tool that serves as a centralized repository for information on events affecting the transportation network.
- **Expansion of the Massachusetts Interagency Video Integration System (MIVIS):** Expansion of video sharing and distribution system to allow sharing of real-time video feeds among a larger group of agencies.
- **511 Travel Information System:** Public travel information system, covering the roadways and transit services in the region.
- **Planning Data Archive:** System for coordinating the planning data archives for the transportation agencies in the region.

These statewide initiatives are largely dependent on MassDOT implementation, and when eventually implemented, will require an expansive effort to involve regional agencies beyond MassDOT to become effective and have a significant effect on regional conditions.

Prioritization

As identified in the 2011 Worcester Regional Mobility Study, Transit Signal Priority (TSP) and Roadway Variable and Dynamic Message Signs (V/DMS) are valuable Intelligent Transportation Systems options for Central Massachusetts' urban core. Both TSP and V/DMS would help reduce vehicle emissions through more efficient bus system operations and added potential for drivers to avoid congested routes thus creating less gridlock for buses that have to travel these routes.

Complete the implementation of the cameras along I-290 and implementation of the RTTMS along this corridor will be the top priority for the Central Massachusetts region. The expansion of the Real Time Message Signs (RTTMs) along I-495 and Rte 146 will also be a priority for the region.

Other regional priorities include:

- Working with MassDOT District 3 to identify significant regional projects which affect the commuting traffic during construction to assist with the traffic management plans and identifying locations for placement of message boards regarding construction related delays and detours.
- Continuing to work with the WRTA and the Worcester DPW staff to identify critical intersections and bus routes for Transit Signal Priority implementation in the future.
- Expanding RTTM technology to include I-395, I-190 and other major state maintained arterials such as Rte 9 and 20 will benefit the region to improve mobility in the future.
- Ensuring that the recently implemented WRTA ITS system remains up to date over time.

Travel Demand Model

Background

The Regional Travel Demand Forecast Model is an important planning tool both for the evaluation of proposed regional transportation improvements and the projection of mobile source air emissions for significant regional projects. The model is the most effective and comprehensive way to project transportation needs within a twenty-year planning horizon as required by Federal regulation.

In the regional travel demand model, traffic volumes are forecast through the interaction of transportation demand and supply. Traffic zones are defined to encompass areas of development that represent the demand, while the actual road network represents the supply. A network is developed consisting 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 contain demographic and employment information, and are represented by special nodes called centroids. Each zone is attached, or "loaded," onto the network by specialized links called centroid connectors.

Each traffic zone produces and attracts person trips based on its land use. Information entered into the model for each zone (such as population, households, income and employment) determines the amount of trips produced and attracted to that zone. Households are the primary producer of trips, while employment sites are the primary 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.

Performance Management

As discussed in Chapter II of this report, MAP-21 requires performance based planning on federal emphasis areas, which includes using the travel demand model to assess the condition of the roadway network. Mobility2040 recognizes the importance of the model to establish baseline data and measure progress to achieve the following goals and objectives:

Goal: Reduce Congestion and Improve Mobility for all Modes

Objective: Improve Corridor Management Integration

Performance Measure: Reduce average delays along identified congested major roadway segments; 2 delay areas every 5 years.

Goal: Reduce Greenhouse Gas and Promote Sustainable practices

Objective: Reduce GHGs generated by Auto and Transit in the region

Performance Measure: One percent VMT reduction in each 5 years period

Analysis

The regional travel demand model was used to generate the Daily Vehicle Miles Travelled and Total Daily Auto Person Trips for the current "2015" and Future "2040" years. Please see the table below for comparison.

Table IV-8: Comparison of travel behavior Current Vs. Future

	2010	2040	Percent Growth
Daily Vehicle Miles Travelled	19,171,695	21,292,110	11%
Total Daily Auto Trips	2,136,828	2,258,052	6%

The table above shows that there will be an increase of about 6% of daily auto trips, and vehicle miles travelled increases by 11%. Given the increase in both the daily person trips and the VMT, it is obvious that the congestion on the roadway network will only get worse in the year 2040. Please see Figure IV-25 which shows the comparison of congested locations for current and future conditions. As mentioned above all the major roadways such as the interstates and state numbered routes in the urban area of the region will be congested by the year 2040.

Needs Assessment

Given the limited funding to expand the transportation system, there is a need to look at innovative ways to reduce congestion by looking more deeply at transportation demand management techniques. Transit, walking and bicycling are modes that can improve livability and public health. Some of the initiatives that could help alleviate congestion are investing in increasing and promoting transit use and investing in programs that reduce single occupancy vehicle use such as MassRIDES, Park and Ride lots, expansion of sidewalks and bike lanes. Intelligent Transportation Systems can also be used for both recurring and non-recurring congestion like construction and accident delays.

Prioritization and Next Steps

Staff will continue efforts to keep the model current with network and landuse data. The model will be use to assist with the following tasks:

- Develop model capabilities to measure key Performance Measure metrics developed as part to this Plan.
- Generate model outputs to assist with TIP project scoring.
- Analyze the benefits of ramp metering on I-290 ramps. Use the Transmodeler micro-simulation to aid in the effort.
- Model the WRTA's comprehensive service analysis recommendations to help prioritize the implementation of the recommendation.
- Improve the model's capability to more accurately reflect freight (truck) travel.
- Develop enhanced transit reports and highway related measures to understand the impacts of projects on environmental justice areas.
- Aid in the traffic management plan development during the construction of major regional projects.

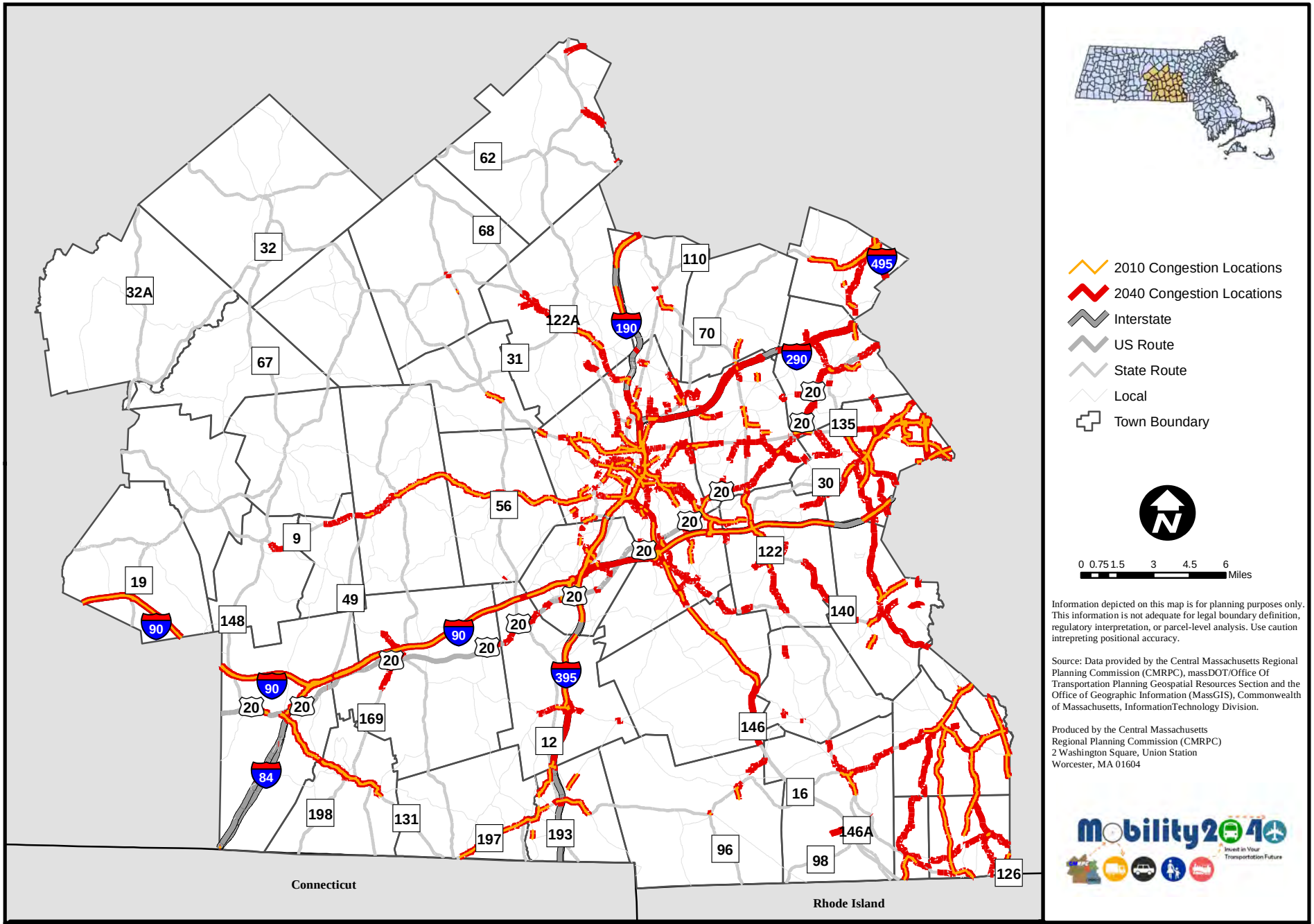


Figure IV-25 Current (2010)and Future No-Build (2040) Congestion Locations

Freight (Rail and Trucking)

Background

Freight movement in the planning region is anticipated to both increase and evolve. Existing intermodal activity will continue between highway and railroad freight. Freight movement has a direct relationship to regional economic vitality. Through connections to the national freight network, the ability of rural communities to access national and international trade markets is strengthened which, in turn, supports regional economic development.

National Efforts

US DOT plans to issue guidance for freight investment, initially targeting the nation's highway system. Another future effort will focus on the nation's extensive network of freight railroads. US DOT is soon to finalize and, pending Congressional approval, potentially expand the initial National Freight Network of roadways required under MAP-21. At this time, the draft network appears somewhat limited and disjointed in the greater New England area. Performance measures for the movement of freight on a national basis are also under development at US DOT, with early release materials discussed below. Freight system reliability is also an important US DOT focus area. Multi-modal stakeholder advisory committees are suggested where necessary to help guide investment in infrastructure that is critical to the movement of freight. Within the planning region, this role is served by the CMMPO Advisory Committee.

FHWA Freight Performance Measures (FPM) Initiative

The FHWA Office of Freight Management & Operations, through a research partnership with the American Transportation Research Institute (ATRI), has developed performance measures for the nation's highway system through the Freight Performance Measures (FPM) Initiative. System performance measurement is at the forefront of the national transportation discussion as various agencies at all levels seek to monitor existing infrastructure, identify investment needs and quantify costs and benefits of improvement.

One element of the FPM initiative is a data processing tool that determines average operating speeds for trucks that travel on the Interstate Highway System. These averages are calculated using onboard data from several hundred thousand trucks. By accessing this system, transportation data analysts, researchers and other practitioners can determine where, when and how efficiently trucks are moving on selected Interstate highways.

US Environmental Protection Agency SmartWay Program

The US Environmental Protection Agency's (EPA) SmartWay Program encompasses a range of efforts aimed at boosting fuel efficiency in business enterprise while reducing emissions that degrade air quality. One sector targeted by SmartWay is the nation's trucking industry. The EPA website, in addition to providing program highlights, displays many links to a range of SmartWay resources including finance programs, shipper and carrier/logistics-oriented materials and strategies, sample partner profiles and case studies, and SmartWay outreach materials that can be used to inform the business public about potential savings and environmentally-sound practices that may be adopted.

Regional Challenges

Typically, the CMMPO does not directly influence the movement of freight within and through the greater region. The planning staff periodically informs the CMMPO of the range of challenges facing the providers of freight transportation, both highway and railroad. Reducing congestion and increasing safety on the nation's primary freight routes is a known emphasis area of US DOT. Regional planning efforts seek to minimize trucking delays as well as decrease crash incidents resulting in both fatalities and injuries. The planning staff has also conducted a multimodal community freight-hosting pilot study effort with rail freight provider Providence & Worcester Railroad and the host communities of Auburn and Oxford. This study considered the needs of trucking movements on local and regional highways between rail served sites and the Interstate System. Further, working with the Regional Chamber of Commerce, staff developed a Freight-Based Economic Development Site Selection Inventory that could be served by trucking originating at the CSX Intermodal Yard on Franklin Street in Worcester. On a statewide basis, the activities of the Mass Motor Truck Association (MMTA) are followed by the staff through the group's periodic newsletter.

Performance Management

Freight is an important component of the region's economic development. As such, it was included in Mobility2040 goal to Improve Economic Vitality and Freight Movement. The measures for this goal are the following:

Objective 1 - Reduce delay along identified Freight Routes.

- Expand ITS Real Time Traffic Management (RTTM) to include identified freight routes. Install 2 VMBs every 5 years.

- Reduce average travel delays along roadway segments of major freight routes. 2 every 5 years.

Objective 3 - Improve Safety along Freight Routes.

- Reduce injuries and fatalities along freight routes. 10% every 10 years.

Analysis

Current Conditions

The Region's Primary NHS Freight Routes

The region's primary National Highway System (NHS) freight routes serve major intermodal facilities and are a focus of ongoing freight planning efforts in the region. These priority freight routes, in many cases, provide a connection between major Interstate highways and major intermodal terminals, particularly in the region's core. The primary routes were previously established through ongoing freight planning efforts and documented in earlier LRTPs and Management System Progress Reports. Tables IV-9 and IV-10 (located on pages IV-88 and IV-89) provide a summary of facts, observations and deficiencies on the Primary NHS freight routes within the planning region:

Primary NHS Freight Routes: Facts and Observations

Table IV-9 includes facts and observations for the primary NHS freight routes for five major intermodal terminals in the planning region. Four of the locations are in the City of Worcester while the other is in the town of Westborough. All are truck-railroad freight facilities with the exception of the Worcester Regional Airport. Most of these NHS freight routes are functionally classified as a minor or principal arterial. Traffic volumes range from as low as 3,700 daily vehicles near the Worcester Intransit Container Incorporated (ICI) facility to as much as 18,000 daily vehicles in vicinity of the Worcester Regional Airport. The only at-grade railroad crossings are in the ICI facility. The majority of adjacent land uses near these major intermodal facilities are business, industrial, or manufacturing, with some residential.

In regards to pavement, it is in "good" or "excellent" condition for the four locations in Worcester. The Westborough CSX Yard is the worst, with an average Overall Condition Index (OCI) of 59, which is considered to be in "fair" condition. For safety data, documented "crash clusters" along the primary freight routes were analyzed. The data shown in the table indicate the severity of crashes in the identified clusters over a three-year sample period. The route serving the ICI terminal in Worcester did not have any crash clusters, therefore no crashes are listed. The Westborough CSX intermodal facility had only 13 crashes. However, the routes

serving the three remaining Worcester facilities each had about 100 crashes over the three year analysis period.

There is at least one bridge along the established freight routes for all five terminals. Most of the bridges had a minimum rating of 70.0 with the exception of the structure near the Worcester CSX terminal and one of the bridges along the primary freight route to the Regional Airport. There are two P&W Railroad-owned structures over Southbridge Street in Worcester. Bridge 69.74A is a potential candidate for future year rehabilitation. At this location, bridge column piers on the curb of Southbridge Street would be modified to increase lateral clearance for the roadway. Further, the railroad has indicated that Bridge 42.48/Track 1, constructed in 1892 and 1911, needs to be replaced at a cost of approximately $1.75M. When replaced the structure would be lengthened, thus eliminating the travel lane reduction beneath the bridge that currently exists on Southbridge Street. Lastly, there are no guide signs for three of the facilities and minimal signs for the Westborough CSX yard, although there are numerous guide signs for the Worcester Regional Airport.

Primary NHS Freight Routes: Observed Deficiencies

Included in Table IV-10 are the observed deficiencies along the primary NHS freight routes for the five major terminals in the planning region. In regards to geometric/physical features, tight turning radii is a problem at some intersections along most of the established freight routes. There is also measureable pavement distress along some roadways as well as a narrow bridge underpass on Southbridge Street near Lafayette Street, adjacent to the P&W's freight terminal. The final two columns in the table address the safety/delay deficiencies on either a connector roadway or at a connector/NHS junction. As for the connector roadways, all experience some level of congestion in the AM/PM periods and trucks have difficulty making turns during these peak periods. Also, there are two intersections along these roadways that lack defined turning lanes. In regards to the connector/NHS junctions, lengthy delays and heavy congestion have been observed in the field. The Route 9 interchange with Computer & Research Drives is utilized by trucking serving the Westborough CSX yard. For the Worcester CSX yard, peak period congestion occurs at the Washington Square roundabout. Further, there is a recurring congestion issue observed along the "J" ramp at MassPike (I-90) interchange #10A in Millbury that needs to be monitored.

TABLE IV-9

Primary NHS Freight Routes: Facts and Observations

Community (Area type)	Terminal name	Facility Type	Facility ID	NHS Freight Route Description & mileage	Functional Class	# Lanes	Typical Daily Vol	At Grade RR Crossings	Adjacent Land Use	CMP Segment	PMS OCI	Safety: Cluster Crashes in 3-yr sample period	Bridges	BMS Ratings	Guide Signs
Westborough (Small Urban)	Westborough CSX Yard	Truck/Rail Facility	MA61R	R1: Yard to Flanders Rd to Computer Dr to Route 9 ramps (2.25 mi); R2: MA61R1 to Research Dr to Route 9 ramps (.15 mi)	Minor Arterial; Minor Collectr; Local	Varies; Two to Four	7400 VPD '10 HV: 10.1%	None	Industrial, manufacturing and warehousing; Other	N/A	59; 87; 31 Avg= 59.0	Property damage = 10 Personal injury = 3 Fatalities = 0	W-24-026 (Lyons St over Rt 9) (ON)	70.0	Minimal
Worcester (Urbanized)	Worcester CSX Yard - Franklin St (Grafton St Entrance)	Truck/Rail Facility	MA70R	Yard to Grafton St to Summer St to I-290 WB (.50 mi)	Minor Arterial	Two	9100 VPD '14 HV: 6.9%	None	High density business; Industrial, manufacturing and warehousing	#27	75	Property damage = 80 Personal injury = 16 Fatalities = 0	W-44-082 (I-290 EB) (Over); W-44-082 (I-290 WB) (Over)	55.0	None
Worcester (Urbanized)	Worcester P&W Yard - Southbridge St	Truck/Rail Facility	MA67R	R1: Yard to Southbridge St to cambridge St (.45 mi) R2: Yard to Southbridge St to Quinsigamond Ave (.3 mi)	Minor Arterial	Two to Four	14100 VPD '12 HV: 9.3%	None	High density business; High density residential	#24 & #45	95	Property damage = 81 Personal injury = 29 Fatalities = 0	P&W bridge #69.74A Constructed 1926, 504176E (Over); P&W bridge #42.48/Track 1 Constructed 1892 & 1911 861586K (Over)	---	None
Worcester (Urbanized)	Worcester ICI Yard - Wiser Ave (Blackstone River Rd Entrance)	Truck/Rail Facility	MA68R	R1: Yard to Blackstone River Rd NB to Route 146 (.8 mi) R2: Yard to Blackstone River Rd SB to Route 146 (.25 mi)	Minor Arterial	Two	3700 VPD '12 HV: 7.3%	905790K; 871895A; 871893L; Add'l on Millbury St near Saint Anthony St	Low density commercial; Industrial, manufacturing and warehousing; Low density residential	#37	97; 73 Avg= 85.0	Property damage = 0 Personal injury = 0 Fatalities = 0	W-44-157 (Blackstone River Rd) (ON); W-44-161 (McKeon Rd) (ON)	96.6; 94.0	None
Worcester (Urbanized)	Worcester Regional Airport	Airport	MA65A	Airport Drive to Bailey St to Pleasant St to Highland St to Rt 9/12/122A (4 mi)	Principal Arterial; Minor Arterial	Varies; Two to Four	18000 VPD '12 HV: 11.8%	None	High density commercial; High density residential	#28 & #41	92; 80; 95; 69; 71; 65; 87; 99; 48 Avg= 78.4	Property damage = 86 Personal injury = 24 Fatalities = 0	W-44-094 (Belmont St) (ON); W-44-078 (Belmont St) (ON); W-44-073 Pleasant St) (ON)	19.0; 70.6; 74.4	Numerous

TABLE IV-10
Primary NHS Freight Routes: Observed Deficiencies

Community	Terminal name	Geometric/Physical Feature Deficiencies (relative extent of area)	Safety/Delay Deficiencies on Connector Roadway (AM/PM or Terminal peaks)	Safety/Delay Deficiencies at Connector/NHS Junction (AM/PM or Terminal peaks)
Westborough	Westborough CSX Yard	Tight turning radii at intersections (some) Road deterioration on Walkup Dr (most)	Heavy traffic/congested (AM/PM) Long delays at traffic signals (AM/PM) Pedestrian crossing markings faded (AM/PM)	Highly utilized interchange w/ Rte 9: Heavy traffic/congested (AM/PM) Long delays at traffic signals (AM/PM) Pedestrian crossing markings faded (AM/PM)
Worcester	Worcester CSX Yard - Franklin St (Grafton St Entrance)	Tight turning radii at intersections (some) Pavement distress (some)	Heavy traffic/congested (AM/PM) Difficulty making turns (AM/PM)	Heavy traffic/congested (AM/PM): Peak period congestion observed at Washington Sq. roundabout
Worcester	Worcester P&W Yard - Southbridge St	Tight turning radii at intersections (some) Narrow bridge underpass near Lafayette St (one) Drainage/Flooding (most)	Roadway width varies (AM/PM) Heavy traffic/congested (AM/PM) Difficulty making turns (AM/PM) Lack of turning lanes at intersections (AM/PM)	Heavy traffic on mainline NHS (AM/PM) Tight turning radii at intersections (AM/PM) Lack of turning lanes (AM/PM)
Worcester	Worcester ICI Yard - Wiser Ave (Blackstone River Rd Entrance)	Surrounding roadway system reconstructed in last decade as part of Rte 146 major infrastructure improvement project	Regional and local traffic flows now separated - congestion in area (AM/PM) reduced	Reconstructed roadways and interchanges need to be monitored for peak period congestion and/or safety deficiencies (current issue noted on "J" ramp at MassPike Interchange 10A in Millbury)
Worcester	Worcester Regional Airport	Tight turning radii at intersections (some) Pavement distress (some)	Heavy traffic/congested (AM/PM) Difficulty making turns (AM/PM) Lack of turning lanes at intersections (AM/PM)	Northern corridor east-west arterial mobility improvements at key locations to address congestion and safety

Inefficiencies to Movement of Freight

Inefficiencies to the movement of freight along the region's highway network have been observed and documented within the planning region, as summarized below.

Low Bridge Structures

Older bridge infrastructure, some in excess of 100 years in age, lacks necessary vertical clearance for modern vehicles and associated equipment. There are a number of low bridges in town of Westborough and city of Worcester, and on other lesser traveled roadways in the planning region. When large trucks get inadvertently stuck beneath low bridges, quite often vehicle damage results, and there are traffic delays associated with clearance operations of the stuck and often disabled vehicles as well as impacts to surrounding businesses. Over-size vehicle detection equipment has been considered and installed at specific low bridge locations that have a history of clearance issues. Methods include enhanced warning signage, hanging barriers, and lasers which detect excess height vehicles.

Substandard Roadway Geometry

Tight turning radii exists at older highway interchanges and intersections, and there are sharp curves where rollovers have a tendency to occur and other substandard roadway geometry. Modern chevron-style warning signs can be installed on identified high hazard roadway curves where rollovers have been documented. These signs can also be supplemented by selective vegetation removal. Further, High Friction Surface Treatments (HFST) should also be considered for sharp roadway curves with a significant crash history.

Freight Policy

Policy-related issues are formidable. These include local restrictions on delivery times, neighborhood commercial vehicle exclusions, and a lack of adequate commercial loading zones, truck parking and turning facilities, particularly in the more urbanized areas. Ongoing planning efforts attempt to balance neighborhood preferences with the need to move goods.

Truck parking issues exist on a wide basis in greater New England. Truck-oriented facilities are somewhat limited in comparison to other areas of the country. Truckers, who travel long distances, need places to park, rest, eat and bathe. As demand for goods is anticipated to remain high, the needs of the trucking community must to be addressed to ensure the continued safe flow of freight on the highway network.

Despite a range of challenges, MassDOT efforts to install select Intelligent Transportation System (ITS) components statewide [including an All Electronic Tolling System (AETS) on the MassPike (I-90)] are anticipated to decrease the known inefficiencies of the highway network in the greater region. This will help to reduce delays in the movement of freight. Further, consolidated truck permitting for all of the New England states is being considered on the federal

level so as to streamline highway freight movement in the geographically compact six-state region.

Freight Railroad Providers Operating in the Planning Region

This section of Mobility 2040 provides an overview of the freight rail transportation providers operating in the greater region. Six railroads are active in the planning region. General information concerning each is summarized. One, the North Brookfield, is currently being resurrected from dormancy.

- CSX
- East Brookfield & Spencer Railroad
- Grafton & Upton Railroad
- MassCentral Railroad
- North Brookfield Railroad
- Pan Am Railways
- Providence & Worcester Railroad

Central Massachusetts is a significant freight intermodal hub for the state of Massachusetts and the greater New England region. A map of railroads and major intermodal facilities in the region is shown in Figure IV-26.

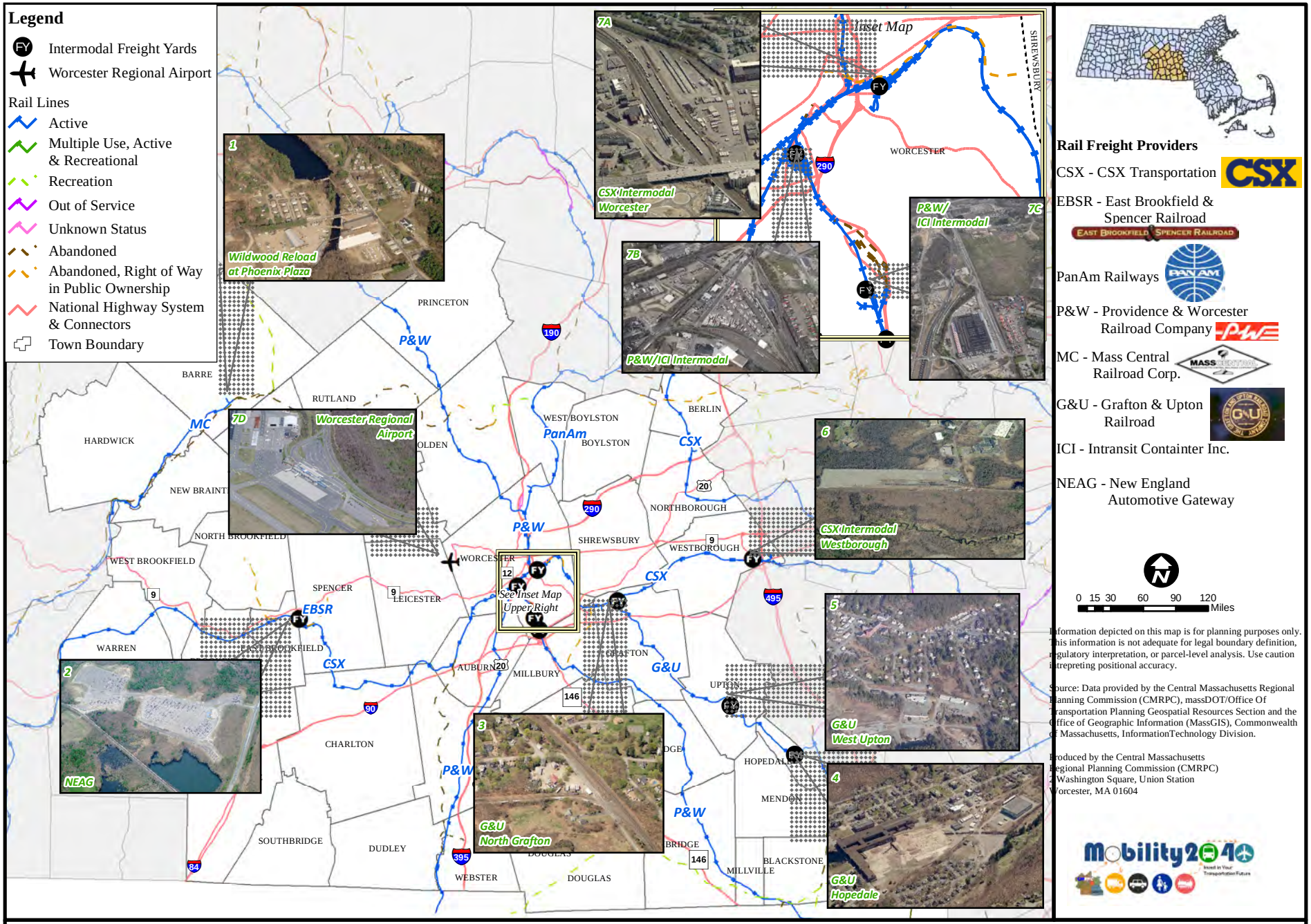


Figure IV-26 Highway and Railroad Freight Network with Major Intermodal Facilities

Needs Assessment

Various improvements to the multimodal transportation infrastructure in the greater region that would enhance the freight movement across the system have been identified. These improvements range from the restoration of existing infrastructure, to new construction, to the deployment of various technologies. For the purposes of this summary, the "freight system" is viewed to consist of the region's network of major highways and railroads. In addition, planning efforts also focus on the region's previously identified, primary National Highway System (NHS) freight routes serving major intermodal facilities, particularly in the region's core. Further, some focus is also placed on the major federal-aid roadways serving the region's rural areas that are also important to the movement of freight.

Highway

Interstate Maintenance (IM) Program

The FHWA first became involved with funding for maintenance activities on the Interstate System as a result of the Federal-Aid Highway Act of 1976 that established the 3R program to fund Interstate resurfacing, restoration and rehabilitation. The Federal-Aid Highway Act of 1981 expanded the program by adding a fourth "R", reconstruction.

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) terminated the I-4R program, except for a small discretionary set aside, and established a new IM program and a separate NHS program which includes the Interstate System. The IM funds may be used on the Interstate System for 3R work and for reconstruction of bridges, interchanges and overcrossings along existing Interstate routes, but may not be used for the construction of new travel lanes other than high occupancy vehicle lanes or auxiliary lanes. The 1998 Transportation Equity Act for the 21st Century (TEA-21) expanded eligibility for funding under the IM program to the 4th R, reconstruction. As a result, the addition of new interchanges, new rest areas, new noise walls, etc. became eligible for IM funding. However, IM funding of added lanes, except HOV and auxiliary lanes, are not allowed.

In the greater region, likely future Interstate highway interchange reconstruction is anticipated at I-495/Route 9 in Westborough and, the MAPC planning region, I-495/MassPike (I-90) in Hopkinton and I-495/I-290 in Marlborough. In Worcester, future envisioned projects include the reconstruction of the I-290/Vernon Street interchange and the potential expansion of the I-290/Route 12 (Hope Avenue) interchange to accommodate all movements. At this time, traffic cannot exit I-290 eastbound nor enter I-290 westbound. Further, at this time, the reconstruction of the Route 9 (Belmont Street) bridge over I-290 is currently underway. A host of construction

period mitigation measures are included as part of this major project which will result in a widened Route 9 bridge over I-290.

Deployment of Intelligent Transportation System (ITS) Technologies

MassDOT is now in the process of finalizing the design for the installation of real-time guide signs on I-290 and other roadways to inform the travelling public of travel times in the greater region. In particular, MassDOT's now underway I-290 Intelligent Transportation System (ITS) Implementation Project includes 16 Closed Circuit Television (CCTV) cameras and 4 overhead Changeable Message Signs (CMSs) from the MassPike (I-90) to I-495. Another aspect of the I-290 project includes the installation of Real Time Travel Monitoring (RTTM) devices. (The RTTM signs will be different from those on the MassPike; they will be in the form of a green Guide sign.) Eventually, similar technologies are anticipated for deployment along I-395 and other major roadways.

All Electronic Toll System (AETS) on the MassPike (I-90)

MassDOT is currently in the process of converting and replacing the MassPike (I-90) cash and electronic EZ Pass toll collection systems with a new system of tolling relying only on All Electronic Tolling (AET). The project will include both roadway tolling infrastructure and toll collection system technology. With the planned removal of existing toll booths, vehicle delay may be reduced at a number of MassPike interchanges, including those in the planning region.

Regional Management Systems: Congestion, Pavement & Safety

The Management Systems maintained by the CMRPC transportation planning staff monitor both the usage and condition of the region's federal-aid network of major roadways. The congestion, pavement and safety management systems have been ongoing and continually evolving for the past two decades. Observations are made in the field, data is collected, a range of analysis is conducted and annual progress reports are compiled. Based on the findings, a range of improvement projects are proposed for future year consideration for implementation.

Congestion: roadway segment travel time and delay monitoring, critical intersection Level-of-Service operations assessment, and identification of high delay locations. Program now includes FHWA-required Local Bottleneck Reduction Program (LBRP).

Pavement: windshield roadway distress surveys, subsequent analysis, determination of Overall Condition Index (OCI) and compilation of maintenance plans.

Safety: crash data compilation, GIS analysis identifying top crash locations as well as "crash clusters". Staff now regularly participates in MassDOT sponsored "Roadway Safety Audits (RSA).

At this time, the Management Systems are evolving to meet the US DOT requirement for the transition to performance-based planning. Those projects that have the greatest return on the investment of transportation improvement funding will be identified and moved towards implementation by the CMMPO.

"Complete Streets": Designing for All Modes

A "Complete Street" is one that provides safe and accessible options for all travel modes - pedestrian, bicycle, public transit, autos and trucks - and for all ages and abilities. While many existing roadways are designed to optimize auto travel, Complete Street efforts have sought to increase the role of non-motorized and transit options by providing continuous sidewalks, bicycle lanes, or wide roadway shoulders. Instead of simply focusing on main streets or downtown corridors, a Complete Street policy creates a safe, accessible environment throughout a transportation network.

Increasing the role of the pedestrian and bicyclist in roadway design and operation standards, Complete Street policies are meant to ensure that safe travel options exist for all users. MassDOT's *Project Development & Design Guide* embraces this approach to roadway design, and serves as a useful guide on how to implement the Complete Streets design approach. As such, designers, planners, public officials and advocates have a responsibility to promote and improve public health, reduce traffic congestion, make places safer and more livable, while reducing environmental impacts.

Designing a Complete Street can be challenging without first identifying all the factors that may influence the design. Other than funding some of these factors include: number and type of users, available right-of-way, safety amenities, community needs and desires, parking needs, utilities, public transit, and sensitive land uses. Accordingly, the needs of trucking serving local businesses in the greater region need to be accounted for early in the planning process.

CMMPO Transportation Improvement Program

One implementation option for highway-related improvement projects is the annual Transportation Improvement Program (TIP) administered by the Central Massachusetts Metropolitan Planning Organization (CMMPO). The CMMPO is the transportation policy and project selection for the planning region. Each year, eligible projects are selected for programming using the federal-aid funding targets provided by MassDOT. The TIP must be

financially constrained for each of the listing's four fiscal years. The TIP includes roadway, bridge, intermodal and bicycle & pedestrian projects. At this time, the TIP continues to evolve, transitioning to *performance-based* planning in an attempt to maximize the return on investments made in the region's multi-modal transportation network.

Railroad

Overview

In general, opportunities for expansion of the rail system in the greater region were considered broadly in both a micro and macro scale. Focusing on the major intermodal facilities located throughout the region, some identified opportunities are Worcester centric while others have the potential to directly pertain to the host communities of intermodal transload facilities.

Industrial Rail Access Program

Most improvements to the infrastructure of the railroads are privately funded. However, MassDOT's Industrial Rail Access Program, known as "IRAP", provides infrastructure improvement funding for modest-sized rail access projects. Recent recipients in the region included the Grafton & Upton Railroad and the Providence & Worcester Railroad. Funding awarded within the planning region included the following useful projects that were implemented using a combination of public and private funding:

- G&U Railroad: improvements to the Hopedale yard, constructing a switching lead and several sidings, $221K state ($552K total)
- P&W Railroad: "Cargill Bridge" replacement, $313K state ($522K total)

In December 2014, the P&W submitted another application for IRAP funding for the proposed rehabilitation of an approximately four hundred linear foot (400') "wye" track (and three (3) switches) connecting P&W's Norwich Branch and Main Line track in the Worcester classification yard. The project will facilitate a head-on move of Unit Trains, alleviating a freight rail bottleneck while also enhancing safer operating conditions.

CSX

CSX operations in Massachusetts now feature full Phase II double stack container freight due to recent clearance increases. CSX recently expanded and modernized the Worcester Intermodal Facility located along Franklin Street. The expansion of the Worcester yard represents an investment in excess of $100 million. The Worcester facility mainly handles domestic containers and trailers on flatcar. Similarly, in nearby Westborough, another intermodal freight yard was improved within its existing footprint to handle bulk materials transloading. Materials handled include corn syrup, chemicals, pellets and other commodities. Economic spin-off is anticipated

from the presence of both modernized CSX yards. In response to a request from the Regional Chamber of Commerce, a parallel CMRPC agency effort has focused on the potential for rail served freight opportunities within a 20-mile radius of the Worcester yard.

East Brookfield & Spencer Railroad (EB&S RR)

East Brookfield & Spencer Railroad (EB&S RR) serves as the switching railroad for the New England Automotive Gateway (NEAG) located in the namesake host communities. Since the site was developed as a major automotive rail-to-truck transload facility serving all of southern New England, a range of mitigation measures have been implemented. Recent site improvements included expansive earthwork to provide additional railroad track capacity for railcar staging and storage. At the site, the EB&S RR works to unload the railcars and ready them for the return trip to automotive plants. Final "last mile" delivery of the finished vehicles throughout the greater New England area is completed by a number of trucking companies that serve the NEAG site. Clearance improvements along the CSX Boston Line will allow for "AutoMax" railcars to serve the site, increasing capacity. Also, EB&S worked closely with CSX to reduce the number of train whistle blasts in vicinity of the yard using a radio & flag person arrangement. It is likely that other future improvement projects are planned for the NEAG site.

Grafton & Upton Railroad (G&U RR)

The Grafton & Upton Railroad (G&U) is a short line railroad operating in the region. Following the resolution of recent litigation with the host community of Grafton, the railroad is proceeding with the construction of a new propane transfer facility in North Grafton. Other efforts by the G&U include work to reestablish a severed rail connection to CSX in Milford. This would allow the railroad to transfer freight with CSX in Milford in the south in addition to CSX in North Grafton. Further, freight yard improvements are ongoing in both Hopedale and West Upton.

MassCentral Railroad (MC RR)

Rural carrier MassCentral Railroad (MC), operating in the Ware River Valley between Palmer and South Barre, recently benefited from state-funded track improvement work. The MassCentral operates over trackage owned by the Commonwealth. Various rail-related activities continue at the South Barre industrial park known as Phoenix Plaza. This facility allows for convenient last mile delivery in this rural part of the planning region.

North Brookfield Railroad (NBRR)

The North Brookfield Railroad (NBRR), long dormant, is planning to restore track infrastructure and reestablish operations in its namesake community. The NBRR is viewed as the resurrection of a community-owned rail line dormant since the 1970's. In order to generate railcar traffic, a number of line side industries are envisioned. As an example, perhaps a paving stone manufacturer located along the line's right-of-way would one day reinstitute rail service. As part

of the rail line's envisioned restoration, an at-grade crossing over Route 9 in East Brookfield will need to be reestablished.

Pan Am Southern (PAS)

The P&W Railroad may determine the need to implement clearance increases on the carrier's line between Worcester and Gardner. In Gardner, the P&W interchanges with Pan Am Southern (PAS). PAS is a freight rail carrier operated jointly by Pan Am Railways and Norfolk Southern (NS). Along the PAS line in the northwest corner of Massachusetts is the Hoosick Tunnel, 5 miles in length. Engineering studies are now underway to determine the effort necessary to undertake a project to increase clearances in the tunnel to accommodate full double stack service. Preliminary estimates indicate an investment ranging from $30-50 million. When the envisioned improvements are completed, double stack trains from the west could be interchanged in Gardner and then proceed to Worcester on the P&W. With the planned Hoosick Tunnel double stack clearance improvements, as well as necessary clearance improvements on the Gardner Branch, P&W will have the ability to receive containers from both CSX and NS.

Providence & Worcester Railroad (P&W RR)

Regional freight carrier the Providence & Worcester Railroad (P&W) is headquartered in Worcester. The P&W's namesake rail line in the Blackstone Valley requires the replacement of five (5) aging bridge structures in excess of 100 years in age. These bridges are worn due to years of constant use and repetitive loading. They cannot be effectively maintained due to archaic assembly methods no longer used or supported. The replacement of the structures is necessary to accommodate fully loaded modern freight cars weighing 286,000 pounds. At this time, freight cars must be "light loaded" in order to pass over the line. The cost of replacing these structures is estimated at $30M. The P&W has been unsuccessful in obtaining US DOT TIGER funding for this project on the national level. As such, other opportunities for funding the replacement of the five bridges are being investigated.

The planning staff has also provided limited assistance with two P&W RR applications for improvement funding through MassDOT's Industrial Rail Access Program (IRAP) grant program. One focused on the replacement of a small bridge structure serving an active set of switching tracks worn after decades of service. The other IRAP application, pending at the time of writing, seeks the rehabilitation of an approximately 400 foot "wye" track and three switches connecting P&W's Norwich Branch and Main Line track, located at opposite sides of P&W's Southbridge Street yard. The project will facilitate a head-on move of unit trains from the Norwich branch to the main line, alleviating a freight rail bottleneck for unit trains as well as the hundreds of other railcars moving through P&W's yard facility on a daily basis.

In addition, other P&W lines may need to be cleared in order to accommodate full double stack container service in the future, increasing system capacity. For example, in the host community of Auburn, the under-clearance of the Route 20 bridge over the P&W Railroad is insufficient to accommodate full double stack service. Should double stack trains use this line in the future, clearance increases would be required for this structure. Elsewhere on the P&W rail network in the greater region, modest improvements are planned, such as the repair, replacement or installation of switches and rail sidings.

Intransit Container Incorporated (ICI)

Intransit Container Incorporated (ICI) operates the Wiser Avenue intermodal container yard in the city of Worcester. The ICI facility is served by the P&W Railroad. ICI's focus is international container traffic from around the globe. The site is a customs-bonded, inland port. Yard expansion at the Wiser Avenue site is underway and many recent improvements have been made. In addition to more property for container and chassis storage, the yard will also have improved lift capabilities, speeding operations. Overhead power lines on the site are planned for burial, increasing the maneuverability of the lift equipment. Further, along with the expansion, ICI has implemented a range of mitigation measures, including an impressive wall shielding site operations as well as environmental work associated with identified wetlands.

Regional Strategies to Reduce Impact of Multimodal Freight Movement

Overview

In order to reduce the local impacts from expanded freight capability in the Central Massachusetts planning region, the following suggested improvement options were previously compiled as part of ongoing freight planning activities. The options are provided for further consideration by host communities, intermodal facility operators, area freight transportation providers, and the CMMPO.

- Prohibit on-street vehicle parking adjacent to and across from intermodal facility site drives.
- Keep site drive areas clear of all obstacles such as large signs, street furniture, utility poles and overgrown vegetation.
- Provide adequate truck turning radii at major intersections, optimally to fully accommodate the movement of 53 foot international intermodal containers.
- Maintain and resurface roadway pavement surfaces as deemed appropriate.
- Maintain all traffic control signs, signals and pavement markings.

- Consider identification and designation of "Preferred Truck Routes" throughout the greater region. Such an effort could be pursued by the host communities of intermodal transload facilities. As an example, officials in the host community of Oxford have indicated that trucking activities in the community attempt to avoid the intersection of Route 12 with Sutton Avenue in the town center.

- A "Supplemental Guide Sign" plan should be considered for the region's primary National Highway System (NHS) freight routes serving major intermodal facilities. These roadways provide access between the Interstate System, major regional highways and major intermodal terminals. Such Supplemental Guide Signs (as included in the Manual on Uniform Traffic Control Devices [MUTCD]) would assist truckers and others unfamiliar with the area in following the primary NHS freight routes connecting to the region's intermodal facilities. Supplemental Guide Signs are considered "trail blazing" or "wayfarer" signs. As indicated in the MUTCD, Supplemental Guide Signs can be used to provide information regarding destinations accessible from an interchange, over and above those shown on standard signing. An example of this type of sign is shown in Figure IV-27.

WRMS Improvement Options for Multimodal Freight Movement

The Worcester Regional Mobility Study (WRMS) is a multi-modal transportation report that focused on the region's core community of Worcester and the immediate surrounding towns. The WRMS was completed in 2011. Freight-related improvement options to reduce the local impacts from expanded freight capability in the region's core included in the WRMS are summarized as follows:

- **Supplemental Guide Sign Plan**: Improve "wayfarer" or "trail blazing" on I-290 to/from the city's major truck-rail intermodal yards. This includes the CSX Franklin Street yard, P&W's Southbridge Street yard and Intransit Container's (ICI) Wiser Avenue yard.

- **Route 122 Kelly Square Bypass**: A conceptual plan has been suggested to minimize regional car and truck traffic in this identified bottleneck location. Potential routing for the Bypass would use an extension of Winter Street adjacent to the elevated CSX railroad tracks to Gold Street, continuing to Madison Street. This option would serve to reduce regional traffic volumes and heavy vehicles from both Water and Harding Streets, thus reduces associated turning movements in the heart of Kelly Square.

- **Potential "Truck Routing" Assessment**: Suggested by the WRMS as a future effort, this proposed regional study would identify "Preferred Truck Routes", identified bottlenecks to avoid, residential areas to avoid, low bridge clearances and other impediments to the efficient movement of freight. Pertinent examples in the city

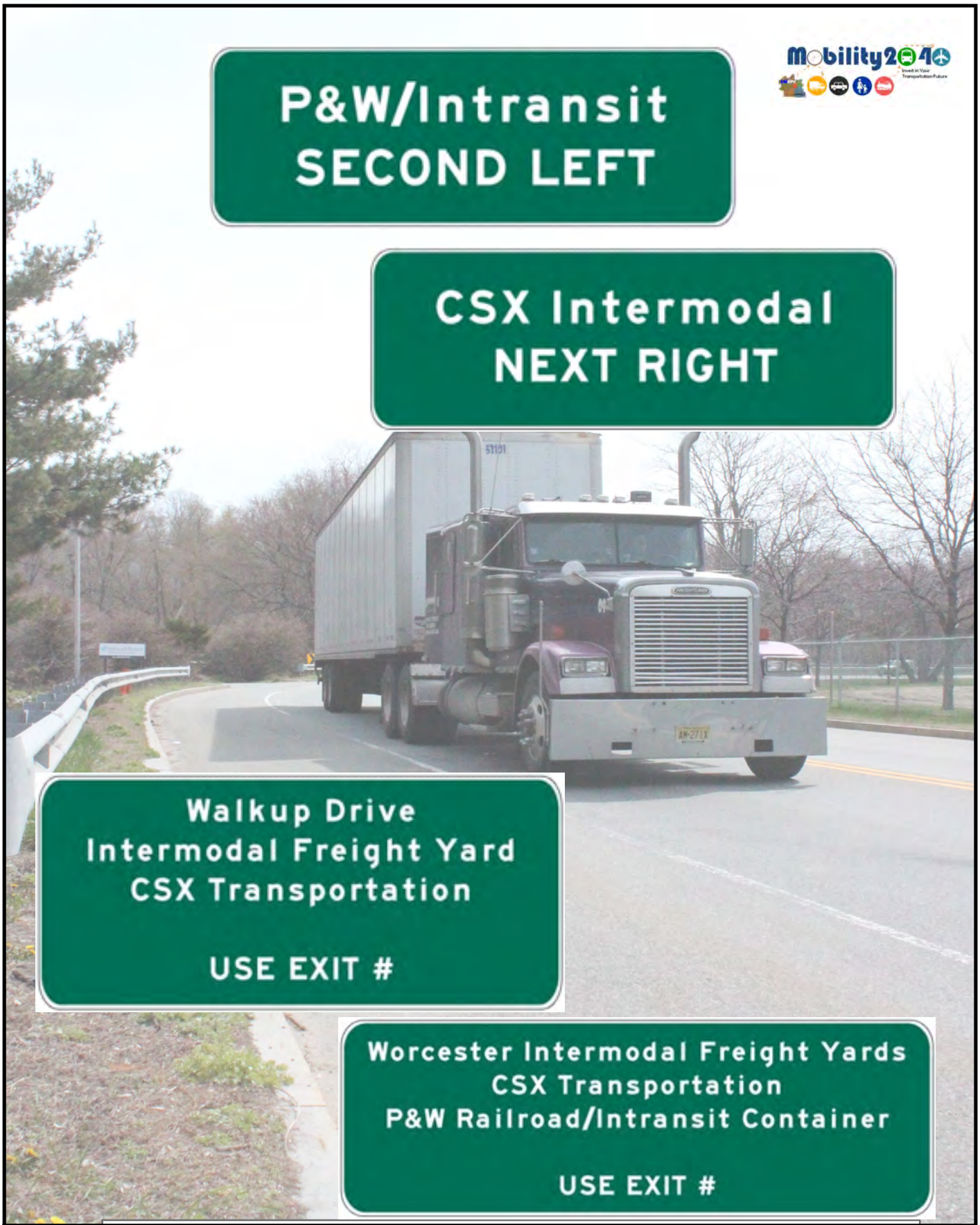


Figure IV-27
Supplemental Guide Sign Examples For Major Intermodal Facilities

Worcester include the low bridge on Cambridge Street as well as periodic flooding on Southbridge Street. Outreach to major trucking stakeholder UPS is anticipated.

Site-Specific Mitigation for Multimodal Freight Movement

In order to reduce the local impacts from expanded freight capability, the following suggested site-specific mitigation options were compiled based on various examples found in the greater region. They are included for the consideration of host communities and intermodal facility operators.

- Install noise attenuation walls and/or earthen berms to reduce noise while also shielding site operations.
- Use vegetation and other plantings to not only beautify but also to shield site operations and reduce noise.
- Consider facility hours of operation, the implementation of "quiet times" as well as procedures to reduce truck trip generation.
- When considering overhead lighting fixtures, attempt to reduce light "spillover" to adjacent sites.
- Consider use of "hostler" trucks to move trailer, chassis and containers internally on site, minimizing the need for full size trucking maneuvers, reducing both noise and emissions.
- At rail served sites, consider the use of low emissions locomotives and Auxiliary Power Units (APUs) to reduce emissions and unnecessary idling while improving local air quality.

Prioritization

Based on the above discussion, the following top freight-related needs, from both the highway and railroad modes, have been prioritized for further study or implementation.

Highway Trucking

The following lists priority trucking-related projects identified in the planning region. These should be considered along with the Major Infrastructure projects for highways identified elsewhere in Mobility 2040. The financially-constrained highway-related Major Infrastructure projects all address various needs of the trucking industry, such as increasing roadway safety and reducing recurring congestion. Others could be implemented by the private sector using private funding, such as full service rest stops catering to trucking. Others may be able to benefit from a

public-private funding scenario, where private funding is used to leverage designated public monies.

- Initiative to consider implementation of full service rest stops in the region serving the trucking industry (private venture). As noted, the trucking community often lacks adequate facilities to park, rest, bathe, eat, purchase fuel and make repairs.
- Consider improvements for trucking associated with UPS distribution facility in Shrewsbury. A recent Road Safety Audit (RSA) was conducted at the adjacent intersection of US Route 20 and Grafton Street. Route 140 is also located adjacent to the UPS site. A prior study of Route 20 through the entirety of Shrewsbury had identified improvements at the Route 20/Grafton Street intersection that addressed congestion, pavement condition, safety as well as freight movement.

Freight Rail

The following lists priority freight rail projects identified in the planning region. Some will be implemented by the private sector using private funding. Others may be able to benefit from a public-private funding scenario, such as the state's Industrial Rail Access Program (IRAP), where private railroad funding is often used to leverage additional public monies.

East Brookfield & Spencer Railroad

- Various future expansion activities, including potential IRAP-funded track improvements.

Grafton & Upton Railroad

- Implementation of various at-grade highway crossing improvements along southern segment of the line.

MassCentral Railroad

- Ongoing track maintenance & various at-grade highway crossing improvements. The MC RR right-of-way is largely owned by the Commonwealth.

North Brookfield Railroad

- Revitalization effort to restore freight service to dormant five-mile railroad while providing opportunities for new line-side industry.

Providence & Worcester Railroad

- Investigate further potential for IRAP-funded track improvements in Worcester Yard.

- Replace substandard railroad bridge over Southbridge Street to accommodate both roadway widening and bridge strengthening for heavier railcars.
- Initiative to consider viability of hosting Worcester-Providence passenger rail service operated by an outside contractor.

Airport

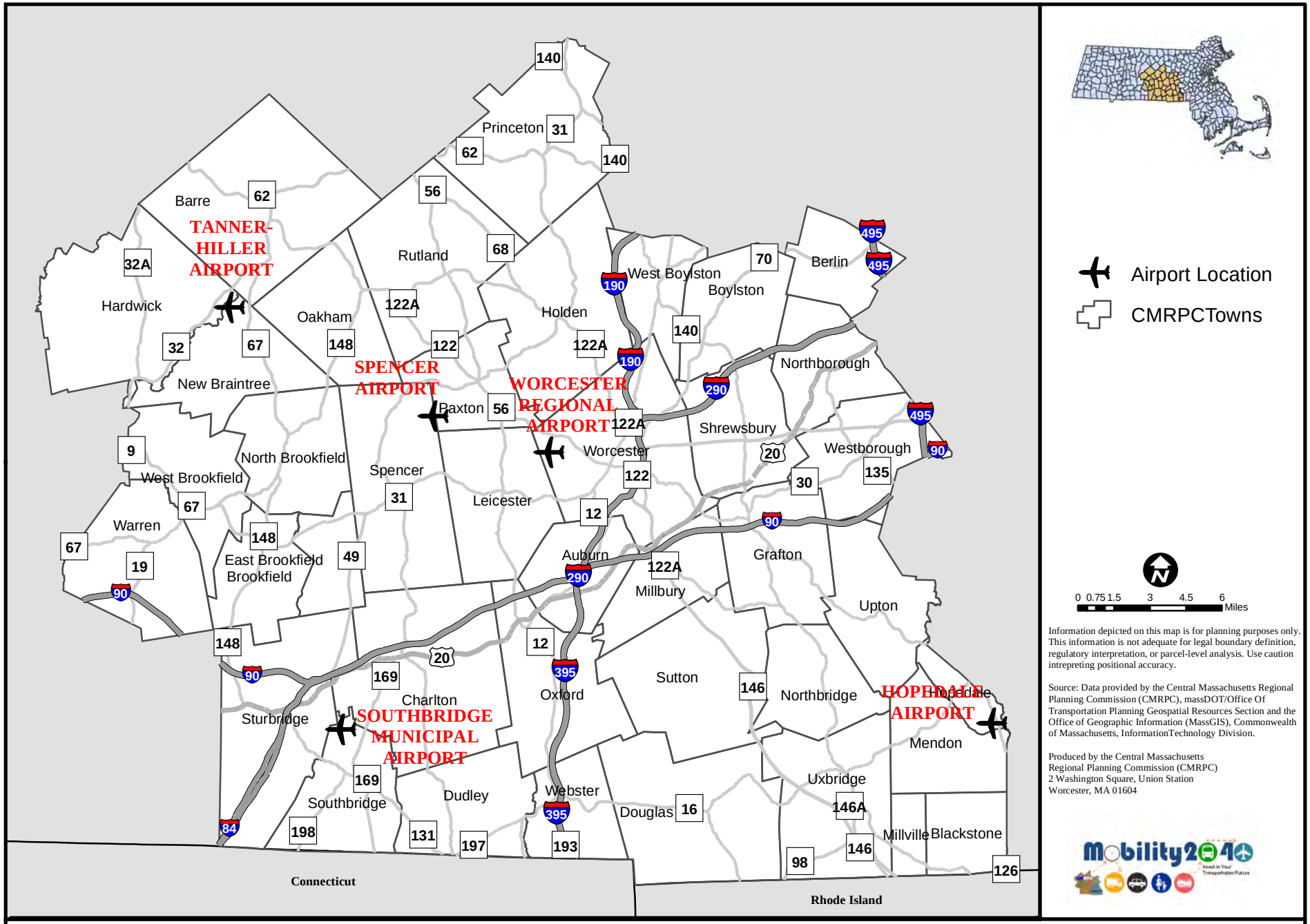
The region's airports are an essential component of the overall transportation system in Central Massachusetts. They serve a variety of purposes, including personal, business, and recreational travel as well as freight movement. Both people and goods are moved by air transportation. Although the number of passengers and the volume of freight moved by air may be relatively small compared to that of other modes serving the region, air transportation plays an important role.

The five airports located within the Central Massachusetts region are illustrated in Figure IV-28. The airports shown are Hopedale Industrial Park Airport, Southbridge Municipal Airport, Spencer Airport, Tanner-Hiller Airport in New Braintree, and Worcester Regional Airport. All five have been designated by the Massachusetts Aeronautics Commission (MAC) as part of the statewide airport system. The purpose of the statewide airport system is to ensure that all areas of Massachusetts are accessible by air. With the exception of Worcester Regional Airport, these sites are all utility airports that are designed to accommodate smaller, lighter, general aviation aircraft. Worcester Regional Airport is classified as a "General Transport Airport".

Worcester Regional Airport

Existing Condition and Future Needs

Worcester Regional Airport is relatively sparsely used today in comparison to its own recent past and to the levels of other major regionals. The reasons for this are many, and it is unclear which holds the greatest weight. Pricing has always been a problem, yet low-cost service has not thrived. It is sometimes challenging to locate and travel to Worcester airport, but over the years, people have been able to “get there from here”, at least locally. Many believe that improved access would help generate increased passenger service; others take the point of view that other market forces would need to encourage the provision of new service which would in turn spur the need for appropriate ground linkages. It is noted that the advent of GPS access to drivers has diminished some of the need to have major access roadways, particularly since a very large share of the market is local and coming from multiple directions. In general, today’s smaller airports do not generate enough traffic to fill larger planes multiple times a day, thus failing to attract and retain the low-fare airlines that select and survive in markets with larger volumes.



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

Mobility2040

Figure IV-28 Locational Map of the Region's Airports

At one time, the future use of the site of Worcester Airport was unclear. But now, with Massport's financial and business investment, it will be retained as an air facility, with cargo/general aviation emphasis, while setting the stage for the day when the local flying public begins to seek an easier, more convenient, less congested outlet with a suitable flight selection for long-range travel. Abandonment of the site as a functioning airport, as had once been discussed, would require the repayment of millions of dollars of aviation-associated grants over recent years. Now the future direction of the facility has been determined, and it will be led by an agency which is in the transportation business.

Massport once said that Worcester could someday be a major air transportation center under the right conditions, carrying up to a million passengers a year, ten times what it did a few years ago and three times its best year ever. The New England Regional Airport System Plan (NERASP) suggested that Worcester Regional Airport could eventually handle 1.5 million passengers – if infrastructure and access were improved and airlines were in fact willing to offer service to popular destinations. Current medium-growth planning scenario updates estimate a passenger activity level of nearly 300,000 by 2030.

Regarding access, Massport, MassDOT, the City of Worcester and the CMMPO developed a plan for improving directional signage to ORH for the near-term. Due to the fact that a large percentage of Worcester Regional Airport users come from the local Worcester area, there is no one preferred route. Instead, it has been recognized that multiple routes are needed to serve current demand. Six primary routes that travelers now use to access the airport were identified. MassDOT and Massport consulted with local jurisdictions in which the signs would be placed, and MassDOT installed signs that they fabricated. A total of eighty signs were installed on the six primary routes. These consistent signs should be of great help to those seeking quick ground access routes within the area.

An opposing local factor that may be hard to change is the weather. While it has been said that "the perception of the weather issue is worse than the reality here", Worcester airport's siting is not conducive to good flying weather. Its relatively high elevation puts it into fog and clouds often, as well as keeping temperatures about five degrees colder in an area which is very much impacted by winter weather effects. While it is true that flight delay rates are not substantially higher than other locations, the fact remains that landings are often forced to divert to other area airports (at a recent rate of ranging from 3-5% of scheduled arrivals), and departures are often affected by icing conditions not experienced at other nearby regionals.

Enhanced landing equipment in recent years, and the possibility of the installation of a Category III landing system being considered by the FAA for the future, is encouraging. A tree-clearing effort in 2013 resulted in an extended runway visual range with an ability for commercial airlines to land in lower visibility than previously was possible. CAT III systems involve special lighting and aircraft signaling, and many major airlines and pilots are qualified to use them. They technically allow for landing in almost any weather condition. But the timeframe for system installation appears to extend over many years.

It is generally recognized that a viable, functioning airport may be critical to the city and the region's long-term economic development. Every effort should be made to envision, plan and build a total working infrastructure that will make economic contributions in the present as well as when general passenger demand grows again in the future. The general business and governmental community has worked in recent years to overcome the various obstacles.

Other Airports in the Region

Characteristics and Inventory

In addition to Worcester Regional Airport, four other airports serve the Central Massachusetts region. The Southbridge Municipal Airport in Southbridge, the Hopedale Industrial Park Airport in Hopedale, the Tanner-Hiller Airport in New Braintree, and Spencer Airport in Spencer are utility airports that are designed to accommodate smaller, lighter, general aviation aircraft. Table IV-11 lists some of the characteristics of these area airports, along with those of the larger Worcester facility.

As shown in Table IV-11, the majority of the operations at these smaller airports consist of general aviation flights. However, air taxi services are offered at the Hopedale Industrial Park Airport and Southbridge Municipal Airport. Also, a relatively small number of military flights occur at all of these locations.

Of the four utility airports in the region, Southbridge Municipal Airport is utilized the most and has been designated by MAC as part of the statewide airport system. Southbridge Municipal Airport is owned and operated by the Town of Southbridge. The airport is located three miles northwest of downtown Southbridge and approximately five miles from the regional highway system in Sturbridge. The Massachusetts Turnpike (I-90), Interstate 84, and US Route 20 are all accessible via State Route 131 west to Sturbridge.

Table IV-11: Airport Characteristics

	HOPEDALE INDUSTRIAL PARK AIRPORT	SOUTHBRIDGE MUNICIPAL AIRPORT	SPENCER AIRPORT	TANNER-HILLER AIRPORT	WORCESTER AIRPORT
Location	Hopedale	Southbridge	Spencer	New Braintree	Worcester-Leicester
Elevation	269 Ft	699 Ft	1040 Ft	589 Ft	1009 Ft
Runway	18/36	02/20	01/19	06/24	11/29, 15/33
Runway Dimensions	3172'x90'	3500'x75'	1950'x50'	3027'x40'	7000'x150', 5000'x100'
Runway Lighting	Low Intensity	Medium Intensity	Low Intensity	No	High/Medium Intensity
Airport Attended	Dawn-Dusk, Mon-Fri	8 AM-Dusk	9 AM-6 PM, Mon-Sat	8 AM-6 PM M-F 8 AM-4 PM Sat	Continuous
Registered Based Aircraft	14 Single Engine 1 Multi Engine	25 Single Engine 1 Multi Engine 1 Helicopter	25 Single Engine	4 Single Engine	59 Single Engine 6 Multi Engine
Operations Per Year	6,000	31,000	12,000	600	48,000
% Air Taxi	4%	3%	0	0	3%
% Local General Aviation	48%	48%	83%	86%	40%
% Transient General Aviation	48%	48%	17%	12%	55%
% Military	<1%	<1%	<1%	2%	<1%
% Commercial	0	0	0	0	1%

Existing Condition and Future Needs

In the late 1990s, the Tri-community area of Charlton, Southbridge and Sturbridge undertook a Corridor Planning Study. The goal of the study was to identify projects that might alleviate transportation problems in the area bounded roughly by Route 131, Route 169, and US Route 20. Ultimately only Southbridge supported the construction of a "Northern Connector" from US Route 20 in Charlton to a proposed access road which connects to Route 169 in Southbridge. This approach was not favored by either the Charlton or Sturbridge groups because of potential negative impacts to nearby residents and potential environmental and societal impacts.

Southbridge favored this approach as the one providing the greatest reduction of Route 131 traffic and improved access to the regional highway system. Since that time, a link from Route 169 to the Airport/industrial park has been constructed. This link, called Commercial Drive, was completed and opened in 2011. It serves as access to Casella Waste Systems on Barefoot Road as well as being a more convenient, direct link to the airport from the north. The host community hopes that further industrial development can occur on this new roadway as well.

In early 2011 Southbridge Airport was in the midst of undergoing an update to its Airport Master Plan. Additionally, the potential installation of solar energy generation equipment on the site was being pursued with the FAA and other concerned parties.

On June 1, 2011, severe local weather in the form of two tornadoes affected the south-central portion of Massachusetts. One of these travelled to the east just far enough to cross Airport property. Hangars were damaged, some totally, and many aircraft were strewn about as well. Up to $3 million in damage occurred. As this particular area of the storm path was deemed ineligible for federal assistance, insurance and town money needed to be allocated to any rebuilding effort. The FAA hoped to fast-track the master plan update effort in recognition of the need to resume normal operations as quickly as possible.

In mid-2013 Southbridge began exploring alternative uses for the now money-losing facility. Later that year the town began to take steps to evict the airport operator due to failure to meet requirements and funding issues. In March of 2014 consultants were hired to start planning a rebuild of the facility. The town recaptured operation of the airport in May 2014. The state allocated $1 million towards airport renovation at that time as well.

CHAPTER V

Summary of Needs and Analysis

Introduction

The Summary of Needs and Analysis combines multi-modal priorities from three different sources (Management Systems Data, Public Outreach, and Modal Priorities from Chapter IV) to develop a list of potential major infrastructure projects and initiatives based on cost of the projects, project effectiveness and readiness, regional significance and community support. The following will show how the projects were then graded across each of the seven Mobility2040 performance management goal areas to generate a list of scored projects and initiatives. The CMMPO and CMMPO Advisory Committee members placed the projects into tiers, based on how well they met the goals. The recommended list, primarily drawn from Tier 1, are the suite of major infrastructure projects that are part of this plan.

In order to meet financial constraint regulations, the highway major infrastructure projects were broken down into five scenarios for analysis. The projects were placed in financially constrained five-year bands that could be implemented through 2040. The scenarios were used as inputs for the Travel Demand Model, and assessed for the following factors:

- congestion reduction and savings in vehicle miles travelled
- greenhouse gas effects
- geographic equity
- environmental justice benefits and burdens
- consistency with prior public input

Based on the process described over the following pages, the CMMPO chose the suite of projects and the initiatives presented toward the end of this chapter and in Chapter VI.

Summary of Needs

Data Informed Regional Priorities (Management System Data Integration)

Regional Priorities have been developed through a Management Systems approach, resulting in a number of “corridors” that demonstrate the greatest need for improvement. The Management Systems approach combines congestion, safety, traffic volume, pavement condition, transit use, freight movement, and environmental justice related data in order to define “hot spots” throughout the CMRPC planning region. The resulting corridors have been added to the regional needs; andare listed by municipality in the table on page V-5. Locations highlighted in orange are current/recent Transportation Improvement Program (TIP) projects or initiatives; they have been included to show the progress the CMMPO has made in addressing the region’s hotspots.

The following map and table highlight the locations derived from the analysis described in the previous paragraph.

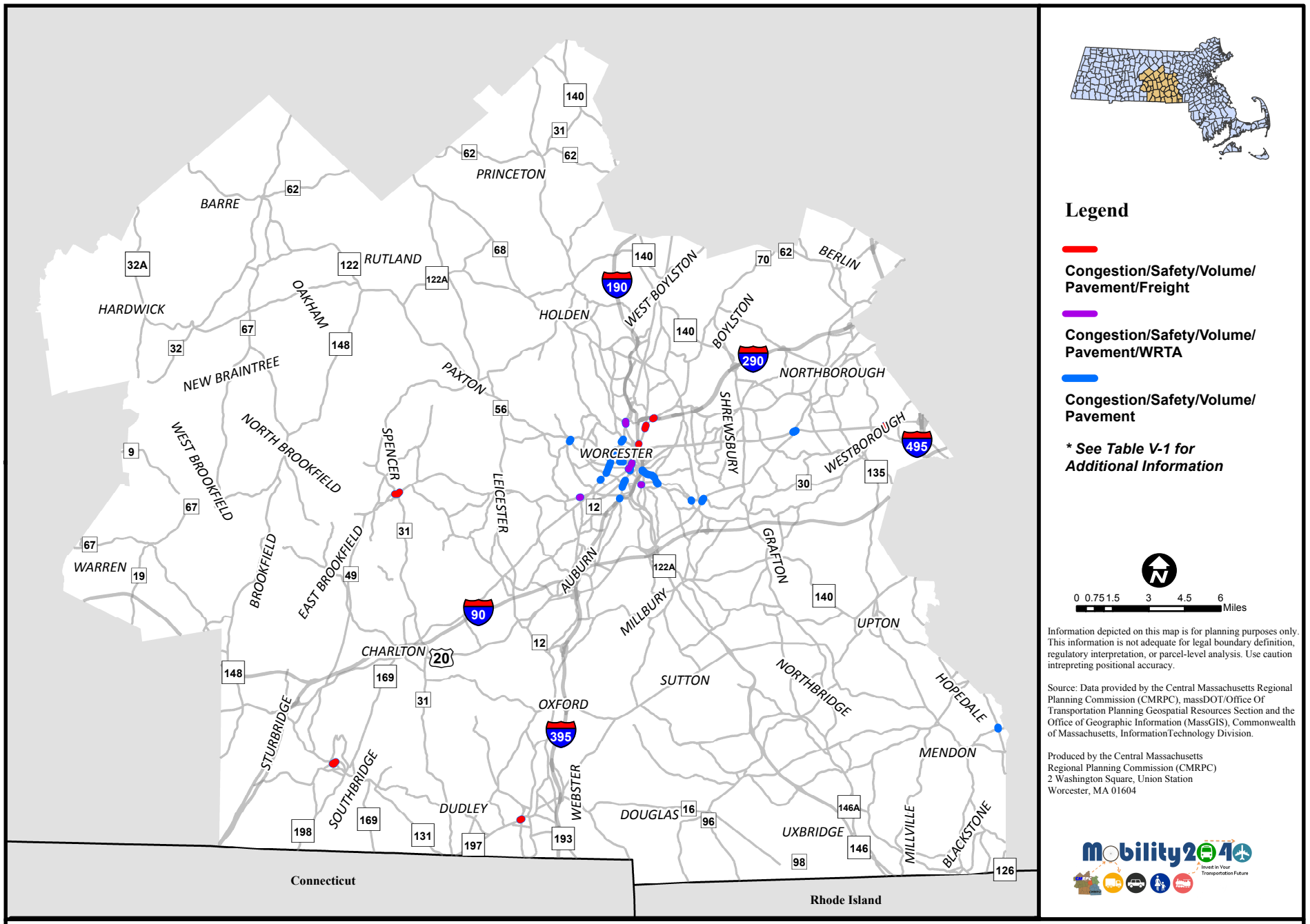


Figure V-1 Management Systems - Data Integration Map

Table V-1 - Management Systems Analysis

Location	Congested	High Crash	High Volume	Poor Pavement	WRTA	Freight
Worcester	X	X	X	X		
Southbridge Street Corridor						
@ Interstate 290	X	X	X	X		
@ Hammond Street	X	X	X	X		
Madison Street to Myrtle Street	X	X	X	X		
Grafton Street Corridor						
Posner Square to Rice Square	X	X	X	X		
@ Sunderland Road	X	X	X	X		
Park Avenue Corridor						
May Street to Pleasant Street	X	X	X	X		
@ Highland Street	X	X	X	X		
@ Salisbury Stret	X	X	X	X		
Grove Street Corridor						
Grove Street to Chadwick Street	X	X	X	X	X	
Main Street Corridor						
Madison/Chandler Streets to Myrtle Street	X	X	X	X	X	
Franklin Street to Pleasant Street	X	X	X	X	X	
@ Curtis Parkway	X	X	X	X	X	
Mill Street Corridor						
@ Tatnuck Square Area	X	X	X	X		
US-20 Corridor						
@ Sunderland Road	X	X	X	X		
Lincoln Street Corridor						
Salisbury Street to Goldsberry Street	X	X	X	X	X	X
McKinley Road to Burncoat Street	X	X	X	X	X	X
@ Interstate 290 Access Road	X	X	X	X	X	X
Pleasant Street Corridor						
@ West Street	X	X	X	X		
Winthrop Street Corridor						
@ Vernon Street	X	X	X	X	X	
Southbridge						
Main Street Corridor						
@ High Street	X	X	X	X		X
@ Hamilton Street	X	X	X	X		X
Spencer						
Main Street Corridor						
Pleasant Street to Grove Street	X	X	X	X		X
Northborough						
MA-9 Corridor						
@ US-20	X	X	X	X		
Westborough						
MA-9 Corridor						
@ MA-30	X	X	X	X		X
Dudley						
MA-12 Corridor						
@ MA-197	X	X	X	X		X
Hopedale						
MA-140 Corridor						
@ Hartford Avenue East	X	X	X	X		

Projects highlighted in orange are either current or recent Transportation Improvement Program projects, or they are the subject of current or recent initiatives

Stakeholder/Public Input Regional Priorities

Regional Priorities were also developed in consultation with the CMMPO, MassDOT, regional stakeholders, as well as through public outreach efforts. CMMPO staff worked to develop a list of larger, long-term priorities and needs that would improve the transportation system for all modes based on the collected inputs. The resulting locations or initiatives have been listed below as well as highlighted in Figure V-2; the initiatives have an asterisk to provide clarity.

Highway

- I-90 (Mass Pike)/I-495 Interchange – Westborough/Hopkinton
- I-495/MA-9 Interchange – Westborough/Southborough
- I-290/Vernon Street/Kelley Square Bridge Expansion – Worcester
- MA-9/US-20 Interchange – Northborough
- US-20 Corridor – Charlton/Oxford
- US-20 Corridor – Worcester
- MA-146/Boston Road Interchange – Sutton
- I-90 (Mass Pike)/MA-146/US-20 Interchange – Millbury
- MA-9 Corridor – West Brookfield
- MA-146 Frontage Roads – Millbury/Sutton
- MA-31 Corridor Improvements – Holden/Paxton/Spencer
- Kelley Square Bypass – Worcester

Bicycle/Pedestrian

- Boston-Worcester Air-Line Trail – Shrewsbury/Westborough
- Blackstone River Greenway (Segments 3,4,5) – Uxbridge/Northbridge/Grafton/Sutton/Millbury

Transit

- New Fixed Route Buses
- Intelligent Transportation Systems/Transit Signal Priority (TSP) – WRTA Host Communities*
- Transit “Mini-Hubs” – WRTA Host Communities*
- Bus Rapid Transit (BRT) or BRT “Light” on Main Street (South) – Worcester*
- Union Station Hub Upgrades/Expansion – Worcester**
- Maintenance & Operations Facility Upgrades/Expansion; Possible 2nd Facility – Worcester*
- Union Station Upgrades – Worcester*

Rail

- Boston-Worcester-Springfield High-Speed Rail (Passenger)*
- Western MBTA Commuter Rail Extension: Worcester-Springfield*
- Worcester-Providence Passenger Rail + Improvements*
- Worcester-New London Passenger Rail + Improvements*
- MBTA Commuter Rail Station Upgrades – Worcester, Grafton, Westborough
- CharlieCard Ticket Vending Machines (TVM) – Regional

Freight Rail

- East Brookfield & Spencer Railroad Expansion & Improvements – East Brookfield/Spencer
- Grafton & Upton Railroad At-Grade Highway Crossing Improvements – Hopedale
- MassCentral Railroad Maintenance + Improvement – Hardwick/Barre
- North Brookfield Railroad Revitalization – East Brookfield/North Brookfield
- Providence & Worcester Railroad:
    - (5 Major Bridges) – Blackstone/Millbury/Millville/Sutton/Uxbridge
    - IRAP Track Improvements – Worcester
    - Southbridge Street Overpass – Worcester

Highway Trucking

- Full Service Rest Stops in the Region for Trucking Industry (Private Venture)*
- Improvements for Trucking Associated with UPS in Shrewsbury (US-20/Grafton Street Intersection + MA-140 Nearby.)

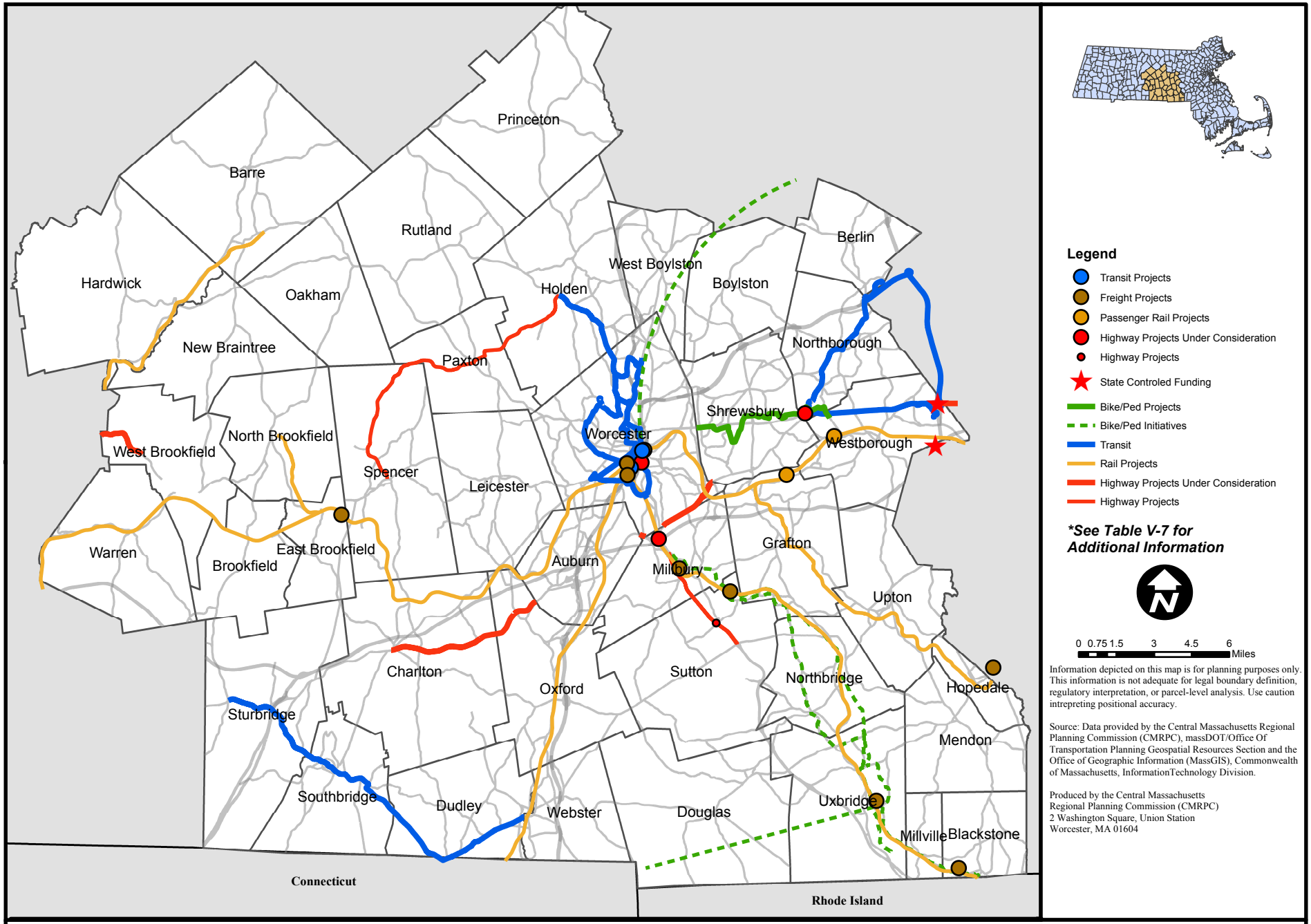


Figure V-2 Preliminary Major Infrastructure

Individual Area/Mode Regional Priorities

Pedestrian

Needs / Next Steps

CMRPC staff will update the Regional Bicycle and Pedestrian Plan during 2015-2016 with further analysis and extensive stakeholder outreach. Emphasis on Access to Essential Services will guide the development of the updated regional plan, along with input from regional stakeholders and the public. For the purposes of Mobility 2040, preliminary analysis has taken place regarding bicycle and pedestrian related crash clusters as well as sidewalk condition on some of the Federal Aid Eligible roadways in the region.

The Massachusetts Department of Transportation generates a listing of Highway Safety Improvement Program (HSIP) eligible Auto, Bike, and Pedestrian clusters for the Commonwealth. A list of HSIP eligible locations for the CMRPC planning region was derived from the statewide list. Ten (10) pedestrian crash clusters have been identified as HSIP eligible for the region.

Prioritization

For the purposes of Mobility2040, the crash clusters that are HSIP eligible are considered highest priority. There is a large concentration of bicycle and pedestrian HSIP clusters within a half mile of the intersection at Main Street and Chandler Street/Madison Street in Worcester. This intersection is also located within feet of the highest ranking automobile cluster in the region (#8 Statewide). A recent Road Safety Audit concerning the Main Street/CBD project in Worcester analyzed this high crash location. Furthermore, a MassDOT project to reconstruct the Belmont Street Bridge over Interstate 290, another high bicycle and pedestrian crash location, is currently underway. A Road Safety Audit was performed at this location, and the results of that exercise have been incorporated into the reconstruction effort. The only HSIP eligible pedestrian cluster outside of the City of Worcester is located in the center of the Town of Spencer. Please see the 2009-2011 CMRPC Regional Safety Report for expanded discussion regarding other non-HISP eligible pedestrian crash clusters.

Table V-2 on the following page provides a listing of the prioritized pedestrian crash clusters for the region ranked by EPDO. Candidate projects must be locations where the data indicates a high incidence of crash severity based on the Equivalent Property Damage Only (EPDO) index: ▫ Property Damage = 1 Point ▫ Injury = 5 Points ▫ Fatality = 10 Points.

Table V-2: 2009-2011 High Priority Pedestrian Clusters in the CMRPC Region

Crash Count	# Fatal	# Injury	# Non-Injury	EPDO	Street #1	Street #2	Town	Rank
103	0	79	24	419	MAIN STREET	SOUTHBRIDGE STREET	WORCESTER	3
37	0	26	11	141	MAIN STREET	CAMBRIDGE STREET	WORCESTER	
26	0	20	6	106	MAIN STREET	HAMMOND STREET	WORCESTER	
25	0	20	5	105	MURRAY AVENUE	MAIN STREET	WORCESTER	
24	1	17	6	101	MAIN STREET	MECHANIC STREET	SPENCER	
22	0	18	4	94	GRAFTON STREET	ORIENT STREET	WORCESTER	
24	1	14	9	89	BELMONT STREET	INTERSTATE 290	WORCESTER	
18	0	16	2	82	BELMONT STREET	EASTERN AVENUE	WORCESTER	
18	1	11	6	71	PARK AVENUE	PLEASANT STREET	WORCESTER	
19	0	12	7	67	INTERSTATE 290	VERNON STREET	WORCESTER	

Bicycle

Needs / Next Steps

As mentioned in the Pedestrian section, CMRPC staff will update the Regional Bicycle and Pedestrian Plan during 2015-2016 with further analysis and extensive stakeholder outreach. Emphasis on Access to Essential Services will guide the development of the updated regional plan, along with input from regional stakeholders and the public. For the purposes of Mobility 2040, preliminary analysis has taken place regarding bicycle and pedestrian related crash clusters as well as shoulder width on some of the Federal Aid Eligible roadways in the region.

The Massachusetts Department of Transportation generates a listing of Highway Safety Improvement Program (HSIP) eligible Auto, Bike, and Pedestrian clusters for the Commonwealth. A list of HSIP eligible locations for the CMRPC planning region was derived from the statewide list. Six (6) bicycle crash clusters have been identified as HSIP eligible for the region.

Prioritization

For the purposes of Mobility2040, the crash clusters that are HSIP eligible are considered highest priority. There is a large concentration of bicycle and pedestrian HSIP clusters within a half mile of the intersection at Main Street and Chandler Street/Madison Street in Worcester. This intersection is also located within feet of the highest ranking automobile cluster in the region (#8 Statewide). A recent Road Safety Audit concerning the Main Street/CBD project in Worcester analyzed this high crash location. Furthermore, a MassDOT project to reconstruct the Belmont Street Bridge over Interstate 290, another high bicycle and pedestrian crash location, is currently

underway. A Road Safety Audit was performed at this location, and the results of that exercise have been incorporated into the reconstruction effort. Please see the 2009-2011 CMRPC Regional Safety Report for expanded discussion regarding other non-HISP eligible bicycle crash clusters.

Table V-3, below, provides a listing of the prioritized bicycle crash clusters for the region ranked by EPDO. Candidate projects must be locations where the data indicates a high incidence of crash severity based on the Equivalent Property Damage Only (EPDO) index: ▫ Property Damage = 1 Point ▫ Injury = 5 Points ▫ Fatality = 10 Points.

Table V-3: 2009-2011 High Priority Bicycle Clusters in the CMRPC Region

Crash Count	# Fatal	# Injury	# Non-Injury	EPDO	Street # 1	Street #2	Town
10	0	8	2	42	INTERSTATE 290	BELMONT STREET	WORCESTER
9	0	7	2	37	MAIN STREET	OREAD STREET	WORCESTER
10	0	6	4	34	MAIN STREET	MURRAY AVENUE	WORCESTER
6	0	6	0	30	FRANCIS J. MCGRATH BOULEVARD	MADISON STREET	WORCESTER
9	0	5	4	29	CHANDLER STREET	AUSTIN STREET	WORCESTER
8	0	5	3	28	PARK AVENUE	MILL STREET	WORCESTER

Public Transit and Passenger Rail

Fixed Route and Paratransit

Congestion / On-Time Performance

Needs/Next Steps

There are many congestion improvement options to consider in an effort to maintain on-time performance for fixed-route and paratransit service. Short-term improvements include:

- adjusting signal timing and phasing
- maintaining traffic control signage and pavement markings
- maintaining good pavement condition
- trimming overgrown vegetation along roadways that impair vehicle sight lines
- maintaining roadway drainage structures
- Access Management techniques.
- upgrading or developing electronic systems (radio, telephone, internet) to communicate within the WRTA and among various organizations

- developing/updating protocols for how internal and external communications should occur
- continued success of the Mobility Management Model (MMM) depends on further automation of the scheduling and dispatching responsibilities, in addition to a well trained staff.

Long-term options that are more costly and take greater amount of time to implement include: intersection realignment, installation of a modern roundabout, building additional lanes to increase capacity, and incorporating Intelligent Transportation Systems (ITS) capabilities or tools.

Prioritization

In concert with the goals and objectives adopted by the CMMPO, there are certain roadways and intersections that should be improved first. These prioritized locations should have improvements that will alleviate congestion and reduce travel time, particularly where they impact high transit routes. Performance Measures help determine if a project should be undertaken as a result; a project that benefits multiple modes or management systems will get a higher priority over a proposed project that only helps one element.

Using various data acquired by the WRTA through its manual and AVL technology will assist in maintaining or improving schedules that meet on-time performance. Identifying the location of critical peak hour delay intersections can help determine which roadway segments should undergo improvements to reduce travel time and potential bottlenecks. Most of the critical locations are in the City of Worcester and the Town of Shrewsbury. The remaining few are in the Towns of Sutton, Upton, and Webster, of which only Webster is served by fixed route transit.

Improvement of existing Park-and-Ride facilities and the possible addition of more facilities that are connected to transit can help meet the goals of a 5% total automobile VMT reduction and the long term creation of five new Park-and-Ride locations. Further, rideshare programs such as MassRIDES and NuRide will also help with VMT reduction by encouraging travelers to use alternative options such as public transit. Travel demand management (TDM) is another way to reduce traffic congestion by including transit options for commuters.

Safety and Security

Needs/Next Steps

Safety

In 2015, the WRTA will be updating its Safety and Security Program Plan (SSPP). In addition, the WRTA will also update its Continuity of Operations (COOP) Plan from its last update in 2009, as well as its Safety Management System (SMS) to include not only the fixed route system, but also the paratransit system, fixed facilities and vehicle fleets. Lastly, development of a full Emergency Response Plan will also be started in 2015.

Security

CMRPC and Montachusett Regional Planning Commission (MRPC) staff will continue Phase 2 Evacuation planning efforts. Phase 2 will aid jurisdictions in practical application and use of the Phase 1 "Tool Kit'. Phase 2 will continue to align the Central Regional Homeland Security Advisory Council Evacuation Plan strategies and goals with state evacuation plans.

State of Good Repair

Needs/Next Steps

With the anticipated completion of the WRTA's new maintenance and operations facility in the summer of 2016, the major capital improvement projects for the system's operation will be complete. Future SOGR efforts for fixed-facilities will focus on maintaining these for many years, even decades, of good service and system reliability.

Prioritization

Replacement, or possible expansion, of the WRTA's existing bus and van fleet will be the primary focus of new equipment in the coming years. In FY 2016 and FY 2017, the WRTA has programmed six new buses, three in each fiscal year, for fleet expansion. Beginning in FY 2020, the WRTA is expecting to begin replacing its 2008 fixed-route buses. Funding for replacement vans comes from MassDOT through their Community Transit Grants program or through WRTA 5307 capital funds.

Intelligent Transportation System

Needs/Next Steps

Regional transportation stakeholders identified key regional needs for fixed route and demand response transit among other modes. These needs, specific to Central Massachusetts, are:

- Congestion Management
- Transit Efficiency
- Efficient Use of Existing Infrastructure
- Economic Development
- Safety and Security
- Communications Infrastructure
- Traveler Information
- Use of ITS Data

Multi-function Program Areas were also developed as part of the ITS Architecture Implementation Plan and they include:

- Electronic Toll Collection Integration for Parking – Future initiative for MassDOT, MBTA, and community parking facilities that have controlled access.
- Regional Fare Card Integration for Parking – Future initiative for MassDOT, MBTA, and community parking facilities that have controlled access.
- CAD/AVL (Computer Aided Dispatch/Automated Vehicle Locator) for Transit Vehicles – Currently being deployed by the Worcester Regional Transit Authority (WRTA)
- Traffic Signal Priority – A future initiative for reducing congestion delays for WRTA buses.
- Regional Fare Card – Deployed in spring 2012, this initiative provides an interoperable fare medium allowing riders to use the WRTA, MBTA and other participating RTAs.

Prioritization

As identified in the 2011 Worcester Regional Mobility Study, Transit Signal Priority (TSP) and Roadway Variable and Dynamic Message Signs (V/DMS) are valuable Intelligent Transportation Systems options for Central Massachusetts' urban core. Both TSP and V/DMS would help reduce vehicle emissions through more efficient bus and van system operations and added potential for drivers to avoid congested routes thus creating less gridlock for buses and vans that have to travel these routes. More efficient (and potentially more expansive) bus and van service provides a benefit to EJ populations along corridors where TSP is implemented. Businesses along these corridors could benefit from TSP implementation through added transit services. While additional corridors, such as Park Avenue and Shrewsbury Street, are being assessed by the WRTA, City of Worcester and the CMMPO for future TSP implementation, a final strategy has yet to be determined. In addition, further expansion of the WRTA's paratransit Mobility

Management Model to neighboring communities would allow for more efficiencies through ITS technology.

Access to Essential Services

Needs/Next Steps

Based on the WRTA's Comprehensive Service Analysis (CSA) recommendations and analysis, there is an expressed need to increase the number of fixed routes operating for weekend service, as well as schedule improvements along mainline corridors for improved access to essential services that are only available now on weekdays. In this regard, the WRTA has identified Main Street and Lincoln Street in the City of Worcester as mainline corridors that could benefit from higher frequencies. Doing so would require adjusting route schedules of mainline core routes, which are currently interlined/paired together. Also, the WRTA has identified the need for more "cross-town" opportunities beyond the current bus pairings and outside the "hub-and-spoke" alignment of routes.

Other areas with identified needs are the towns of North Brookfield, Ware and West Brookfield. In the CMRPC *Rural 11 Prioritization Project* study, the Town of Warren was identified by community leaders as a potential connection hub for the Pioneer Valley Transit Authority (PVTA) and the WRTA. A rural route or service connecting Ware and the Brookfields was also identified. Work done by the Central Massachusetts Regional Coordinating Council (RCC) also identified the need for more transit service in the western part of the region, mainly for access to job opportunities. The CSA also supplements this perceived need by also recommending a connection with the PVTA's Ware Shuttle from West Brookfield.

Currently, the towns of Hardwick and Ware have expressed a need to improve access to essential services and have discussed these issues at RCC meetings. As towns at the edges of RTAs and not within the WRTA, both are isolated from the core of their respective service areas. Additionally, both are rural towns with limited service which significantly adds to the vehicle hours and miles, and reduces efficiencies. Working to change and improve the service will require assistance at the local, regional, and state levels.

The WRTA has also developed five distinct ADA paratransit eligibility applications in an effort to simplify the process for applicants and ask targeted questions about how the applicant's disability prevents them from using the fixed route service. With hope of having one application

for all Massachusetts RTAs, MassDOT has formed a Common Application committee. This application is currently under review.

WRTA is also planning on joining other RTAs on Ride Match software to improve online service information dissemination in a one-stop-shopping model. Ride Match would provide the public information on available public and private alternatives to get from point A to point B within communities and across the state.

Other service opportunities exist on the fringe of the current fixed-route system. These options would increase mobility options, provide more access to essential services and create new mode options not currently available. A potential transit corridor has been identified in the southernmost part of the region, connecting the towns of Dudley, Southbridge, Sturbridge and Webster. Input gathered for the CSA from multiple public meetings, surveys and meetings with community organizations coincide with the need to connect these towns.

Lastly, improved transit services for college students were also identified as a need in the CSA. The Higher Education Consortium of Central Massachusetts (HECCMA), a consortium of the ten (10) colleges in the WRTA region, is currently in conversations with the WRTA to improve transit access to select colleges in Worcester.

Intercity Bus

Needs/Next Steps

Due to Peter Pan and Greyhound operating as private carriers versus public transportation, the CMMPO is not aware of their most pressing future needs. Like other transportation providers, securing funding for maintaining operations is vital and determines system preservation and any plans for potential expansions.

Areas of importance to regional bus mobility are to fill gaps in the existing system and expansion to meet growth in future demand. Some geographic areas and times of day could benefit from bolstered or added service in the Central Massachusetts region, such as:

- Increase service from Worcester to Providence, specifically at times which would benefit potential commuters.
- Alter the current Worcester to Springfield schedule to service its Sturbridge stop in the AM for potential commuters in the CMMPO West (the Brookfields, Spencer, Warren)

and Southwest (Charlton, Southbridge, Sturbridge) sub-regions; the current schedule provides trips only in the mid-day and evening time periods.

- Consider a 'Park and Ride' stop in Palmer along the Worcester to Springfield route, which would provide access to intercity bus service for communities in the CMMPO West sub-region (the Brookfields, Hardwick, Warren).

Further statewide needs and other potential services for both public transportation and regional bus services were identified in the *Massachusetts Regional Bus Study*, completed by CTPS in 2013.

Intercity Rail

Needs/Next Steps

As referenced earlier, providing funding for maintaining operations is vital and determines system preservation and any plans for potential expansions. While the CMMPO does not program funding for either the MBTA commuter rail or Amtrak, they are actively involved in passenger/commuter rail discussions and any future expansion studies/plans.

The Framingham-Worcester commuter rail line continues to have issues with on-time performance. In the past six months (May-October 2014), the line averages an 86% on-time adherence (81.7% May-July, and 90% August-October)[1]. The line suffers from summertime speed restrictions due to the steel tracks "de-stressing", the inability to withstand heat. MassDOT unveiled plans to improve travel times on the line, with work begun in 2014 between Worcester and Grafton and is anticipated to be completed in 2016.

In addition to the MBTA, passenger/commuter rail service between Worcester and Providence has been discussed. The Boston Surface Railroad Co. and the Providence and Worcester Railroad are in the initial stages of conducting a study with the purpose of creating a commuter rail service between the two cities. The projected route would include only one additional stop in Woonsocket, Rhode Island and is anticipated to be a 70-minute trip time.

MassDOT has partnered with its sister agencies in Vermont and Connecticut to initiate a study of the "Inland Route", which would examine a second passenger rail service from Boston to Worcester, Springfield, Hartford, and New Haven, Connecticut. The study would likely include

[1] MBTA, MBTA ScoreCard Archive, http://www.mbta.com/about_the_mbta/scorecard/default.asp?id=18476

potential improvements and recommendations for upgrades to the existing route for higher-speed standards, similar to Amtrak's *Lake Shore Limited*.

Although the MBTA commuter rail service area covers 175 communities, some geographic areas and times of day could benefit from expanded or added service in the Central Massachusetts region, such as:

- Connections to other Regional Transit Authorities (RTA's) at suburban MBTA commuter rail stations are non-existent and would promote inter-modality in the region. For example, the WRTA operates community shuttles to the Grafton and Westborough stations, and would benefit to foster a connection with the MWRTA at either the Westborough or Southborough station.
- Extension of commuter rail service from Worcester to Springfield.
- Examination of passenger/commuter rail service from Worcester to Providence.
- Improved on-time performance.

Auto Travel

Congestion

Needs

The CMMPO planning staff has compiled an extensive listing of CMP intersections that endure recurring congestion. The master listing includes 287 intersections collected over a period of nearly two decades. Of the total number of intersection locations, 74 encounter above average vehicle delay. In order to meet CMMPO established performance management goals, efforts should be made to address identified deficiencies at ten locations prior to the LRTP's 2040 benchmark year. Often, by addressing critical intersection location, operations on adjacent roadway segments can be improved. Further, there are opportunities in the region for improved or new Park and Ride facilities.

Prioritization

For the purposes of Mobility2040, the top 20 congested intersections analyzed through ongoing CMP efforts are considered highest priority. These locations are listed in the included summary table. As mentioned above, an additional 54 critical intersections could also be considered for future year improvements, especially if other performance-based planning targets relating to

pavement and safety are concurrently addressed. By focusing improvement funding on these carefully selected locations, the region's performance-based goals stated earlier in the document can be effectively addressed. In addition, model-driven analysis has indicated locations in the region where new multimodal Park and Ride facilities could eventually be sited. Expanded Park and Ride in the region will also help meet performance-based goals of Mobility 2040.

Table V-4: Top 20 Congested Intersections included in Regional CMP

Community	Intersection	Total Peak Hour Delay
Worcester	Belmont St/Lake Ave	12275
Webster	I-395 NB Ramps/Route 16/Sutton Rd	12080
Worcester	Foster St/Francis J McGrath/Franklin St/Green St	10908
Upton	High St/Hopkinton Rd/School St/Westboro Rd	10862
Worcester	Chandler St/Mower St/Pleasant St	10656
Upton	Route 140/Hartford Ave/Maple Ave	10601
Worcester	Cambridge St/Southbridge St	10501
Shrewsbury	Route 9/South St	9819
Worcester	Park Ave/Salisbury St	9388
Sutton	Route 146/Boston Rd	9340
Westborough	Route 9/Lyman St	8907
Worcester	Cambridge St/Main St/Webster St	8800
Shrewsbury	Main St/N Quinsigamond Ave/Holden St	8563
Worcester	Route 20/Massasoit Rd	8381
Westborough	Route 30/Church St/School St	7795
Worcester	Route 20/Sunderland Rd	7611
Worcester	Plantation St/Lincoln St	7306
Westborough	Route 9/Otis St	6976
Shrewsbury	Route 140/Main St	6802
Shrewsbury	Route 20/Lake St	6803

Safety

Needs

The Massachusetts Department of Transportation generates a listing of HSIP eligible Auto, Bike, and Pedestrian clusters for the Commonwealth. A list of HSIP eligible projects for the CMRPC planning region was derived from the statewide list. One hundred and seventy six (176) automobile, six (6) bicycle, and ten (10) pedestrian clusters have been identified as HSIP eligible for the region. (It should be noted that mainline Interstate crash clusters have been removed from consideration due to jurisdictional issues.)

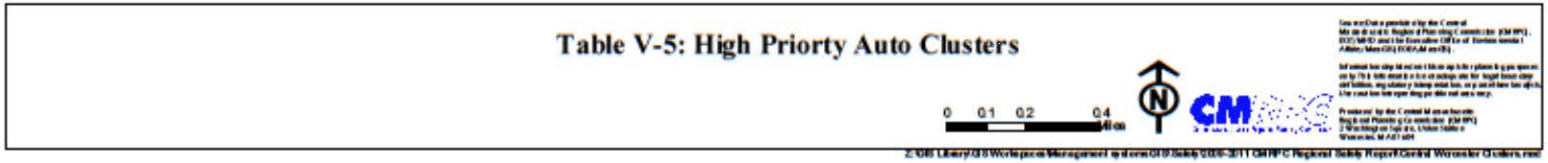
Prioritization

For the purposes of the Long Range Transportation Plan, crashes from the CMRPC region's share of the statewide Top 200 are considered highest priority. These twenty eight (28) locations are provided in Table V-5 on the following page. Additional HSIP eligible crash locations have been identified for the region, and placed in lower tier levels. Please see the *2009-2011 CMRPC Regional Safety Report* for expanded discussion regarding Tiers II & III, as well as other non-HISP eligible crash clusters. With limited funding available, HSIP specific target funds amount to just under $1 million per year, it is important to develop projects that provide the greatest improvement in safety figures. Improving the CMRPC region's share of the statewide Top 200 Automobile clusters will help to work toward achieving the safety related goals laid out in Chapter II of Mobility2040. Since Mobility2040 is a multimodal Long Range Transportation Plan, bicycle and pedestrian HSIP eligible locations have been prioritized in their respective sections. Clusters have been ranked by EPDO, or, Equivalent Property Damage Only (EPDO) index: ▫ Property Damage = 1 Point ▫ Injury = 5 Points ▫ Fatality = 10 Points.

Table V-5

2009-2011 Proposed High Priority Motor Vehicle Clusters in the CMRPC Region (Excludes Interstate Highways)

Crash Count	EPDO	# Fatal	# Injury	# Non-Injury	Town	Statewide Rank	Map Name
90	226	0	34	56	WORCESTER	8	8 CHANDLER STREET - MURRAY AVENUE IN WORCESTER
69	169	0	25	44	WORCESTER	20	20 HIGHLAND STREET - HARVARD STREET IN WORCESTER
82	158	0	19	63	WORCESTER	27	27 PARK AVENUIE - PLEASANT STREET IN WORCESTER
63	155	0	23	40	WORCESTER	28	28 LINCOLN STREET - MARSH AVENUE IN WORCESTER
74	154	0	20	54	SUTTON	30	30 WORCESTER PROVIDENCE TURNPIKE - BOSTON ROAD IN SUTTON
67	139	0	18	49	WORCESTER	44	44 SOUTHBRIDGE STREET - HAMMOND STREET IN WORCESTER
50	134	0	21	29	WORCESTER	54	54 MAIN STREET - PARK AVENUE IN WORCESTER
53	134	1	18	34	WORCESTER	54	54 MAIN STREET - MILL STREET IN WORCESTER
61	129	0	17	44	WORCESTER	60	60 GRAFTON STREET - HAMILTON STREET IN WORCESTER
73	125	0	13	60	WORCESTER	68	68 BELMONT STREET - LINCOLN STREET IN WORCESTER
95	123	0	7	88	NORTHBOROUGH	72	72 WEST MAIN STREET - SOUTH STREET IN NORTHBOROUGH
54	118	0	16	38	WORCESTER	84	84 BELMONT STREET - PLANTATION STREET IN WORCESTER
71	115	0	11	60	SHREWSBURY	89	89 BOSTON TURNPIKE - SOUTH STREET IN SHREWSBURY
67	115	0	12	55	SHREWSBURY	89	89 BOSTON TURNPIKE - SOUTH QUINSIGAMOND AVENUE IN SHREWSBURY
42	114	0	18	24	WORCESTER	93	93 GRAFTON STREET - PLANTATION STREET IN WORCESTER
53	113	0	15	38	WORCESTER	97	97 HIGHLAND STREET - MAIN STREET IN WORCESTER
41	113	0	18	23	WORCESTER	97	97 GRAFTON STREET - MENDON STREET IN WORCESTER
69	109	0	10	59	WORCESTER	110	110 MADISON STREET - GREEN STREET (KELLEY SQUARE) IN WORCESTER
56	108	0	13	43	SHREWSBURY	113	113 HARTFORD TURNPIKE - GRAFTON STREET IN SHREWSBURY
57	105	0	12	45	CHARLTON	126	126 STURBRIDGE ROAD - BROOKFIELD ROAD IN CHARLTON
49	105	0	14	35	WORCESTER	126	126 BELMONT STREET - LAKE AVENUE NORTH IN WORCESTER
51	103	0	13	38	WORCESTER	136	136 LINCOLN STREET - COUNTRY CLUB BOULEVARD IN WORCESTER
53	101	0	12	41	WORCESTER	149	149 HIGHLAND STREET - LANCASTER STREET IN WORCESTER
57	101	0	11	46	WORCESTER	149	149 PARK AVENUE - HIGHLAND STREET IN WORCESTER
44	100	0	14	30	WORCESTER	154	154 PROVIDENCE STREET - MILLBURY STREET IN WORCESTER
53	97	0	11	42	OXFORD	171	171 MAIN STREET - SUTTON AVENUE IN OXFORD
35	96	1	13	21	WORCESTER	179	179 CHANDLER STREET - PIEDMONT STREET IN WORCESTER
37	93	0	14	23	WORCESTER	199	199 MADISON STREET - KELLEY SQUARE (BY ADDRESS) IN WORCESTER



Pavement and State of Good Repair

Needs

In the Central Massachusetts planning region, the largest burden for road maintenance rests with the towns. Funding to maintain these roadways comes primarily through Chapter 90 funding and sometimes through special apportionment through the towns themselves. Some Federal aid eligible town maintained roadways are funded through the TIP every year. CMRPC staff has identified an approximate $10 million annual funding shortfall to maintain the current federal-aid system, as these same resources are stretched to address congestion, safety, and other transportation issues. The towns have the added burden of local roads that are ineligible for federal aid funding. Even with Chapter 90 apportionment, the Massachusetts Highway Association (MHA) identified an approximate $30 million annual funding shortfall for towns to maintain their roadways.

Prioritization

For the purpose of Mobility2040, a list of roadway segments has been prioritized to improve the region's state of good repair. The following list are those segments identified as top regional priorities.

Table V-6: Top Regional Roadway Segment Priorities

City/Town	Route	From	To
Brookfield	Fiskdale Road	Molasses Hill Road	Sturbridge Town Line
Millbury	Greenwood Street	McCracken Road	Elmwood Street
Paxton	Holden Road	Grove Street	Holden Town Line
Southbridge	Hamilton Street	Main Street Loop	Main Street Loop
Spencer	Medow Road	Old Main Street	Dewey Street
Spencer	Charlton Road	Maple Street	Charlton Town Line
Uxbridge	Hartford Avenue East	North Main Street	Granite Street
West Boylston	Laurel Street	Holden Town Line	Hosmer Street
Worcester	Greenwood Street	Blackstone River Road	Route 20
Worcester	Main Street	Chandler Street	Martin Luther King Jr. Boulevard

For additional information please see the *2013 Regional Pavement Management Report and Priority Listing.* Listings of other regional priorities and town priorities can be found in the Technical Appendix.

Intelligent Transportation Systems - Highway

Needs

In 2004, the Executive Office of Transportation-Office of Transportation Planning (now MassDOT) led the effort to develop Central Massachusetts Regional ITS Architecture. This effort was updated in 2010. The four regional needs, unchanged since 2004, were: **congestion management; transit efficiency; efficient use of existing infrastructure; and economic development**. The three major themes for Central Mass region were: **transit demand and revenue; traffic congestion and traveler information** and the **use of ITS data**. From the above mentioned regional needs and major themes came four statewide Near-Term Multi-Agency Initiatives that were recommended by the Guidance Committee for Central Massachusetts. They are:

- **Event Reporting System:** Internet-based tool that serves as a centralized repository for information on events affecting the transportation network.
- **Expansion of the Massachusetts Interagency Video Integration System (MIVIS):** Expansion of video sharing and distribution system to allow sharing of real-time video feeds among a larger group of agencies.
- **511 Travel Information System:** Public travel information system, covering the roadways and transit services in the region.
- **Planning Data Archive:** System for coordinating the planning data archives for the transportation agencies in the region.

These statewide initiatives are largely dependent on MassDOT implementation, and when eventually implemented, will require an expansive effort to involve regional agencies beyond MassDOT to become effective and have a significant effect on regional conditions.

Prioritization

As identified in the 2011 Worcester Regional Mobility Study, Transit Signal Priority (TSP) and Roadway Variable and Dynamic Message Signs (V/DMS) are valuable Intelligent Transportation Systems options for Central Massachusetts' urban core. Both TSP and V/DMS would help reduce vehicle emissions through more efficient bus system operations and added potential for drivers to avoid congested routes thus creating less gridlock for buses that have to travel these routes.

Complete the implementation of the cameras along I-290 and implementation of the RTTMS along this corridor will be the top priority for the Central Massachusetts region. The expansion of the RTTMs along I-495 and Route 146 will also be a priority for the region.

Other regional priorities include working with MassDOT District 3 to identify significant regional projects which affect the commuting traffic during construction to assist with the traffic management plans and identifying locations for placement of message boards regarding construction related delays and detours.

Continue work with the WRTA and the Worcester DPW staff to identify critical intersections and bus routes for Transit Signal Priority implementation in the future.

Expansion of the RTTM technology to include I-395, I-190 and other major state maintained arterials such as Rte 9 and 20 will benefit the region to improve mobility in the future.

Transportation Security

Needs

Some of the needs that were identified by the communities include Opticom[2], bridge repairs, facility repairs, staffing needs, and evacuation route signs that would be needed to affect an orderly evacuation. There is a need for MassDOT to prioritize bridge repair on the primary and secondary evacuation routes.

Local disasters most often identified were train derailment, truck rollover, pipeline explosion or deficient dams. In addition, power plants/transformer stations, waste water treatment or sewage treatment plants, and a few big chemical plants were also identified. The Quabbin and Wachusett reservoirs and aqueduct systems that supply water to Boston area residents and the various reservoirs that supply the City of Worcester were indicated as vulnerable infrastructure. 49 communities have the potential to be directly affected by a train derailment or other railroad accident in their community. Only 19 of the communities are not intersected by MA Routes 2, 9, 20, 146 or Interstates 84, 90, 190, 290, 395, or 495. Every other community sees significant cross state or interstate traffic that has a high potential for truck rollover or other accident that could complicate a regional evacuation.

[2] The Opticom System provides traffic signal priority override for a high level of safe traffic management for emergency vehicles travelling through an intersection.

In addition, the region's communication towers (i.e. summit of Wachusett in Princeton, Ragged Hill in West Brookfield, or Asnebumskit in Paxton) were determined to be important vulnerable infrastructure.

Private emergency communication systems, such as Code Red,[3] are important means of communication with residents in situations such as weather related events or evacuations.

Prioritization

In 2015 staff will continue Phase 2 Evacuation planning efforts. Phase 2 will aid jurisdictions in practical application and use of the "Tool Kit". This will be accomplished through the development and delivery of training workshops and exercises to assure jurisdictions have the knowledge and capabilities to utilize this data during an actual event. Planners will interview municipal and regional stakeholders in advance of the workshops to identify communication concerns. Based on planner/facilitator understanding, workshop agendas will be designed that interactively develop and test a communications protocol between local and regional emergency personnel.

Phase 2 will continue to align the Central Region Homeland Security Advisory Council Evacuation Plan strategies and goals with state evacuation plans. During this phase efforts to identify and resolve conflicting response actions between all stakeholders will be undertaken. Phase 2 will continue to utilize the Evacuation Advisory Council that helped coordinate and facilitate planning efforts in the first two phases of the evacuation planning project.

[3] Code Red is designed to enable local government officials to record, send and track personalized messages to thousands of citizens in minutes. http://www.ecnetwork.com/codered/

Mobility2040 Projects/Initiatives Analysis

Goals/Performance Measures Conformance

Staff developed the list of projects for consideration for the major infrastructure listing by analyzing projects and needs mentioned previously based on cost, effectiveness, readiness, regional significance and community support. The projects were then graded across each of the seven goal areas. If a project met the goal and related performance measures comprehensively it was given a scoring of "XX", if a project met the goal and related performance measures somewhat it was a given a scoring of "X" and finally if a project did not meet the goal or related performance measures it was not given a score.

The staff presented the scoring of the projects to the CMMPO Advisory Committee members and the committee placed the projects in "tiers" one, two and three. Tier one being the projects that met most of the goals comprehensively and tier three being projects that did not meet certain goal areas. The following table shows the list of projects along with the goal/performance measures grading and finally the tiering of the projects by the committee.

Potential Mobility2040 Major Infrastructure Projects				**Mobility2040:Goals**						
				(X- Meets Goal in Some Areas XX- Meets Goal Comprehensively)						
Tier	**Name**	**Municipality**	**Scope**	Reduce Congestion / Improve Mobility for all Modes	Improve the Safety & Security of the Region	Achieve State of Good Repair	Increase Transportation Options & Promote Healthy Modes	Reduce Greenhouse Gas & Promote Sustainable Practices	Equitable Transportation for all Population	Improve Economic Vitality & Freight Movement
Highway										
*	I-90 (MassPike)/I-495 Interchange	Westborough/Hopkinton	Major Interstate Interchange reconstruction follows removal of toll Barriers	X	XX	X		XX+	X	XX
*	I-495/Rte 9 Interchange	Westborough/Southborough	Major interstate interchange reconstruction on braided ramps with Route 9 improvements. 50 year old bridge structures.	XX	XX	X	XX	XX	X	XX
1	Kelly Square Bypass	Worcester	Utilizes conceptual Winter Street Extension to Madison Street alignment. Reduces overall traffic volumes in Kelly Square. Also reduces truck volumes.	XX	XX	X	XX	X	XX	X
1	I-290/Vernon St/Kelly Square Bridge Expansion	Worcester	Reconstruction & widening of Vernon Street (Route 122A) bridge over I-290 and related ramp work	XX	X	X	X	X	XX	XX
1	Rte 9/ Rte 20 Interchange	Northborough	MassDOT indicates need to replace 1930's bridge structure. Existing ramps replaced by conceptual diamond style geometry.	XX	XX	X		XX	X	xx
1	Rte 146/Rte 20/MassPike Interchange	Millbury	Observed congestion causes operational issues. Investigate improved signals and interchange roadways.	XX	XX	X	X	X	X	XX
2	Route 20	Worcester	Widening to four lane cross section between Massasoit Road and Sunderland Road. Reconstruct Route 20/Route 122 interchange and MBTA bridge over Route 20	X	XX	X	X	X	X	XX
2	Route 20	Charlton/Oxford	Modernization of Route 20 with median barrier and breakdown lanes. Route 20 /Route 56 intersection improvements. Replace bridge over French River and Little River.	X	XX	XX	X	X		X
3	Route 31 Corridor improvements	Holden/Paxton/Spencer	Range of highway improvements in three host communities. Includes bridges, roadway realignment and bike/ped accommodations	X	X	X	X	X	X	X
3	Rte 146/Boston Road Interchange	Sutton	Future year improvement over nearly complete modernized intersection with new ramp in northeast quadrant.	X	XX	X		XX		XX
2	Route 9	West Brookfield	2.1 mile segment of rural highway requires widening by 10' to address safety and accommodate Bicycles and Pedestrians.	X	X	X	X		X	X
3	Frontage Roads on Rte 146	Millbury/Sutton	Construction of frontage roadways from approx. West Main Street to Boston Road. Removes most curbs from Route 146	X	X			X		XX
Bike/Ped										
3	Boston Worcester Air-Line Trail	Shrewsbury/Westborough	Use of former trolley R-O-W for multi-use trail. Connects with Southborough + Framingham. Serves area of high population and employment.	X	X		XX	X	X	X
2	Multimodal Connection: Blackstone River Greenway to Mass-Central Rail Trail	Worcester/W. Boylston/Boylston	Regional connection between two major multimodal trails. Facilitates East Coast Greeway expansion.	X	X		XX	X	X	X
1	Blackstone River Greenway (Segments 3,4 and 5)	Uxbridge, Northbridge, Grafton, Sutton, Millbury	13 miles in length.	X	X		XX	XX	X	
2	Pedestrian Connection: Blackstone River Greenway to Mid-State Trail	Blackstone Valley	Regional pedestrian connection between two major trails. Expands recreational opportunities.	X	X		X	X		

Potential Mobility2040 Major Infrastructure Projects				**Mobility2040:Goals**						
				(X- Meets Goal in Some Areas XX- Meets Goal Comprehensively)						
Tier	**Name**	**Municipality**	**Scope**	Reduce Congestion / Improve Mobility for all Modes	Improve the Safety & Security of the Region	Achieve State of Good Repair	Increase Transportation Options & Promote Healthy Modes	Reduce Greenhouse Gas & Promote Sustainable Practices	Equitable Transportation for all Population	Improve Economic Vitality & Freight Movement
Transit										
1	New fixed route buses	Regionwide	Expansion of the WRTA fixed route fleet.	X	X	XX	XX	XX	XX	XX
1	New fixed route buses	Regionwide	Replacement of the WRTA fixed route fleet.		X	XX	XX	XX	XX	XX
2	Union Station Hub Upgrades/Expansion	Worcester	Future preventative maintenance/potential upgrades or expansion at the WRTA's Union Station Hub	XX		XX	XX	X	XX	X
2	Union Station upgrades	Worcester	Future preventative maintenance/potential upgrades or expansion at Worcester's Union Station	XX		XX	XX	X	XX	X
1	Transit "mini-hubs"	Regionwide	Construct transit "mini-hubs" to provide intermodal connectivity to fixed-route, paratransit, shuttle or rail service within the region	XX			XX	XX	XX	X
3	BRT or "BRT Light" on Main Street (South)	Worcester	Develop a "BRT Light" route on Main Street (South) in Wsorcester between the WRTA Hub through Webster Square	XX			XX	X	XX	X
3	ITS/Transit Signal Priority (TSP)	Regionwide	Install Transit Signal Priority (TSP) infrstructure to signalized intersections within the region	XX		XX		X		
3	M&O Facility Upgrades/Expansion; Possible second facility	Worcester	Future preventative maintenance/potential upgrades or expansion at the WRTA's Maintenance and Operations Facility on Quinsigamond Ave (Adjacent new Railroad track planned by P&W Railroad)			XX				
Rail										
1	Boston-Worcester-Springfield High-Speed Rail passenger service	International, interstate passenger rail connectivity	High Speed Rail Inland Route. Boston-Worcester-Springfield, north to Vermont, Montreal, Quebec.	X		XX	X	XX	XX	X
2	Passenger rail to south: Worcester-New London, CT	Interstate Connectivity	P&W track utilized for future passenger service connecting to Amtrak's North East Corridor Acela service	X		X	XX	X	XX	X
2	Western commuter rail extension Worcester-Springfield	Intercity Connectivity	MBTA Expansion to west with intermediary stations.	X		X	X	XX	XX	X
1	Worcester-Providence passenger service and railroad improvements.	Interstate Connectivity	Potential passenger rail provider envisions using P&W track to institute future service between Worcester and Providence throught the Blackstone Valley.	X		X	X	XX	XX	X
1	MBTA commuter rail station upgrades	Worcester, Grafton, Westborough		X	X	X	X	X	X	
2	CharlieCard Ticket Vending Machines (TVM)	Region					X		X	

Potential Mobility2040 Major Infrastructure Projects				**Mobility2040:Goals**						
				(X- Meets Goal in Some Areas XX- Meets Goal Comprehensively)						
Tier	**Name**	**Municipality**	**Scope**	Reduce Congestion / Improve Mobility for all Modes	Improve the Safety & Security of the Region	Achieve State of Good Repair	Increase Transportation Options & Promote Healthy Modes	Reduce Greenhouse Gas & Promote Sustainable Practices	Equitable Transportation for all Population	Improve Economic Vitality & Freight Movement
Freight										
1	Providence & Worcester Railroad	Worcester	Bridge over Southbridge Street	X	X	XX				X
1	Grafton & Upton Railroad	Hopedale	At-grade highway crossing improvements	X	XX	X				X
2	NB RR	East Brookfield, North Brookfield	Private revitalization effort.		XX	X				X
1	Providence & Worcester Railroad	Blackstone, Millbury, Millville, Sutton, Uxbridge	5 major bridges in the BRV			XX				XX
1	EB & S Railroad	East Brookfield, Spencer	Various expansion and IRAP track improvements for improved operations.		X	X		X		X
1	Providence & Worcester Railroad	Worcester	IRAP track improvements		X	X		X		X
2	MassCentral Railroad	Hardwick, Barre	Track maintenance and improvement (R-O-W largely owned by Commonwealth)			X				X

Major Infrastructure Projects and Initiatives

The Major Infrastructure project list for the Bicycle and Pedestrian, Commuter rail and Freight areas was compiled based on the tiering of projects by the CMMPO Advisory Committee. The major infrastructure projects that were identified as part of this plan for the above mentioned areas were all Tier 1 projects. This list was financially constrained since the initiatives will be undertaken through annual work program elements by staff in the upcoming years or the projects have private/state funding as the primary funding source.

Table V-8: List of Major Infrastructure Projects Included in Mobility2040

Bicycle and Pedestrian Projects/Initiatives

Recommended Implementation Schedule	Project	Project Scope	Project/Initiative
2015-2020	Boston Worcester Air-Line Trail	TIP or TAP funding ($500k)	Project
2015-2020	Blackstone Rive Greenway (Segments 3,4 and 5)	Staff will pursue an Initiative to collaborate with the lead agency to identify segments, establish costs for each segment and project scope	Initiative
2020-2025	Multimodal Connection: Blackstone River Greenway to Mass-Central Rail Trail	Staff will pursue an Initiative to collaborate with the lead agency to establish costs and project scope	Initiative
2020-2025	Pedestrian Connection: Blackstone River Greenway to Mid-State Trail	Staff will pursue an Initiative to collaborate with the lead agency to establish costs and project scope	Initiative

Commuter Rail Projects/Initiatives

Recommended Implementation Schedule	Project	Project Scope
2020-2025	Worcester-Providence passenger service and railroad improvements	Private Railroad operations and funding
2015-2040	MBTA commuter rail station upgrades	MBTA funding

Freight Rail Projects/Initiatives

Recommended Implementation Schedule	Project	Project Scope
2015-2020	Grafton & Upton Railroad	At-grade highway crossing improvements (Private funding)
2020-2025	Providence & Worcester Railroad	Bridge over Southbridge Street (Private funding)
2015-2040	EB & S Railroad	Various expansion and IRAP track improvements for improved operations (Private funding)
2015-2040	Providence & Worcester Railroad	IRAP track improvements (Private funding)

There were two transit projects that were identified as major infrastructure projects. These two projects were Tier one projects by the MPO Advisory Committee. The two projects were "new fixed route buses" and "transit mini-hubs". Based on input provided by WRTA on the feasibility and funding availability the two projects mentioned above were listed as transit major infrastructure projects that would be financially constrained.

Table V-9: List of Major Infrastructure Transit Projects Included in Mobility2040

Recommended Implementation Schedule	Project	Project Scope
2015-2020	Route 43 - New route connecting Webster, Dudley, Southbridge, and Sturbridge	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2015-2020	Route 32 - New route to connect Holden with Worcester.	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2020-2025	Route 17 - New route to connect Westborough Office Park, Solomon Pond Mall, and Northborough Crossing (Wegman's).	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2020-2025	Route 44 - Proposed new route to connect colleges: - Becker, WPI, Assumption, WSU, Clark, Holy Corss, Quinsigamond CC	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2015-2040	New fixed route buses	Replacement or expansion of the WRTA fixed route fleet.

The CMMPO agreed to the Major Infrastructure projects and initiatives recommendation for Bicycle and Pedestrian, Transit, Commuter Rail and Freight areas.

Highway Project Options

Staff presented three financially constrained highway project options to the CMMPO based on projects that were ranking in Tier 1 or 2, project costs, work completed so far, previous studies and staff input. Given the tight funding constraints and the magnitude of projects, staff had assumed that the I495/Masspike interchange modifications and I495/Rte 9 interchange projects will be funding through other state funding mechanisms. These two projects have studies completed and are not just regional high priorities but MassDOT priorities as well. Staff hopes that these projects will be listed under the statewide plan within the next few years. Hence the above mentioned projects were included in the all the options presented below.

Table V-10: List of Options for Major Infrastructure Highway Projects

Recommended Implementation Schedule	Option 1	Option 2	Option 3
2015-2020	Route 9 - West Brookfield **OR** No MI project	Route 9 - West Brookfield **OR** No MI project	Route 9 - West Brookfield **OR** No MI project
2021-2025	Route 9/20 Interchange - Northborough	Route 20 widening between Massasoit Rd and Sunderland Rd - Worcester	Route 20 modernization with Median barriers and Intersection improvements - Charlton/Oxford
2026-2030	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Route 9/20 Interchange - Northborough	Route 20 widening between Massasoit Rd and Sunderland Rd - Worcester
2031-2035	Route 146/20/MassPike Interchange - Millbury	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Route 9/20 Interchange - Northborough
2036-2040	Kelly Square Bypass - Worcester	Route 146/20/MassPike Interchange - Millbury	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester

Note: It is currently assumed that implementation of the following projects will be pursued using primarily State controlled funding sources

- ***I - 90 (MassPike)/I - 495 Interchange: Major reconstruction follows removal of tolls (Westborough/Hopinkton)***
- ***I - 495/Route 9 Interchange: Major reconstruction on braided ramps with Route 9 improvements (Westborough/Southborough)***

Under the Highway project options the CMMPO decided to expand the three options to five options for analysis. Option 1 and 2 would be analyzed with and without the Route 9 – West Brookfield project in the Years 2015-20120 and Option 3 would be analyzed without the West Brookfield project.

Staff performed various analyses using the travel demand model to analyze the congestion and vehicle miles travelled reductions, GreenHouse Gas impact analysis, Environmental Justice benefits and burdens analysis, Geographic Equity Analysis and Public Input on the presented options. Also the transit projects were included as part of the analysis to capture the maximum extent of the impact of each of the options in a multi-modal way.

The five options that were analyzed are shown below in Table V-11. Please note projects highlighted in grey are the same in all the options presented.

Table V-11: Major Infrastructure Project Options for Analysis

Recommended Implementation Schedule	Option 1	Option 1A	Option 2	Option 2A	Option 3
2015-2020	I495/Rte 9 Interchange Improvments	I495/Rte 9 Interchange Improvments	I495/Rte 9 Interchange Improvments	I495/Rte 9 Interchange Improvments	I495/Rte 9 Interchange Improvments
2021-2025	I495/Masspike Interchange Improvements	I495/Masspike Interchange Improvements	I495/Masspike Interchange Improvements	I495/Masspike Interchange Improvements	I495/Masspike Interchange Improvements
2015-2020	WRTA Route 43 - New route connecting Webster, Dudley, Southbridge and Sturbridge	WRTA Route 43 - New route connecting Webster, Dudley, Southbridge and Sturbridge	WRTA Route 43 - New route connecting Webster, Dudley, Southbridge and Sturbridge	WRTA Route 43 - New route connecting Webster, Dudley, Southbridge and Sturbridge	WRTA Route 43 - New route connecting Webster, Dudley, Southbridge and Sturbridge
2015-2020	WRTA Route 32 - New route to connect Holden with Worcester	WRTA Route 32 - New route to connect Holden with Worcester	WRTA Route 32 - New route to connect Holden with Worcester	WRTA Route 32 - New route to connect Holden with Worcester	WRTA Route 32 - New route to connect Holden with Worcester
2021 - 2025	WRTA Route 17 - New route to connect Westborough Office park, Solomon Pond Mall, and Northborough crossing	WRTA Route 17 - New route to connect Westborough Office park, Solomon Pond Mall, and Northborough crossing	WRTA Route 17 - New route to connect Westborough Office park, Solomon Pond Mall, and Northborough crossing	WRTA Route 17 - New route to connect Westborough Office park, Solomon Pond Mall, and Northborough crossing	WRTA Route 17 - New route to connect Westborough Office park, Solomon Pond Mall, and Northborough crossing
2021-2025	WRTA Route 44 - Proposed new routes to connect colleges - Becker, WPI, Assumption, WSU, Clark, Holy Cross, Quinsigamond CC	WRTA Route 44 - Proposed new routes to connect colleges - Becker, WPI, Assumption, WSU, Clark, Holy Cross, Quinsigamond CC	WRTA Route 44 - Proposed new routes to connect colleges - Becker, WPI, Assumption, WSU, Clark, Holy Cross, Quinsigamond CC	WRTA Route 44 - Proposed new routes to connect colleges - Becker, WPI, Assumption, WSU, Clark, Holy Cross, Quinsigamond CC	WRTA Route 44 - Proposed new routes to connect colleges - Becker, WPI, Assumption, WSU, Clark, Holy Cross, Quinsigamond CC
2015-2020	Route 9 - West Brookfield		Route 9 - West Brookfield		
2021-2025	Route 9/20 Interchange - Northborough	Route 9/20 Interchange - Northborough	Route 20 widening between Massasoit Rd and Sunderland Rd - Worcester	Route 20 widening between Massasoit Rd and Sunderland Rd - Worcester	Route 20 modernization with Median barriers and Intersection improvements - Charlton/Oxford
2026-2030	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Route 9/20 Interchange - Northborough	Route 9/20 Interchange - Northborough	Route 20 widening between Massasoit Rd and Sunderland Rd - Worcester
2031-2035	Route 146/20/MassPike Interchange - Millbury	Route 146/20/MassPike Interchange - Millbury	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Route 9/20 Interchange - Northborough
2036-2040	Kelly Square Bypass - Worcester	Kelly Square Bypass - Worcester	Route 146/20/MassPike Interchange - Millbury	Route 146/20/MassPike Interchange - Millbury	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester

Highway Project Analysis

Introduction

The Victoria Transport Policy Institute defines Equity as "the distribution of impacts (benefits, disadvantages and costs) and whether that distribution is considered fair and appropriate." Current regulations mandate different types of analysis in order to prevent foreseeable impacts to the population as a result of a transportation project. Equity principles permeate in transportation planning when the analyses include possible impacts to disadvantage populations and measures to avoid, minimize or mitigate such impacts. Mobility2040 incorporates equity in the Central Massachusetts long range transportation planning process by measuring different facets of equity according to federal provisions and planning emphasis areas for each of the options for major infrastructure projects.

CMMPO staff analyzed primarily the five highway options for major infrastructure projects. Other major infrastructure projects, as explained before, are considered initiatives at this point (bicycle and pedestrian projects), the CMMPO does not vote on particular projects (rail) or wouldbe funded with state funds (MBTA). In the case of transit projects, the findings from the Comprehensive Service Analysis (CSA) were used as supplemental information. The CSA analyzed transit travel demand based on accessibility to jobs, population density, priority development areas, zero-vehicle households, low-income population and minority areas (See the Technical Appendix for more details). As a result, only the five options for roadway major infrastructure projects were analyzed using multiple equity criteria, including geographic equity analysis, demographic analysis, benefits and burdens analysis, public input and possible impacts from greenhouse gases (GHG). A detailed discussion follows.

Geographic Equity

Geographic equity, in this case, refers to the equal distribution of projects among the six CMMPO subregions. The measure used for this analysis was the number or percentage of major infrastructure projects in each subregion. Option 1 and Option 2, both has one project in each subregion (6 of 6), whereas Option 1A and Option 2A only has projects in five of the six subregions. Option 3 has the least with projects in only four of the six subregions.

Environmental Justice and Other Vulnerable Population

Environmental Justice is the ***fair treatment*** and ***meaningful involvement*** of all people regardless of race, color, national origin, or income with respect to the development, implementation, and

enforcement of environmental laws, regulations, and policies (Executive Order I2898 – February 1994). The principles include the following: 1) to ensure the full and fair participation process; 2) to avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects; and 3) to prevent the denial of, reduction in, or significant delay in the receipt of benefits.

As such, the environmental justice populations include minority and low income populations. It is the CMMPO's role to identify environmental justice populations' needs and make the necessary efforts to engage them so that they are part of the decision-making process.

In October 2013, the CMMPO updated and approved the current Environmental Justice (EJ) definition to reflect regional characteristics and demographic changes. The CMMPO used data from the 2010 U.S. Census and the 2010 5-year American Community Survey (ACS) data. The CMMPO Environmental Justice definition reads as following:

A U.S. Census Block Group will be denominated as a "Neighborhood of Environmental Justice Concern" (NEJC) if complies with any of the following criteria:

Low income population – Block Groups (2010 ACS) where the median household income is less than or equal to 65% of the regional median (65% * $77,323 = $50,259).

Minority population – Block Groups where the percentage of minority population is greater than or equal to the regional proportion of minority population, 20.3%.

Likewise, the CMMPO identifies other vulnerable populations as a means to expand project outreach activities and identify possible mitigation efforts. Still, the CMMPO reassures its intention to be flexible adding more criteria if necessary, depending on projects' characteristics or local knowledge of a given location. The thresholds for other vulnerable population were set at 150% of region's average. This allows the identification of areas with thresholds above the average and to be inclusive, but discrete based in resources available. Other vulnerable populations include the following:

Zero Vehicle Household – Refers to the occupied housing units (owner or renter occupied) without a vehicle available. In the CMMPO region 8.5% of all occupied housing units don't have a vehicle available. A Census Block Group is considered an NEJC if the proportion is equal or greater than 12.75% (150% higher than the region's).

Linguistically Isolated Household – Is a household in which all members 14 years old and over speak a non-English language and also speak English less than ‘‘very well.’’ No one 14 years old or older speaks only English. In the CMMPO region, 6.3% of all households are linguistically isolated. A Census Block Group is considered an NEJC if the proportion is equal or greater than 9.45% (150% higher than the region’s).

Elderly Population – For the CMMPO, an elderly population refers to those households in the region that have one or more persons 75 years of age or older. In the region, 12.5% of all households have at least one person 75 years age or older. A Census Block Group is considered an NEJC if the proportion is equal or greater than 18.8% (150% higher than the region’s).

Hispanic or Latino population – Refers to people who reported Hispanic, Latino or Spaniard origin regardless of race. In the CMMPO region 9.36% reported some type of Hispanic origin. A Census Block Group is considered an NEJC if the proportion is equal or greater than 14.0% (150% higher than the region’s).

For Mobility2040, the CMMPO Environmental Justice definition was used to determine the possible impacts on the population for all the options for Major Infrastructure Projects. For this purpose, staff used Geographic Information Systems (GIS) to view and tabulate demographic information. The unit of geographic analysis used was Census Block Groups in conformity with the CMMPO definition of NEJC. These maps are a valuable visualization tool used to depict the proposed Major Infrastructure projects in relation to the region’s NEJC. Also, the maps include all mappable projects. Projects such as bridges or intersections were mapped as points, whereas other road-related projects were mapped as lines. A one-mile radii buffer was done for each the features. If the project’s buffer intersects a block group with either low-income population, minority population or other vulnerable populations, the project was considered to be located in a NEJC area for the purpose of this analysis. (See Figure V-3)

Table V-12 shows that all major infrastructure projects included in the five options impact a vulnerable population within a Neighborhood of Environmental Justice Concern (NEJC). With the exception of the US-20 improvement project in the towns of Charlton and Oxford, all projects are located within one mile from a minority or low income NEJC. In addition, the projects in Kelley Square, both the MA-122 bypass and the bridge expansion over I-290, show a very diverse environmental justice population composition within the one-mile buffer zone.

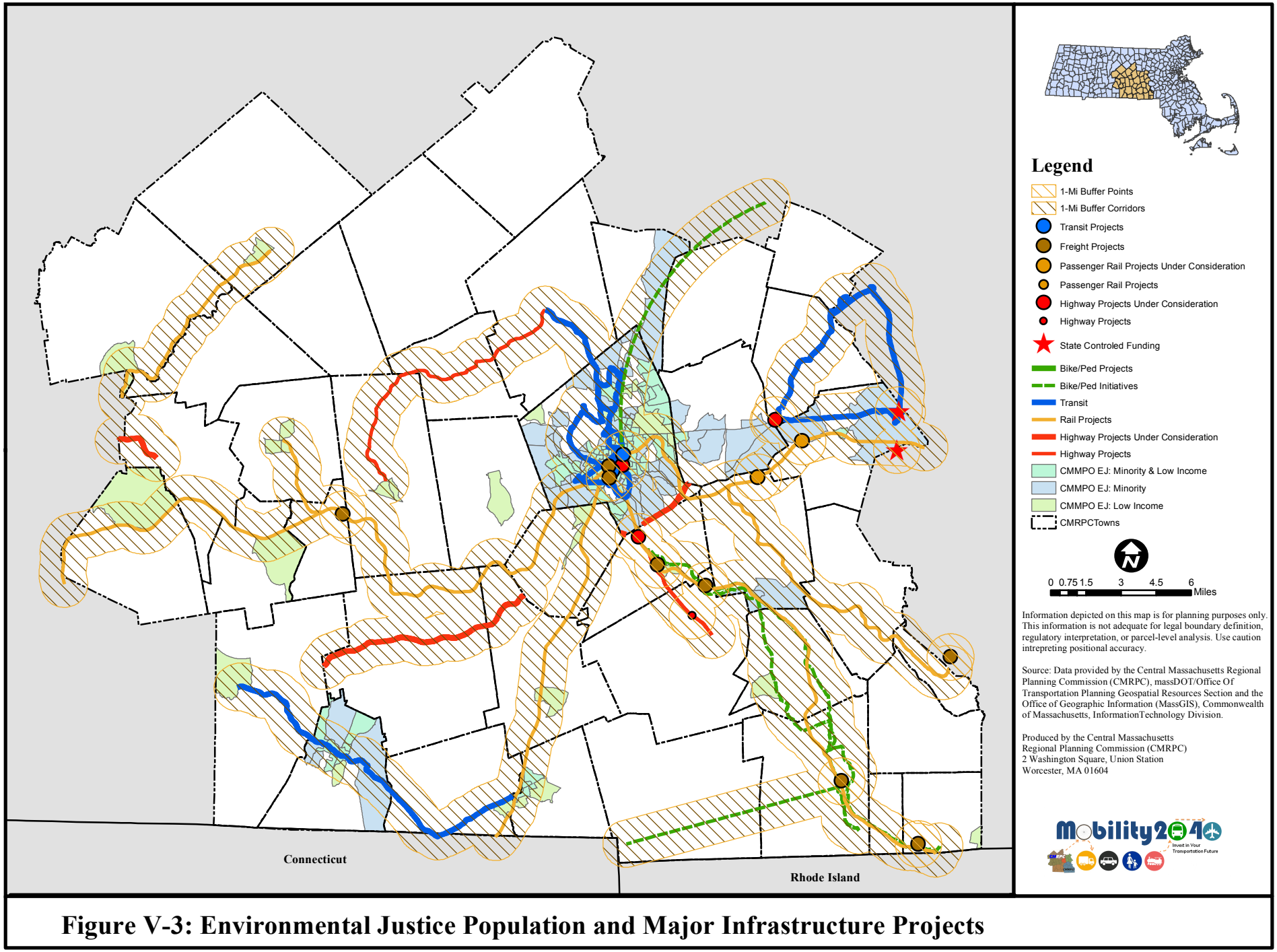


Figure V-3: Environmental Justice Population and Major Infrastructure Projects

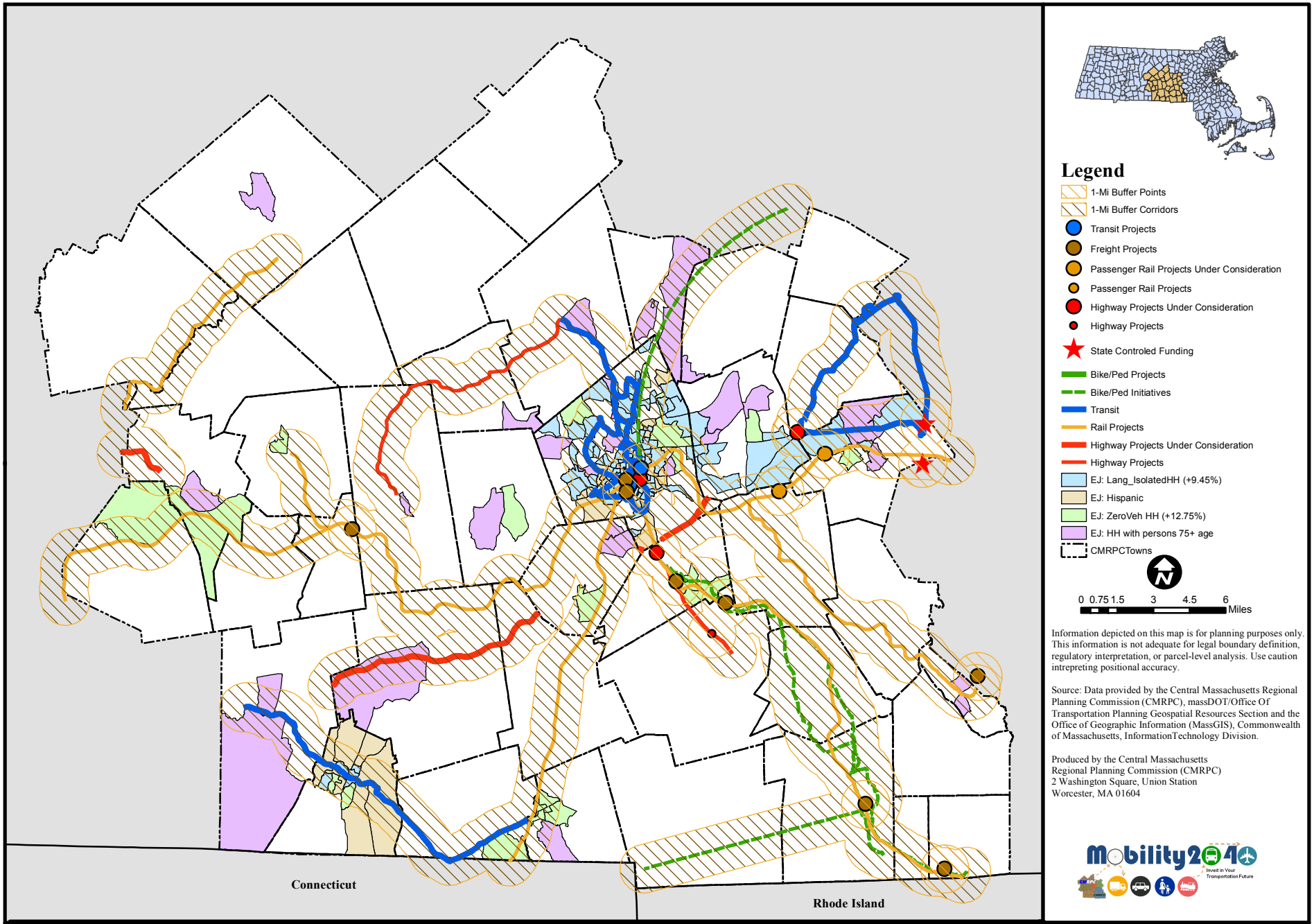


Figure V-4: Vulnerable Populations and Major Infrastructure Projects

This initial analysis make planners aware of the need to tailor outreach activities for each one of these major infrastructure projects according to the populations identified in this buffer zone. As projects move forward to the design phase, the analysis become more refined and will allow the identification and engagement of other vulnerable populations not initially identified.

Table V-12: Environmental Justice Criteria by Major Infrastructure Highway Project

	Kelley Square Bypass (MA-122)	& I-290 Interchange (Kelley Square and Vernon Street)	US-20 (Worcester)	I-90 / MA-146 / US-20 Interchange (Millbury)	MA-9 (West Brookfield)	US-20 / MA-9 Interchange (Northborough)	US-20 (Charlton/Oxford)
Minority Population	✓	✓	✓	✓		✓	
Low Income	✓	✓	✓		✓		
Zero Vehicle Household	✓	✓	✓	✓	✓		
Linguistically Isolated Household	✓	✓	✓			✓	
Households with people 75 years or older	✓	✓	✓				✓
Hispanic or Latino	✓	✓		✓			

It is important to note that these criteria does not determine the feasibility or desirability of a project more than other, it is only a method to know at early planning stages if a transportation project will likely impact environmental justice populations. This method makes transportation planners aware of the need to avoid such impacts, minimize or to mitigate any foreseeable impacts. Also, it is an initial tool that assists future outreach efforts. These efforts need to be refined as the planning process and future implementation develops. In addition, environmental effects of projects proposed for Federal funding must comply with the National Environmental Policy Act (NEPA) process. The NEPA review is a more detailed assessment on the potential human or natural environmental effects. The NEPA assessment includes human health, economic and social effects on minority and low-income populations.

Benefits and Burdens Analysis

A Benefits and Burdens Analysis is "an evaluation comparing impacts likely to be experienced by EJ populations against those likely to be experienced by non-EJ populations and the community as a whole in order to address any disproportionate benefits or burdens between EJ populations and the population at large." (FTA C 4703.1, August 15, 2012) It is important to note that there's no one-size-fits-all type of approach to determine benefits or disproportionate burdens from transportation projects; but it is important to recognize and base the analysis on local characteristics.

For Mobility2040, outputs from the Travel Demand Model were used to measure the change in vehicles mile traveled (VMT) in environmental justice areas (EJ areas) and non-environmental justice areas (non-EJ areas). For this purpose, the CMMPO considered two main scenarios, the No-Build Scenario against Current Conditions and the Build Scenario against Current Conditions. The Build Scenario included the five options already mentioned.

Scenario 1

Current Conditions (2010) versus No Build Scenario by 2040

The 2010 Base Scenario for the CMMPO region show a total of 19,171,695 vehicle miles traveled (VMT), of which 15,818,236 of total VMT are in non-EJ areas, whereas 5,472,875 will occur in EJ areas. The percent of increase of VMT by 2040 in the No-Build scenario was 11.1%. The percent of increase in non-EJ areas was 10.7%, and in EJ areas, 12.2%. See Table V-XX for more details.

Scenario 2

Current Conditions (2010) versus Build Major Infrastructure by 2040

By 2040, the VMT increases will be lower in each one of the five options when compared to the No-Build scenario. In average, the build options will account for 21,217,431 VMT, of which 15,770,182 will occur in non-EJ areas and 5,447,249 in EJ areas. The percent of increase of VMT by 2040 in the Build scenario (average of the five options) was 10.7%. The percent of increase in non-EJ areas was 10.3%, and in EJ areas, 11.7%.

Table V-13: VMT in EJ and non-EJ areas

	Non-EJ Areas		EJ Areas		Total	
	VMT	% increase by 2040	VMT	% increase by 2040	VMT	% increase by 2040
Base 2010	***14,295,512***		***4,876,183***		***19,171,695***	
No Build Scenario	***15,818,236***	***10.7%***	***5,472,875***	***12.2%***	***21,291,110***	***11.1%***
Average Build Options	***15,770,182***	***10.3%***	***5,447,249***	***11.7%***	***21,217,431***	***10.7%***
Option 1	15,779,418	10.4%	5,445,203	11.7%	21,224,621	10.7%
Option 1A	15,778,559	10.4%	5,445,685	11.7%	21,224,244	10.7%
Option 2	15,772,948	10.3%	5,450,723	11.8%	21,223,672	10.7%
Option 2A	15,772,467	10.3%	5,449,260	11.8%	21,221,728	10.7%
Option 3	15,747,518	10.2%	5,445,371	11.7%	21,192,889	10.5%

VMT data from the travel demand model was aggregated by options and by town. As a result, EJ areas in some towns will experiment a higher increase in VMT depending on the option. See Table V-14 for a summary by town.

In summary, by 2040 there will be an increase in VMT across the region. Overall, this increase in vehicle miles traveled will be higher in EJ areas, with specific variances by town. Nonetheless, if none of the options are built by 2040, the VMT will be even higher and the impact in EJ areas will be even higher than in any of the build options.

If ranked by the option with the lowest VMT in EJ areas, Option 1 ranked the highest, followed by Option 3. Option 2 ranked the lowest because it has the higher amount of VMT in EJ areas. See Table V-15 on the following page for more details.

Table V-14: VMT Percent of Increase by 2040 in EJ and non-EJ areas by Town

	Percent of increase in VMT in Non-EJ Areas						Percent of increase in VMT in EJ Areas					
	No build Scenario	Option 1	Option 1A	Option 2	Option 2A	Option 3	No build Scenario	Option 1	Option 1A	Option 2	Option 2A	Option 3
CMMPO Region	**10.7%**	**10.4%**	**10.4%**	**10.3%**	**10.3%**	**10.2%**	**12.2%**	**11.7%**	**11.7%**	**11.8%**	**11.8%**	**11.7%**
AUBURN	2.7%	2.3%	2.3%	2.3%	2.3%	2.3%	8.0%	6.7%	6.7%	6.9%	6.8%	7.1%
BARRE	-4.4%	-4.7%	-4.7%	-4.8%	-4.8%	-4.8%	-6.8%	-7.5%	-7.5%	-7.5%	-7.5%	-7.5%
BERLIN	4.5%	4.6%	4.7%	4.7%	4.8%	4.7%						
BLACKSTONE	15.9%	15.8%	15.8%	15.8%	15.8%	15.8%	22.4%	25.1%	25.1%	24.7%	25.1%	25.1%
BOYLSTON	9.9%	10.5%	10.3%	10.3%	10.4%	10.1%						
BROOKFIELD	6.4%	6.2%	6.2%	6.3%	6.2%	6.2%	9.2%	9.1%	9.1%	9.2%	9.2%	9.5%
CHARLTON	4.1%	3.5%	3.5%	3.5%	3.5%	3.6%						
DOUGLAS	15.3%	14.7%	14.7%	14.8%	14.7%	14.4%						
DUDLEY	3.3%	3.4%	3.4%	3.4%	3.4%	3.4%	8.4%	8.2%	8.2%	8.2%	8.2%	8.2%
EAST BROOKFIELD	4.7%	4.6%	4.5%	4.6%	4.6%	4.6%						
GRAFTON	14.0%	12.3%	12.3%	12.0%	12.0%	11.6%	43.6%	42.5%	42.5%	43.1%	43.0%	42.1%
HARDWICK	4.7%	3.7%	3.7%	3.7%	3.7%	3.8%	8.9%	7.9%	7.9%	7.8%	7.9%	8.1%
HOLDEN	-0.5%	-0.7%	-0.7%	-0.6%	-0.7%	-0.5%						
HOPEDALE	4.7%	4.9%	4.9%	4.6%	4.7%	4.8%						
LEICESTER	0.9%	0.6%	0.6%	0.6%	0.6%	0.6%	-0.7%	-1.0%	-1.0%	-1.0%	-1.1%	-1.0%
MENDON	9.1%	10.2%	10.2%	9.9%	10.0%	9.5%						
MILLBURY	11.7%	11.4%	11.4%	11.3%	11.3%	10.3%	39.9%	38.3%	38.3%	38.2%	38.1%	38.1%
MILLVILLE	13.1%	11.8%	11.8%	11.7%	11.7%	11.8%						
NEW BRAINTREE	0.1%	0.0%	0.1%	-0.1%	0.0%	0.2%						
NORTH BROOKFIELD	-0.2%	-0.2%	-0.1%	-0.2%	-0.1%	-0.1%	-2.1%	-2.1%	-2.1%	-2.1%	-2.1%	-2.1%
NORTHBOROUGH	15.1%	15.0%	15.1%	15.1%	15.0%	15.0%						
NORTHBRIDGE	24.2%	24.4%	24.3%	24.0%	23.9%	22.2%	24.1%	24.1%	24.1%	24.2%	24.1%	23.6%
OAKHAM	4.1%	3.9%	4.0%	3.8%	3.9%	4.0%						
OXFORD	4.4%	4.2%	4.2%	4.2%	4.2%	4.3%	7.0%	6.7%	6.7%	6.7%	6.7%	6.8%
PAXTON	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%						
PRINCETON	1.3%	1.1%	1.1%	1.1%	1.1%	1.1%						
RUTLAND	-1.2%	-1.2%	-1.2%	-1.2%	-1.2%	-1.2%						
SHREWSBURY	15.2%	15.0%	15.0%	15.1%	15.1%	15.2%	17.8%	18.0%	18.0%	18.3%	18.2%	18.5%
SOUTHBRIDGE	3.2%	3.1%	3.1%	3.1%	3.1%	3.4%	7.1%	6.8%	6.8%	6.8%	6.8%	6.8%
SPENCER	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	2.6%	2.4%	2.4%	2.4%	2.4%	2.4%
STURBRIDGE	5.3%	5.2%	5.2%	5.2%	5.2%	5.2%	5.6%	5.8%	5.8%	5.8%	5.8%	5.7%
SUTTON	37.9%	37.8%	37.8%	37.9%	37.8%	37.1%						
UPTON	42.8%	43.1%	43.1%	42.9%	43.0%	41.6%						
UXBRIDGE	29.7%	29.7%	29.7%	29.8%	29.6%	29.2%						
WARREN	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%	3.9%	3.9%	4.0%	3.9%	4.0%	4.1%
WEBSTER	11.4%	11.2%	11.2%	11.2%	11.2%	11.4%	10.4%	10.3%	10.3%	10.2%	10.2%	10.4%
WEST BOYLSTON	-0.6%	-1.0%	-0.9%	-0.8%	-0.9%	-0.8%	6.1%	5.7%	5.8%	6.1%	6.2%	5.8%
WEST BROOKFIELD	11.2%	11.0%	10.9%	11.1%	11.0%	11.0%						
WESTBOROUGH	34.8%	33.7%	33.6%	33.3%	33.4%	33.5%	29.0%	27.6%	27.6%	27.9%	27.9%	27.3%
WORCESTER	3.6%	3.3%	3.3%	3.5%	3.5%	3.4%	8.3%	7.8%	7.8%	7.8%	7.8%	7.7%

Table V-15: Ranking of Options based on Lower VMT in EJ areas

Rank	Options	Non-EJ Areas	EJ Areas	Total
1	Option 1	15,779,418	5,445,203	21,224,621
2	Option 3	15,747,518	5,445,371	21,192,889
3	Option 1A	15,778,559	5,445,685	21,224,244
4	Option 2A	15,772,467	5,449,260	21,221,728
5	Option 2	15,772,948	5,450,723	21,223,672

Greenhouse Gas (GHG) Savings

Throughout the development of Mobility2040, the CMMPO has tracked regional progress towards GHG emission reductions. As the regional travel demand model has yet to provide quantitative data for this purpose, the CMMPO staff has provided a qualitative assessment concerning the anticipated impacts of selected Major Infrastructure projects. All LRTP Major Infrastructure projects have been assessed as to whether those selected will have a maximum, moderate or minimal/insignificant impact on the potential reduction of GHG in the regional air shed.

The results of this multimodal analysis fed directly into the Major Infrastructure project options selected by the MPO within the financial constraints of anticipated future year funding. Further, a cumulative qualitative assessment has been provided at this time that shows that the projects selected by the MPO will have an overall "moderate" positive impact on reducing GHG within the planning region. Accordingly, throughout the development process of Mobility2040, the MPO has made efforts to minimize GHG emissions and impacts.

Further, when engaging the public throughout the development of the LRTP, the MPO staff highlighted GHG as a byproduct of the transportation system and made efforts to gain feedback on how to advance projects and strategies within the region on how to reduce GHGs. In particular, an annual "Environmental Consultation Session" was held in April 2015 for both "Mobility 2040" and the under development 2016-2019 TIP. The meeting agenda covered GHG topics that included the state's GWSA, the Clean Energy & Climate Plan, measurable GHG reduction potential, as well as associated adverse effects to public health. At the session, the planning staff stated that the projects in both the CMMPO LRTP and TIP were selected in full consideration of likely GHG impacts, among other performance-based project selection criteria. Based on the staff's qualitative analysis the overall benefit for each of the options was "moderate". The only project that would bring in huge amounts of GHG savings is the I-495/ Masspike Interchange project. Other projects have some moderate or minimal GHG savings.

Public Input

The intent of the Mobility 2040 Funding and Major Infrastructure survey was to garner public input for their preference of options regarding transportation funding scenarios and determine options for Major Infrastructure projects. The second question asked respondents to select one of

the Major Infrastructure roadway project options, in five-year bands, to be included in the plan. 45 of 77 respondents (59%) selected project Option 1, 14 of 77 respondents (18%) selected project Option 2, and 18 of 77 respondents (23%) selected project Option 3.

Travel Demand Modeling Analysis

The travel demand model was used to analyze all the five project options to understand the benefits of each of the options in terms of reduction in congestion and savings in vehicle miles travelled. The 2010 model was run to understand the current conditions. There was a model run for the year 2040 with no major infrastructure projects to understand the impact of landuse change. The 2040 No-Build scenario estimated a total of 38.3 miles of congested roadways and 21,291,110 vehicle miles travelled. Each of the project option was compared to the No-build scenario to calculate the net benefit of the option. Staff compared congestion locations for each of the options and again the only projects that had major congestion relief was the I495/Masspike and I495/Rte 9 project. The Table V-16 below shows the results of the model for the five options and the 2040 no-build.

Table V-16: Results from the Travel Demand Model Analysis by Option

Model Analysis	Option 1	Option 1A	Option 2	Option 2A	Option 3	2040 No Build
Miles of congested roadways	36.2	36.2	36.4	36.4	37.7	38.3
Reduction in miles of congested roadways (vs. No Build)	2.1	2.1	1.9	1.9	0.6	
Vehicle Miles Travelled	21,224,621	21,224,224	21,223,672	21,221,728	21,192,889	21,291,110
Reduction in Vehicle Miles Travelled (vs. No Build)	66,489	66,886	67,438	69,382	98,221	

Project Analysis Results

Table V-17 summarizes the results from all the analyses done and rank the options based the results previously discussed.

Table V-17: Ranking of Highway Projects Options

	Congestion Reduction	Reduction in Vehicle Miles Travelled	Benefits to EJ areas	Public Input	Geographic Equity	GHG savings	Preferred Option Ranking
Option 1 & 1A	**1**	3	**1**	**1**	**1**	2	**First**
Option 2 & 2A	2	2	3	3	**1**	2	**Third**
Option 3	3	**1**	2	2	2	2	**Second**

Based on the ranking tabulated above the CMMPO picked Option 1 as the preferred highway major infrastructure projects as part of this plan. The Major Infrastructure Highway Projects included in Mobility2040 are included in Table V-18.

Table V-18: Major Infrastructure Highway Projects

Recommended Implementation Schedule	Project	Project Scope
2015-2020	Route 9 - West Brookfield	2.1 mile segment of rural highway requires widening by 10' to address safety and accommodate Bicycles and Pedestrians.
2021-2025	Route 9/20 Interchange - Northborough	MassDOT indicates need to replace 1930's bridge structure. Existing ramps replaced by conceptual diamond style geometry.
2026-2030	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Reconstruction & widening of Vernon Street (Route 122A) bridge over I-290 and related ramp work
2031-2035	Route 146/20/MassPike Interchange - Millbury	Observed congestion causes operational issues. Investigate improved signals and interchange roadways.
2036-2040	Kelly Square Bypass - Worcester	Utilizes conceptual Winter Street Extension to Madison Street alignment. Reduces overall traffic volumes in Kelly Square. Also reduces truck volumes.

Note: It is currently assumed that implementation of the following projects will be pursued using primarily State controlled funding sources

- *I - 90 (MassPike)/I - 495 Interchange: Major reconstruction follows removal of tolls (Westborough/Hopinkton)*
- *I - 495/Route 9 Interchange: Major reconstruction on braided ramps with Route 9 improvements (Westborough/Southborough)*

Project Options Phase 2

The MPO voted on May 27, 2015 to include Option 1 in the draft Mobility2040 plan to release to public review on June 10, 2015. Before the June 10th meeting following were some of the concerns and comments expressed regarding the Major Infrastrcture Option 1 project listing:

- Significant concern expressed by MassDOT District 3 and the towns of Oxford & Charlton regarding the loss of project #602659-Route 20 Oxford/Charlton after having been listed in previous LRTPs. The project has just filed for ENF review and design is pre-25%, with associated costs.
- CMMPO staff suggested to MassDOT District 3 that if they could split the project into 2 phases and provide a project option that costs in the range of $18-19M each, staff would bring that option to the MPO meeting on June 10th as a project that would spend about 50% of the anticipated TIP funds for 2 years, leaving about $9M each of those 2 years for community generated TIP projects. That Major Infrastructure option would then be debated against the option voted on at the May 27th meeting.
- MassDOT OTP informed staff that all projects assuming statewide funding should be removed. Statewide projects will be assessed against Project Selection Advisory Council recommended process and criteria. This means that I495/I90 and I495/Rte 9 projects must be removed from the financially constrained project listing of the LRTP, and cannot be advanced at this time if federal funding or federal review is needed.

Additional Points of Consideration

1. The City of Worcester Commissioner of Public Works & Parks expressed to MassDOT District 3 that it's acceptable to remove the envisioned Kelly Square Bypass from this LRTP.
2. The Route 20 Charlton/Oxford project can be phased into two projects that would meet FHWA funding requirements. Phase 1 would reconstruct Route 20 from the Routes 12/20 project limit in Oxford up to and including the Route 20/56 intersection, a documented HSIP location. Phase 2 will be Route 20 reconstruction from Route 20/56 intersection west to Richardson's corner in Charlton.
3. MassDOT District 3 staff expressed opinion that the Route 9/20 Northborough project could receive bridge monies in the future and can be moved out of the financially-constrained portion of the LRTP. Since the LRTP cannot list projects constrained with statewide funding, and this is not guaranteed, one of the options includes Rte 9/20 Northborough, and a second option includes I-495/Rte 9 Interchange Improvements to allow continued design to progress.

Given the above, the following options were developed (with projects that were previously under consideration) for the MPO members to consider and make a final decision on Wednesday, June10th.

Option X

2016-2020 – Rte 9 West Brookfield
2021-2025 – Rte 20 Oxford (12/20 to Rte 20/56 intersection)
2026-2030 – Rte 9/Rte 20 Northborough
2031-2035 – I-290/Vernon/Kelly Square Bridge Expansion
2036-2040 – Rte 146/20/Masspike Interchange

Option Y

2016-2020 – Rte 9 West Brookfield
2021-2025 – Rte 20 Oxford (12/20 to Rte 20/56 intersection)
2026-2030 – Rte 20 Oxford/Charlton (West of Rte 20/56 to Richardson's corner)
2031-2035 – I-290/Vernon/Kelly Square Bridge Expansion
2036-2040 – Rte 146/20/Masspike Interchange

Option Z

2016-2020 – Rte 9 West Brookfield
2021-2025 – I495/Rte 9 Interchange Improvements **(2 TIP yrs)**
2026-2030 – Rte 20 Oxford (12/20 to Rte 20/56 intersection)
2031-2035 – I-290/Vernon/Kelly Square Bridge Expansion
2036-2040 – Rte 146/20/Masspike Interchange

The new options were modeled for VMT & congestion reduction, and for Environmental Justice Benefits & Burdens. The Travel Demand Model results for VMT & congestion reduction for the three new options along with Option 1 are in Table V-19 below.

Table V-19: Travel Demand Model Results for VMT & Congestion Reduction

Model Analysis	Option 1	Option X	Option Y	Option Z	No build
Miles of congested roadways	36.2	35.5	36.1	36.2	38.3
Reduction in miles of congested roadways	2.1	2.8	2.2	2.1	
VMT	21,224,621	20,953,503	21,431,758	21,277,594	21291110
Reduction in VMT	66,489	337,607	-140,648	13,516	

The EJ benefits and burdens analysis comparing the effect of VMT increase in EJ vs. Non-EJ areas are shown in Table V-20 on the following page.

Table V-20: EJ Benefits and Burdens Analysis Using VMT

	Non-EJ Areas		EJ Areas		Total	
	VMT	% increase by 2040	VMT	% increase by 2040	VMT	% increase by 2040
Base 2010	***14,295,512***		***4,876,183***		***19,171,695***	
No Build Scenario	***15,818,236***	***10.7%***	***5,472,875***	***12.2%***	***21,291,110***	***11.1%***
Option 1 (voted by the MPO)	***15,779,418***	***10.4%***	***5,445,203***	***11.7%***	***21,224,621***	***10.7%***
Average New Build Options	***15,772,948***	***10.3%***	***5,443,145***	***11.6%***	***21,216,093***	***10.7%***
Option X	15,772,948	10.3%	5,441,092	11.6%	21,214,040	10.7%
Option Y	15,772,948	10.3%	5,441,092	11.6%	21,214,040	10.7%
Option Z	15,772,948	10.3%	5,447,251	11.7%	21,220,199	10.7%

They were also assessed for greenhouse gas (GHG) reduction, geographic equity, and Highway Safety Improvement Program (HSIP) crash clusters. Based on these analysis following are the rankings of the options for each of the performance focus areas:

Table V-21: Performance Focus Area Rankings

Project Options	Focus Area Rankings							Perf. Mgmt Option Rank
	Reduction in Cong. Rdway (miles)	Reduction in VMT	EJ Benefits and Burdens	GHG Savings	Geographic Equity	Safety HSIP	Total	
MPO Voted Option 1 (May 27th) 2016-2020 – Rte 9 West Brookfield 2021-2025 – Rte 9/Rte 20 Northborough 2026-2030 – I-290/Vernon/Kelly Square Bridge Expansion 2031-2035 – Rte 146/20/Masspike Interchange 2036-2040 – Kelly Square Bypass – Worcester	2	2	1	1	2	1	9	Second
Option X 2016-2020 – Rte 9 West Brookfield 2021-2025 – Rte 20 Oxford (12/20 to Rte 20/56 intersection) 2026-2030 – Rte 9/Rte 20 Northborough 2031-2035 – I-290/Vernon/Kelly Square Bridge Expansion 2036-2040 – Rte 146/20/Masspike Interchange	1	1	1	1	1	1	6	First
Option Y 2016-2020 – Rte 9 West Brookfield 2021-2025 – Rte 20 Oxford (12/20 to Rte 20/56 intersection) 2026-2030 – Rte 20 Oxford/Charlton (West of Rte 20/56 to Richardson's corner) 2031-2035 – I-290/Vernon/Kelly Square Bridge Expansion 2036-2040 – Rte 146/20/Masspike Interchange	2	4	1	2	2	2	13	Third
Option Z 2016-2020 – Rte 9 West Brookfield 2021-2025 – I495/Rte 9 Interchange Improvements **(2 TIP yrs)** 2026-2030 – Rte 20 Oxford (12/20 to Rte 20/56 intersection) 2031-2035 – I-290/Vernon/Kelly Square Bridge Expansion 2036-2040 – Rte 146/20/Masspike Interchange	2	3	1	1	1	1	9	Second
1 = Best option for each focus area								

Highway Major Infrastructure Projects

The CMMPO took various criteria under consideration and selected Option Y with the inclusion of Route 9 improvements from the I-495/Route 9 Interchange to Route 9/Crystal Pond Road intersection. The criterion that were included in the discussion were:

- The Route 20 westbound to Route 9 westbound ramp at the Route 9/Route 20 interchange in Northborough will be advertised for construction in 2016. This project will solve major safety concerns. This ramp has the highest number of crashes at the interchange. As reported in the Road Safety Audit that was conducted at this interchange in December 2012, of 110 reported crashes within the interchange between October 1, 2011 and August 28, 2012, 65 (59%) occurred on the Route 20 ramp to Route 9 westbound. Also, the bridge over Route 20 has a fairly low bridge rating and is anticipated to rise on the MassDOT statewide bridge listing for replacement in the future. Since the scope and cost of the bridge would be significant, it would be the appropriate time to redesign and improve the entire interchange. As such, the Route 9/Route 20 interchange project was dropped from the Major Infrastructure project list at this time. The host communities impacted by the removal of the Route 9/Route 20 interchange from the Major Infrastructure list were in consensus with this approach.

- I-495/Route 9 interchange initial design had recommendations with regards to Route 9 improvement through the interchange area as well as the interchange configuration itself. The I-495 bridges over Route 9 will be the driver of future interchange improvements. The state will reconstruct the bridges and the interchange when the bridges move up on the MassDOT bridge list due to the poor rating. At the request of MassDOT, the project scope for the Mobility2040 Major Infrastructure was changed from I-495/Route 9 interchange improvements to Route 9 improvements at the interchange. The cost of the project was also reduced from $37M to $9M. The scope of the Route 9 improvements include enhancing safety and capacity between the Route 9/Research Drive/Computer Drive Interchange with I-495 to the Route 9/Crystal Pond Road intersection in Southborough (MAPC region). Given the reduction in the scope and cost of the I-495/Route 9 project, it was moved by the CMMPO into the 2021-2025 Major Infrastructure band.

- In addition, the host community and stakeholder input received regarding the safety concerns along Route 20 in Charlton and Oxford was strongly considered as a factor to also include improvements to Route 20 west of the Route 20/Route 56 intersection to

Richardson Corners in Charlton as one of the Major Infrastructure project in Mobility2040.

The list of the financially constrained Major Infrastructure highway projects in the Mobility2040 are included in the following Table V-22:

Table V-22 Major Infrastructure Highway Projects

Recommended Implementation Schedule	Project Name	Project Scope
2016-2020	Route 9 - West Brookfield	2.1 mile segment of rural highway requires widening by 10' to address safety and accommodate bicycles and pedestrians
2021-2025	Rte 9 Improvements from Rte 9/I-495 interchange to Rte 9/Crystal Pond Road intersection	Enhance safety and capacity improvements along Rte 9
	Rte 20 Oxford (Rte 20/12 to Rte 20/56 intersection)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford
2026-2030	Rte 20 Oxford/Charlton (West of Rte 20/56 to Richardson's corner)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford
2031-2035	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Reconstruction & widening of Vernon Street (Route 122A) bridge over I-290 and related ramp work
2036-2040	Route 146/20/MassPike Interchange - Millbury	Observed congestion causes operational issues. Investigate improved signals and interchange roadways.

Multi-Modal Major Infrastructure Projects and Initiatives

As described in the above sections various transportation needs and gaps were prioritized and scenarios were analyzed and ranked to finalize a multi-modal list of infrastructure projects. The final list of projects and intiatives that are listed in Table V-23 below help make progress to attain the goals and the objectives that are set as part of the Mobility2040 plan.

Table V-23 Multi-Modal Major Infrastructure Projects and Initiatives

Bicycle and Pedestrian Projects/Initiatives

Recommended Implementation Schedule	Project	Project Scope	Project/Initiative
2015-2020	Boston Worcester Air-Line Trail	TIP or TAP funding ($500k)	Project
2015-2020	Blackstone Rive Greenway (Segments 3,4 and 5)	Staff will pursue an Initiative to collaborate with the lead agency to identify segments, establish costs for each segment and project scope	Initiative
2020-2025	Multimodal Connection: Blackstone River Greenway to Mass-Central Rail Trail	Staff will pursue an Initiative to collaborate with the lead agency to establish costs and project scope	Initiative
2020-2025	Pedestrian Connection: Blackstone River Greenway to Mid-State Trail	Staff will pursue an Initiative to collaborate with the lead agency to establish costs and project scope	Initiative

Transit Projects/Initiatives

Recommended Implementation Schedule	Project	Project Scope
2015-2020	Route 43 - New route connecting Webster, Dudley, Southbridge, and Sturbridge	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2015-2020	Route 32 - New route to connect Holden with Worcester.	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2020-2025	Route 17 - New route to connect Westborough Office Park, Solomon Pond Mall, and Northborough Crossing (Wegman's).	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2020-2025	Route 44 - Proposed new route to connect colleges: - Becker, WPI, Assumption, WSU, Clark, Holy Corss, Quinsigamond CC	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA
2015-2040	New fixed route buses	Replacement or expansion of the WRTA fixed route fleet.

Commuter Rail Projects/Initiatives

Recommended Implementation Schedule	Project	Project Scope
2020-2025	Worcester-Providence passenger service and railroad improvements	Private Railroad operations and funding
2015-2040	MBTA commuter rail station upgrades	MBTA funding

Freight Rail Projects/Initiatives

Recommended Implementation Schedule	Project	Project Scope
2015-2020	Grafton & Upton Railroad	At-grade highway crossing improvements (Private funding)
2020-2025	Providence & Worcester Railroad	Bridge over Southbridge Street (Private funding)
2015-2040	EB & S Railroad	Various expansion and IRAP track improvements for improved operations (Private funding)
2015-2040	Providence & Worcester Railroad	IRAP track improvements (Private funding)

Highway Projects/Initiatives

Recommended Implementation Schedule	Project Name	Project Scope
2016-2020	Route 9 - West Brookfield	2.1 mile segment of rural highway requires widening by 10' to address safety and accommodate bicycles and pedestrians
2021-2025	Rte 9 Improvements from Rte 9/I-495 interchange to Rte 9/Crystal Pond Road intersection	Enhance safety and capacity improvements along Rte 9
	Rte 20 Oxford (Rte 20/12 to Rte 20/56 intersection)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford
2026-2030	Rte 20 Oxford/Charlton (West of Rte 20/56 to Richardson's corner)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford
2031-2035	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Reconstruction & widening of Vernon Street (Route 122A) bridge over I-290 and related ramp work
2036-2040	Route 146/20/MassPike Interchange - Millbury	Observed congestion causes operational issues. Investigate improved signals and interchange roadways.

CHAPTER VI

Financial Plan

Constrained Recommendations & Future Initiatives

Introduction

Federal MAP-21 regulations require that the long-range regional transportation plan be a financially-constrained document. To ensure financial constraint, it is necessary to estimate the costs of all projects recommended in Mobility2040 and to assess the amount of funds that are expected to be available over the course of the planning horizon (2016-2040). Ultimately, the costs of the proposed projects should not exceed that of the expected funding. Because there is not enough expected revenue to meet all the need, not all the projects identified in the needs analysis can be included in the Financial Plan.

Throughout the past year, the CMMPO has embarked on a process to define and assess projects and initiatives for future programming based on:

- Review of all available data, including management systems data
- Sought and received extensive public input on needs and priorities for funding
- Developed policies, projects, and initiatives for possible consideration

In order to prioritize projects for funding, projects and initiatives then went through a two-step process. In the first step, projects and initiatives were prioritized into three tiers based on how well they address measures within the CMMPO performance management goals of:

- Reduce congestion & improve mobility for all modes
- Improve the safety & security of the region
- Achieve a state of good repair
- Increase transportation options & promote healthy modes
- Reduce greenhouse gas & promote sustainable practices
- Equitable transportation for all populations
- Improve economic vitality & freight movement

In the second step, the projects, primarily drawn from Tier 1, were combined into five scenarios which placed the projects into financially-constrained five-year bands for implementation through 2040. These scenarios were then analyzed in the Travel Demand model, and assessed for:

- congestion reduction and savings in vehicle miles travelled
- greenhouse gas effects
- geographic equity
- environmental justice benefits and burdens

- consistency with prior public input

Based on this analysis, the CMMPO chose the mix of projects and the initiatives presented in this chapter.

Management & Operations Considerations

Given the limited funding, competing priorities, and the comprehensive list of unmet needs, it is crucial to maintain and operate the current system at optimal efficiency. Also various management and operation methodologies such as ITS, Transportation Demand Management strategies, Park and Ride lots, Transit Signal Priority, and Corridor Management strategies such as signal coordination will help the region reach its goals of improving mobility, reducing greenhouse gases, improving sustainability and promoting economic development. Given these considerations, in addition to a short list of major infrastructure projects, the CMMPO was presented with two funding options to spend the regional target funding among diverse transportation programs and modes.

The Regional discretionary funding is essentially the expected TIP funding for the region over the next 25 years. This category is used to program Major Infrastructure project/s for each of the five year bands and the annual TIP program. Moving forward the CMMPO will prioritize those TIP projects that address a number of major goal areas and help the region achieve performance measures and targets. The MPO realizes the need to maintain our current infrastructure and this will be accomplished by some of the TIP projects and more importantly by state and local funding that is available to operate and maintain much of the road network in the region.

Funding Options

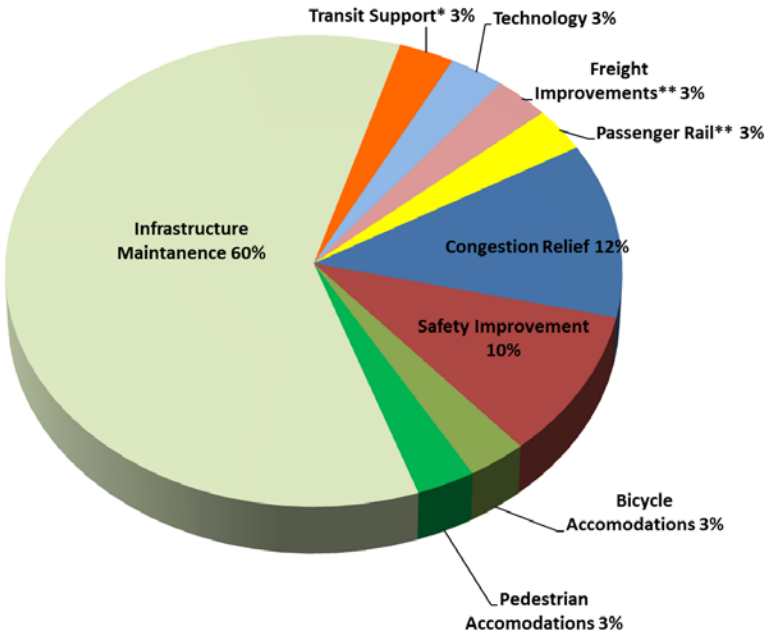
Option 1 showed a funding scenario that maintained current roadway and bridge infrastructure in the "fair" category with 60% of the total regional transportation spending allocation. High funding allocations were also included for improved safety and congestion reduction projects, as well as separate funding categories created for bicycle and pedestrian infrastructure improvements. The remaining categories in Option 1 (transit support, technology, freight and passenger rail) were funded at an allocation of 3% each.

Option 2 showed a funding scenario that still maintains current roadway and bridge infrastructure in the "fair" category but also maintains the Overall Condition Index (OCI) at the current level, requiring a funding allocation increase from 60% to 70%. This necessitated

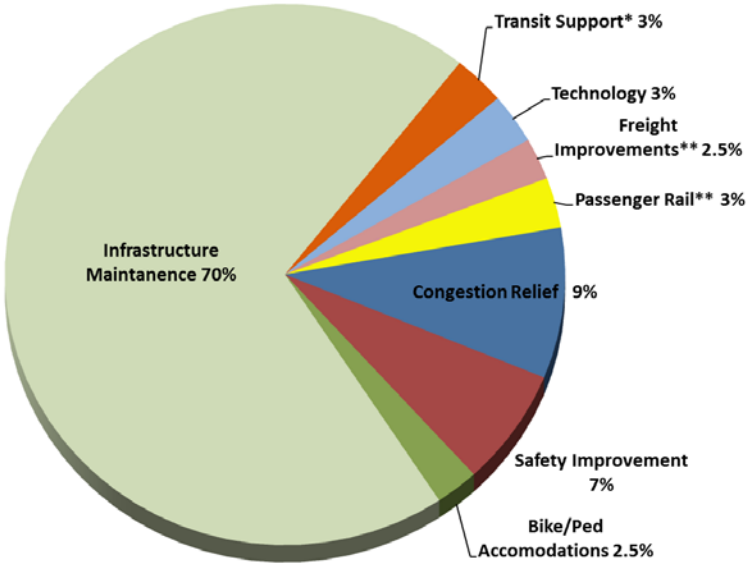
decreasing congestion reduction and safety funding allocations to the mandated minimums of 7 and 9 percent respectively, and also reducing funding allocations for the bicycle, pedestrian and Freight categories. The remaining transit support, technology and passenger rail maintained the 3% funding allocation amounts.

Figure VI-1: Funding Options

OPTION 1



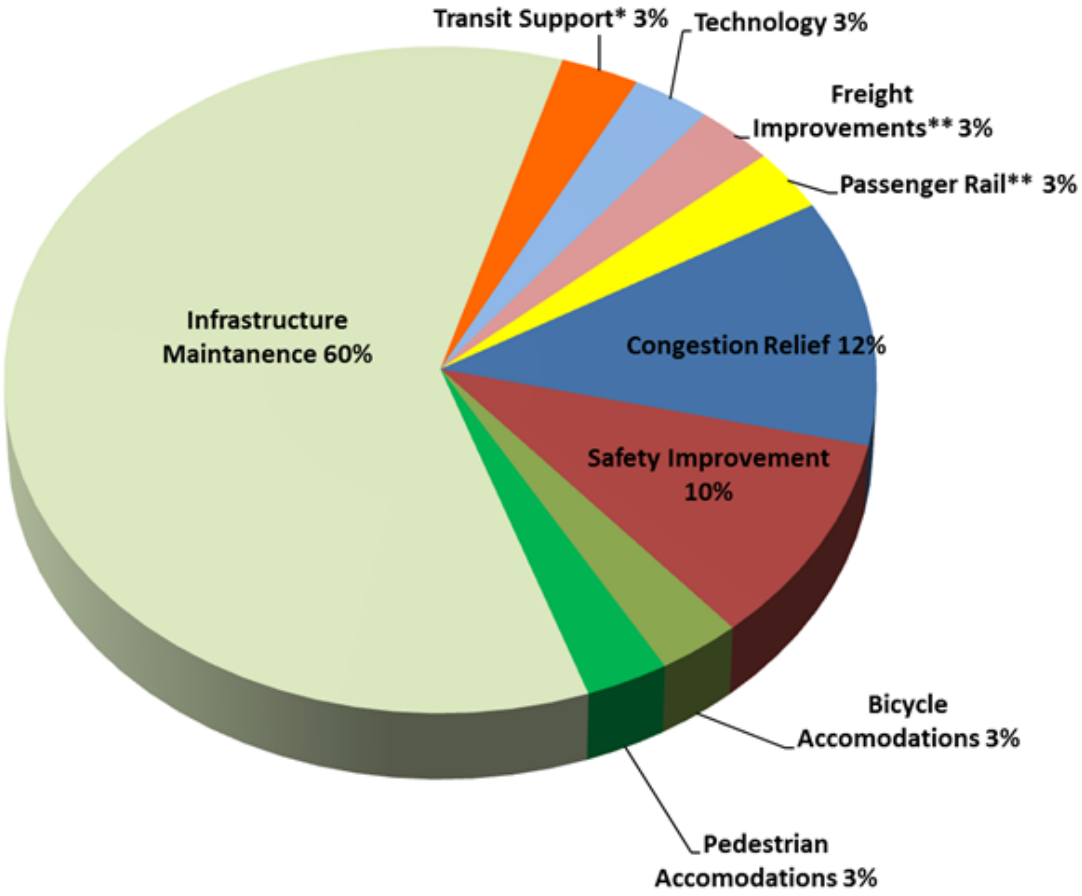
OPTION2



Upon review of the two options, and with consideration of public input received (Option 1 – 79% and Option 2- 21%), the CMMPO chose Option 1 as the preferred funding scenario.

In summary, the MPO expects to distribute the regional target funding through the Transportation Improvement Program amongst the following programs:

- Infrastructure Maintenance – 60%
- Congestion Relief – 12%
- Safety Improvement – 10%
- Bicycle Accommodations – 3%
- Pedestrian Accommodations – 3%
- Passenger Rail Enhancements** – 3%
- Freight Improvements** – 3%
- Transit Support* – 3%



* - i.e., (ParknRide, TSP/Signal Coordination, Corridor Improvement, TMA support)

** - Initiatives/Studies, last mile connections etc.

Policies

While the CMMPO did not adopt any new policies during the development of Mobility2040, their adoption of Option 1 allocation of funding from regional targets and their choices of major initiatives and infrastructure projects re-affirms the commitment to:

- provide for an increasingly balanced multi-modal transportation system that will improve the mobility for users of all modes;
- provide adequate funding to maintain the current system;
- increase healthy options that reduce congestion and greenhouse gas, and are more sustainable;
- improve system safety and security; and
- continue to promote economic vitality & freight movement.

Major Infrastructure Projects and Initiatives

Highway-Funded Projects & Initiatives

Projected Revenue

The major source of funding for highway-related projects in apportionments provided through the Federal Highway Administration (FHWA). These funds typically provide 80% of project funds, with the remaining 20% coming from a state match. Federal funds are usually derived from gasoline tax revenues, and state funds from the Transportation Bond Bill which is paid through either gasoline tax revenues or general tax funds.

MAP-21 provided federal transportation funding from 2012-2014 and now, through Continuing Resolutions to July 31, 2015. To estimate federal funding beyond 2015, the MassDOT-Office of Transportation Planning (OTP) developed programming assumptions based on guidance from FHWA, and provided these estimates to each MPO region in Massachusetts.

Table VI-1

FFY 2016-2040 Estimated Regional Transportation Plan Highway Funding Available

	2016-2020 (Programmed in TIP till 2019)	2021-2025	2026-2030	2031-2035	2036-2040	Total
Total Highway Revenue Available for Programming	**$302,231,831**	**$301,390,973**	**$366,263,046**	**$409,458,880**	**$438,246,120**	**$1,817,590,850**
Bridges	$105,739,644	$102,407,572	$127,968,921	$144,902,565	$156,101,216	$637,119,918
National Highway System	$21,798,880	$21,111,953	$26,381,582	$29,872,558	$32,181,229	$131,346,202
Interstate Maintenance	$38,527,505	$36,464,440	$45,566,114	$51,595,706	$55,583,228	$227,736,993
Non Federal Aid Preservation (bridges and roadways)	$43,450,500	$44,102,258	$44,754,015	$45,405,773	$46,057,530	$223,770,076
Statewide Infrastructure	$3,391,937	$3,285,050	$4,105,012	$4,648,212	$5,007,445	$20,437,656
Regional Discretionary Funding (O&M and Major Infrastructure)**	**$89,323,365**	**$94,019,700**	**$117,487,402**	**$133,034,066**	**$143,315,472**	**$577,180,005**

** - Expected Transporation Improvement Program Funding

Projected Expenses

Initiatives

There are several projects that still require more definition before moving forward, which have been termed Initiatives. The remaining segments of the Blackstone River Greenway, the Multimodal connection between the Blackstone River Greenway to the Mass-Central Rail Trail, and the Pedestrian Connection between Blackstone River Greenway to the Mid-State Trail are all initiatives to be undertaken that would seek to identify the project lead agency and define the project scope. The goal of each initiative would be to define the project enough to be programmed in future LRTPs, or otherwise lead to the implementation of the projects in future years.

Table VI-2: Bicycle and Pedestrian Initiatives

Study Cost will be included in the Unified Planning Work Program

Recommended Implementation Schedule	Project	Project Scope
2015-2020	Blackstone River Greenway (Segments 3,4 and 5)	To collaborate with the lead agency to identify segments, establish costs for each segment and project scope
2020-2025	Multimodal Connection: Blackstone River Greenway to Mass-Central Rail Trail	To collaborate with the lead agency to establish costs and project scope
2020-2025	Pedestrian Connection: Blackstone River Greenway to Mid-State Trail	To collaborate with the lead agency to establish costs and project scope

Projects

The CMMPO deliberated extensively on what major highway-related projects to recommend in the Mobility2040 Plan, given the need to remain within the constraints of estimated funding available, and given that revenues are only expected to grow at 1.5% and costs are projected to grow at 4%. This task was made more difficult for projects in the later years of the plan because it was often necessary to estimate costs on projects that are in the early concept stages. The process of estimating costs began with the Stakeholder Consultation interviews conducted as part of the RTP early public outreach. As the process continued, CMMPO staff discussed the scope and estimated costs of potential major infrastructure projects with MassDOT District #3. This coordination continued to take place throughout the development of the RTP with input from MassDOT-OTP staff. All estimated costs were inflated at 4% per year after the year 2016. The following Table VI-3 represent the CMMPO recommendations. Refer to Figure VI-2 for the location of all major infrastructure projects recommended in the plan.

The one bicycle and pedestrian project to receive funding is the Boston-Worcester Airline Trail in Shrewsbury and Westborough. This project is anticipated to receive TIP or Transportation Alternatives Program (TAP) funds. All freight projects programmed are anticipated to use private funding.

Table VI-3: Major Infrastructure Projects

Highway Projects

Recommended Implementation Schedule	Project Name	Project Scope	Project Cost (in Millions)
2016-2020	Route 9 - West Brookfield	2.1 mile segment of rural highway requires widening by 10' to address safety and accommodate bicycles and pedestrians	$12.17
2021-2025	Rte 9 Improvements from Rte 9/I-495 interchange to Rte 9/Crystal Pond Road intersection	Enhance safety and capacity improvements along Rte 9	$11.40
	Rte 20 Oxford (Rte 20/12 to Rte 20/56 intersection)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford	$23.00
2026-2030	Rte 20 Oxford/Charlton (West of Rte 20/56 to Richardson's corner)	Rte 20 modernization with median barrier and intersection improvements Charlton/Oxford	$34.00
2031-2035	I-290/Vernon St/Kelly Square Bridge Expansion - Worcester	Reconstruction & widening of Vernon Street (Route 122A) bridge over I-290 and related ramp work	$23.84
2036-2040	Route 146/20/MassPike Interchange - Millbury	Observed congestion causes operational issues. Investigate improved signals and interchange roadways.	$29.00

Bicycle and Pedestrian Projects

Recommended Implementation Schedule	Project	Project Cost (in Millions)	Project Scope
2015-2020	Boston Worcester Air-Line Trail	$0.50	TIP or TAP funding

Freight Rail Projects

Recommended Implementation Schedule	Project	Project Scope	Project Cost (in Millions)	Comment
2015-2020	Grafton & Upton Railroad	At-grade highway crossing improvements	$0.50	Grafton & Upton Railroad funding
2020-2025	Providence & Worcester Railroad	Bridge over Southbridge Street	$2.00	Providence &Worcester Railroad funding
2015-2040	East Brookfield & Spencer Railroad	Various expansion and IRAP track improvements for improved operations	$0.50	East Brookfield & Spencer Railroad funding
2015-2040	Providence & Worcester Railroad	IRAP track improvements	$0.50	Providence &Worcester Railroad funding

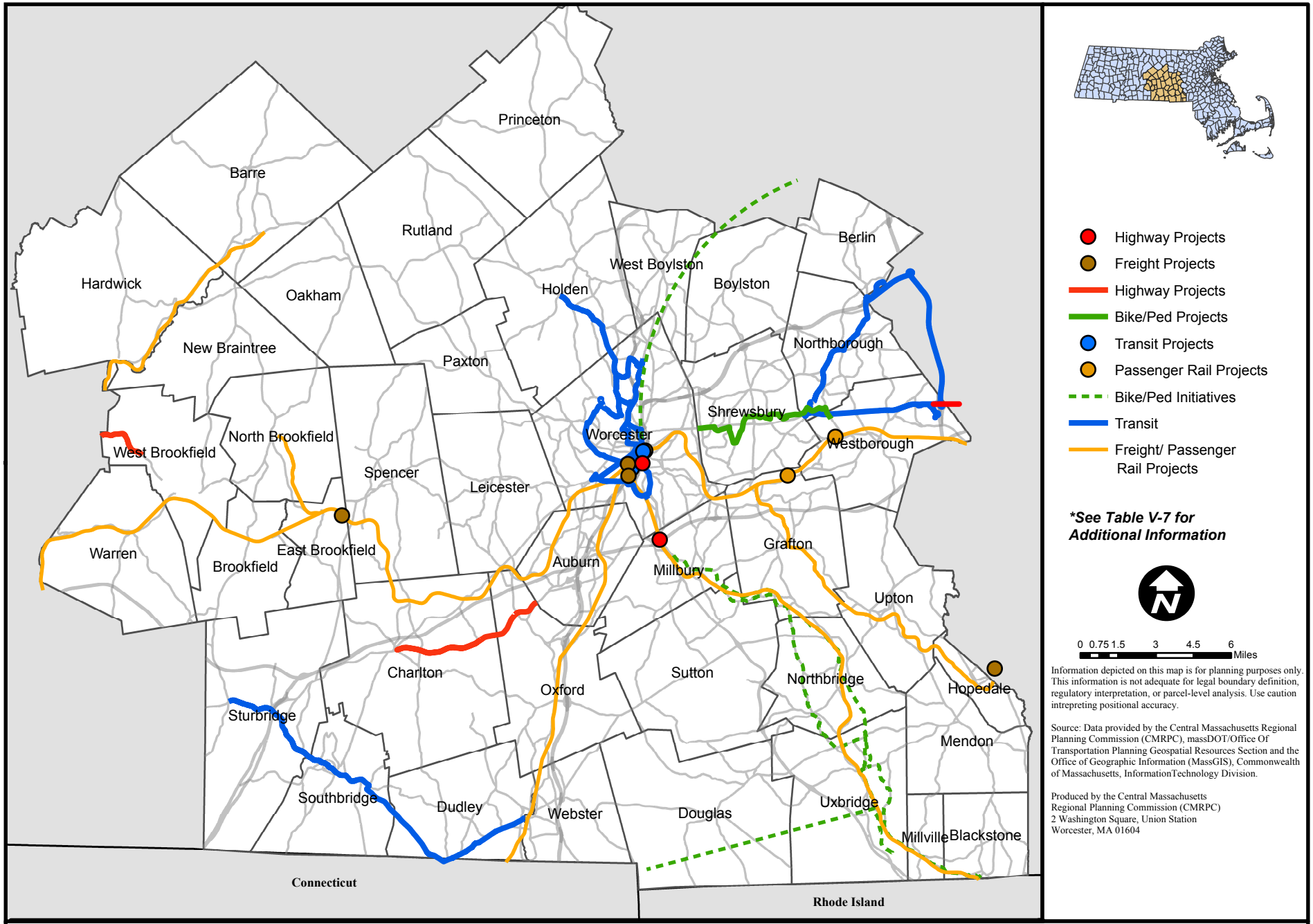


Figure VI-II Major Infrastructure

Major Infrastructure and Operations & Maintenance Expenditure

The Table VI-4 illustrates the allocation of the Regional discretionary funding for the Major Infrastructure and Operations and Maintenance categories.

Table VI-4: Major Infrastructure and Operations & Maintenance Expenditure

Project/Category	2016-2020 Costs (Anticipated 16-19 TIP years	Expected Cost 2021-2025	Expected Cost 2026-2030	Expected Cost 2031-2035	Expected Cost 2036-2040
Major Infrastructure					
Route 9 - West Brookfield	$12,170,000				
Rte 9 Improvements from Rte 9/I-495 interchange to Rte 9/Crystal Pond Road intersection		$11,400,000			
Rte 20 Oxford (Rte 20/12 to Rte 20/56 intersection)		$23,000,000			
Rte 20 Oxford/Charlton (West of Rte 20/56 to Richardson's corner)			$34,000,000		
I-290/Vernon St/Kelly Square Bridge Expansion - Worcester				$23,840,000	
Route 146/20/MassPike Interchange - Millbury					$29,000,000
Total Major Infrastucture Cost	$12,170,000	$34,400,000	$34,000,000	$23,840,000	$29,000,000
Expected Available Funding from Table VI-1	$89,323,365	$94,019,700	$117,487,402	$133,034,066	$143,315,472
Available Funding for Operations and Maintenance (O&M)	$77,153,365	$59,619,700	$83,487,402	$109,194,066	$114,315,472
Operations & Maintenance (O&M)					
Infrastructure Maintenance (60%)	$46,292,019	$35,771,820	$50,092,441	$65,516,440	$68,589,283
Congestion (12%)	$9,258,404	$7,154,364	$10,018,488	$13,103,288	$13,717,857
Safety (10%)	$7,715,337	$5,961,970	$8,348,740	$10,919,407	$11,431,547
Bicycle Accomodations (3%)	$2,314,601	$1,788,591	$2,504,622	$3,275,822	$3,429,464
Pedestrian Accomodations (3%)	$2,314,601	$1,788,591	$2,504,622	$3,275,822	$3,429,464
Technology (3%)	$2,314,601	$1,788,591	$2,504,622	$3,275,822	$3,429,464
Transit Support (3%)	$2,314,601	$1,788,591	$2,504,622	$3,275,822	$3,429,464
Passenger Rail Improvements (3%)	$2,314,601	$1,788,591	$2,504,622	$3,275,822	$3,429,464
Freight Improvements (3%)	$2,314,601	$1,788,591	$2,504,622	$3,275,822	$3,429,464
Total Operations and Maintenance (O&M) Cost	$77,153,365	$59,619,700	$83,487,402	$109,194,066	$114,315,472
Total Expenditure Major Infrastructure + Operations & Maintenance	**$89,323,365**	**$94,019,700**	**$117,487,402**	**$133,034,066**	**$143,315,472**
Expected Available Funding from Table VI-1	**$89,323,365**	**$94,019,700**	**$117,487,402**	**$133,034,066**	**$143,315,472**

Transit-Funded Projects & Initiatives

Projected Revenue

Estimates of available federal and state transit revenue were provided by the MassDOT-Office of Transportation Planning and the Rail & Transit Division. Typically, federal funds are used for capital expenses, although some funds are available for preventive maintenance and programs for rural areas, low-income commuters, and services for elders and people with disabilities. Capital funds are provided at 80% levels and operating funds are provided at 50% levels. Massachusetts provides approximately 55% of the net cost of operating regional transit authority services, with the federal government contributing 25% and member communities contributing the remaining 20%. A summary of projected revenue is presented in Table VI-5 below.

Table VI-5: FFY 2016-2040 Estimated Regional Transportation Plan Transit Funding

	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Total
Total Transit Revenue Available for Programming	**$190,679,799**	**$206,663,268**	**$224,045,865**	**$242,957,253**	**$263,539,947**	**$1,127,886,132**
Urbanized Area Formula (5307)	$49,090,907	$52,884,849	$56,972,002	$61,375,026	$66,118,334	$286,441,118
State of Good Repair Program (5337)	$12,736,998	$13,721,365	$14,781,807	$15,924,204	$17,154,890	$74,319,264
Bus and Bus Facilities (5339)	$2,469,487	$2,660,339	$2,865,940	$3,087,432	$3,326,041	$14,409,239
RTA Capital Assistance Program*	$22,211,310	$23,927,888	$25,777,132	$27,769,291	$29,915,413	$129,601,034
Local Capital Match (City of Worcester)	$3,184,249	$3,430,341	$3,695,451	$3,981,050	$4,288,722	$18,579,813
Other Operating Revenue	$19,360,205	$20,856,439	$22,468,308	$24,204,749	$26,075,388	$112,965,089
State Contract Assistance for Operations*	$58,587,593	$63,115,476	$67,993,293	$73,248,087	$78,908,992	$331,853,441
Community Operating Subsidies	$23,039,050	$26,066,571	$29,491,932	$33,367,414	$37,752,167	$149,717,134

**Annual funding was increased at a rate of 1.5% to match that of Federal funding programs. These funding amounts will be adjusted on an annual basis, and may differ compared to the numbers presented here.*

Projected Expenses

Initiatives

The WRTA is considering expansion/upgrade of the WRTA Hub Transfer facility at Union Station and and implementation of Transit Signal Priority to improve the use of transit in congested areas.

The major capital rail initiatives anticipated over the planning horizon of Mobility2040 is the continued study of expanding high speed passenger rail between Worcester and Springfield, as well as possible passenger rail service re-instituted over Providence & Worcester rail lines through the Blackstone Valley from Worcester to Providence, RI. An additional initiative is possible upgrades to the three MBTA commuter rail stations in Westborough, Grafton, and Worcester.

Some of these initiatives are more likely to occur than others, but each will require additional study to move forward, and costs and revenue sources will have to be identified.

Projects

A major transit capital project anticipated over the planning horizon of Mobility2040 is the creation of transit “mini hubs”, to house vehicle fleets and serve as connection and transfer facilities. Another capital project is the replacement of the WRTA Maintenance and Operations facility, which is currently underway, and will be completed in 2016.

The WRTA also intends to embark on a replacement of the fixed route fleet once again in 2020 and has programmed a modest expansion of the fleet in the current TIP. The WRTA will be purchasing nine expansion vehicles beginning in 2017 to accommodate recommendations contained in the 2015 Comprehensive Service Analysis.

Table VI-6: Transit and Commuter Rail Projects

Transit Projects

Recommended Implementation Schedule	Project	Project Scope	Project Cost (in Millions	Comments
2015-2020	Route 43 - New route connecting Webster, Dudley, Southbridge, and Sturbridge	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2015-2020	Route 32 - New route to connect Holden with Worcester.	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2020-2025	Route 17 - New route to connect Westborough Office Park, Solomon Pond Mall, and Northborough Crossing (Wegman's).	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2020-2025	Route 44 - Proposed new route to connect colleges: - Becker, WPI, Assumption, WSU, Clark, Holy Corss, Quinsigamond CC	Draft recommendation from the Comprehensive Service Analysis. Implementation of the project is dependent on operating funds available and final approval by the WRTA	Operating cost	Not part of capital expenditure
2015-2040	New fixed route buses	Replacement or expansion of the WRTA fixed route fleet.	$93.00	Fleet expansion item

Commuter Rail Projects

Recommended Implementation Schedule	Project	Project Cost (in Millions)	Comment
2020-2025	Worcester-Providence passenger service and railroad improvements	TBD	Private Railroad operations and funding
2015-2040	MBTA commuter rail station upgrades	TBD	MBTA funding

It is expected that 5307 funds will be adequate to fund these. Ongoing capital expenditures associated with the existing operations are expected to equate with projected capital funds in later years.

The following Table VI-7 presents the expected expenses associated with transit.

Table VI-7: Projected Expenses Associated with Transit

Category	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Total
Operating Capital	$34,102,540	$38,297,802	$42,972,654	$48,234,168	$54,157,300	$217,764,464
Ongoing Operations and Maintenance	$93,671,144	$101,845,459	$110,784,307	$120,554,307	$123,238,131	$558,093,348
Fleet Expansion – Fixed Route	$4,016,394					$4,016,394
Fleet Replacement – Fixed Route	$2,894,604	$23,537,338	$21,929,297	$30,829,965	$42,097,951	$121,289,155
Fleet Replacement – Demand Response	$3,646,111	$4,436,052	$5,397,135	$6,566,440	$7,989,079	$28,034,817
Ongoing Capital Expenses	$6,124,756	$7,451,702	$9,066,135	$11,030,339	$13,420,093	$47,093,025
M&O Facility GAN	$11,500,000					$11,500,000
Infrastructure – BRT Light	$2,000,000					$2,000,000
Infrastructure – Transit Mini-Hub	$2,000,000					$2,000,000
Infrastructure – Transit Signal Priority	$1,000,000					$1,000,000
Union Station State of Good Repair	$15,921,245	$17,151,703	$18,477,255	$19,905,252	$21,443,609	$92,899,064
Total Expenditure	**$176,876,794**	**$192,720,056**	**$208,626,783**	**$237,120,471**	**$262,346,163**	**$1,077,690,267**
Total Transit Revenue Available for Programming (Table VI-5)	**$190,679,799**	**$206,663,268**	**$224,045,865**	**$242,957,253**	**$263,539,947**	**$1,127,886,132**
Excess Revenue to be programmed based on availability	**$13,803,005**	**$13,943,212**	**$15,419,082**	**$5,836,782**	**$1,193,784**	**$50,195,865**

There are currently no passenger rail projects that need to be programmed in financial constraint.

Financial Constraint

The financial analysis provided above has addressed the revenue sources reasonably expected to be available, from both federal and state sources, and the costs associated with operations and maintenance needs of the existing transportation system, along with a limited number of projects intended to improve the multi-modal system selected by the CMMPO, following extensive public input. The analysis of projects and initiatives was performed for each of the following concerns:

1) regional funding priorities developed with public input

2) greenhouse gas impacts

3) congestion reduction-travel demand model outputs of vehicles miles traveled and miles of congested roadways

4) geographic equity

5) environmental justice benefits & burdens

6) safety & security impacts

7) state-of-good repair impacts

8) promotion of healthy modes

9) improve economic vitality & freight movement

Based on the above considerations, the Mobility2040, the 2016 long range transportation plan for the CMMPO region, has been determined to meet federal planning and financial constraint requirements.

Central Massachusetts Regional Planning Commission

Member Communities

Auburn
Barre
Berlin
Blackstone
Boylston
Charlton
Douglas
Dudley
East Brookfield
Grafton
Hardwick
Holden
Hopedale
Leicester
Mendon
Millbury
Millville
New Braintree
North Brookfield
Northborough
Northbridge
Oakham
Oxford
Paxton
Princeton
Rutland
Shrewsbury
Southbridge
Spencer
Sturbridge
Sutton
Upton
Uxbridge
Warren
Webster
West Boylston
West Brookfield
Westborough
Worcester

Central Massachusetts Regional Planning Commission
2 Washington Square, Union Station
Worcester, MA 01604
Phone: 508.756.7717

CMRPC
Central Massachusetts Regional Planning Commission

CMMPO
Central Massachusetts
Metropolitan Planning Organization