Route 9 Corridor Analysis

Spring 2011

MAPC
METROPOLITAN AREA PLANNING COUNCIL

MetroWest
Regional Collaborative
Fostering Sustainable Communities

Background

Traversing through twenty-eight cities and towns, Route 9 is an east-west state highway providing a direct connection between Boston and Worcester. After passing through Worcester, the road evolves into a country route, passes through the city of Northampton and into the Berkshires where the road ends near the center of the City of Pittsfield.

Opening as the Worcester Turnpike in 1810 and formally designated as Route 9 in 1932, the highway has had a long history. A trolley line once ran between Boston and Worcester in the early 1900s and one of the nation's first shopping malls was built off the highway in the early 1950s. Today, Route 9 serves as an alternate route to the MassPike and its tolls.

Working in concert with Wellesley, Natick, Framingham and Southborough, MAPC developed a corridor profile focusing on this 8.8 mile section of Route 9. Route 9 in the study area is a dense, diverse, congested and highly successful hub of economic activity. For the majority of the study area, Route 9 is a divided four-lane highway with additional turning lanes at most signalized intersections. In addition to being a corridor that is home to a significant number of high-tech businesses, there are various types of commercial activity ranging from local shops to national retail chains. The Route 9 corridor is also a home to residents in multi-family and single-family homes.

Route 9 is under tremendous development pressure. Increasing traffic volumes, congestion and conflicts are forecast. It is critical that infrastructure decisions be made in the near future to balance development and traffic demands since the economic health and quality of life of this area is dependent on the proper functioning of Route 9.

Executive Summary

The Metropolitan Area Planning Council (MAPC) studied the potential for growth along the Route 9 Corridor between Route 128 and I-495, comparing two different development scenarios in order to better understand how land use changes could achieve growth but also mitigate traffic congestion along this section of Route 9.

The Route 9 Corridor Study was comprised of two phases. As part of Phase One, MAPC conducted a Build-Out analysis of the commercial, industrial and residential zoning for 56 Analysis Sections along Route 9; met with each of the community's planning staff to review development assumptions; and determined appropriate limitations on potential growth caused by physical and regulatory constraints such as floodplains, wetlands setbacks or parking regulations. MAPC then calculated the potential for future growth under existing zoning in the Analysis Sections within the four study communities. Results were calculated in square feet of built space for retail, office or industrial developments and in numbers of units for multi-family residential developments.

The results of the Build-Out analysis indicate that there is potential for significant future development along Route 9. Unfortunately, the total amount of potential growth would result in traffic that significantly exceeds the remaining capacity and would overwhelm Route 9.

Phase Two of the project examined alternative future land use development scenarios that were generated from discussions with the four municipalities. The Phase Two assumptions, referred to as the Community Test scenario, included changes to both land use and density of development.

On the whole, the Community Test scenarios reduced the overall trip generation within the corridor compared to Build-Out. Community Test scenario yields a 61% increase in commercial building square footage (from 17.8 to 28.7 million sq. ft.) plus 3,100 new housing units compared to existing conditions. But the Community Test scenario forecasts only a 16% increase in single occupant vehicle (SOV) traffic. This is less than half as much as the 40% increase in SOV traffic under the Build-Out Scenario. Under the Community Test scenario, over 72,500 vehicular trips could be converted to non-SOV (walking, biking, or public transit) trips.

In order for the successful conversion from SOV to pedestrian, bicycle and public transit trips to occur, there are four central assumptions:

- All developments must contain adequate site design and infrastructure elements (e.g., available on-site bicycle parking facilities).
- Public realm infrastructure must be designed to promote ease of trips made by walking, bicycling and public transit. (e.g., continuous sidewalks).
- There must be sufficient bus and shuttle service. 15 minute headways are considered to be ideal for the Route 9 Corridor.
- Trip generation and trip reduction estimates are based on the Institute of Transportation Engineers Trip Generation Manual 7th Edition.

The amount of commercial square footage (office, retail and industrial) is forecast to increase by 88% in the Build-Out scenario, but only increase by 61% in the Community Test scenario. The number of housing units is projected to increase significantly in the Community Test scenario (approximately 2,970 units) and to a lesser extent (945 units) in the Build-Out scenario. In several cases, the Community Test scenario included a change of land use (e.g., from retail to office or from retail to residential) and a mix of these uses in the same area, where currently there is only one use.

The Build-Out and Community Test results were presented to the communities to ensure that the analyses was completed according to the land use assumptions agreed upon and to make certain that MAPC examined all appropriate mitigation measures. It is anticipated that the results and recommendations in this report will be used by the four communities, Massachusetts Department of Transportation, MetroWest Regional Transportation Authority, developers and others to plan for mitigation of forecasted impacts of growth on Route 9 in the years ahead.

Corridor Analysis Defined

A corridor analysis evaluates potential for future growth and associated vehicular trips. Information from a corridor analysis helps to determine the means to serve future travel demand and helps guide regulatory changes to promote a balance between economic development and community sustainability.

To conduct the Build-Out and Corridor Test scenarios for corridor analysis, the commercially zoned land along Route 9 was divided into 56 Analysis Sections. Appendix A, *Analysis Section Maps*, contains the Analysis Section maps for Wellesley, Natick, Framingham, and Southborough. The additional traffic generated by the land uses was calculated based upon the Institute for Transportation Engineers Trip Generation Manual. The total estimated trips for the daily, AM peak hour, PM peak hour are located in Appendix B, *Summary Table*.

Corridor Analysis - Phase One, Build-Out Scenario

The Corridor Analysis Build-Out Scenario estimated growth potential based on zoning and other regulatory constrains and physical characteristics of the site. All developable properties along the corridor were assumed to be constructed in this scenario. MAPC reviewed recorded traffic data and worked with the community planners to determine how many vacant, developable parcels are in the area (based on Analysis Section), and what the impact would be if they were built-out. Predictions about when or if this level of development will occur were not made. The Analysis Sections were identified with the cooperation of the communities' town planners as areas of significant development (both new growth and redevelopment) potential.

Commercial Development

Overall, the existing built square footage in the 56 Analysis Sections is approximately 17.8 million square feet, with the potential for another 15.7 million square feet of space to be constructed according to the development calculations and assumptions made in the analysis. This represents an approximate doubling of development within the study area. However, not all commercial or industrial lands along Route 9 were included in the analysis, and some of the non-included areas have less of a potential for growth. Therefore, the 15.7 million square foot potential does not represent an overall doubling of the total built space in the entire Route 9 corridor.

Under the current regulations, there is potential for redevelopment in Wellesley (as evidenced by the ongoing redevelopment of the Wellesley Motor Inn site), but there is little potential for net new growth because the majority of the corridor is zoned for single family residential development, and much of the existing commercial development is already built to or over the current zoning limit. Natick has the potential to grow to 7.9 million square feet, or 34% (about 2 million square feet) over its current amount of 5.9 million square feet of built space. Framingham has the potential for the largest total square footage at Build-Out, slightly over 15 million square feet, which represents a 79% increase (6.7 million square feet) over its current amount of 8.5 million square feet. Southborough, with a current amount of 1.5 million square feet of built space in the Analysis Sections, has the largest potential for growth (465%) in the 8.4 million square feet that can be built. Appendix C, *Build-Out Analysis Spreadsheets by Community*, contains the analysis sheets illustrating the Build-Out assumptions and calculations for each of the communities under Phase One.

For some areas where there was a perceived lack of market for new growth, where development was recently completed and the community felt that there was not a likelihood for significant future change, or where there was large multi-family development existing within a commercial zone, calculations for future growth were not undertaken and no significant future growth was

assumed. As a result, the 56 Analysis Sections do not include all of the commercial or industrial properties along Route 9, only the areas that the communities wanted to focus on.

Daily Vehicular Trips

The MAPC transportation analysis illustrates that the total vehicle trips within the corridor, based on the Build-Out land use assumptions, would increase by approximately 41%. The data also illustrate that the morning and evening peak hours would not be evenly impacted in each of the 56 Analysis Sections, because each land use (e.g., residential, office and retail) would have different numbers of trips forecasted during the various times of the day.

Corridor Analysis - Phase Two, Community Test

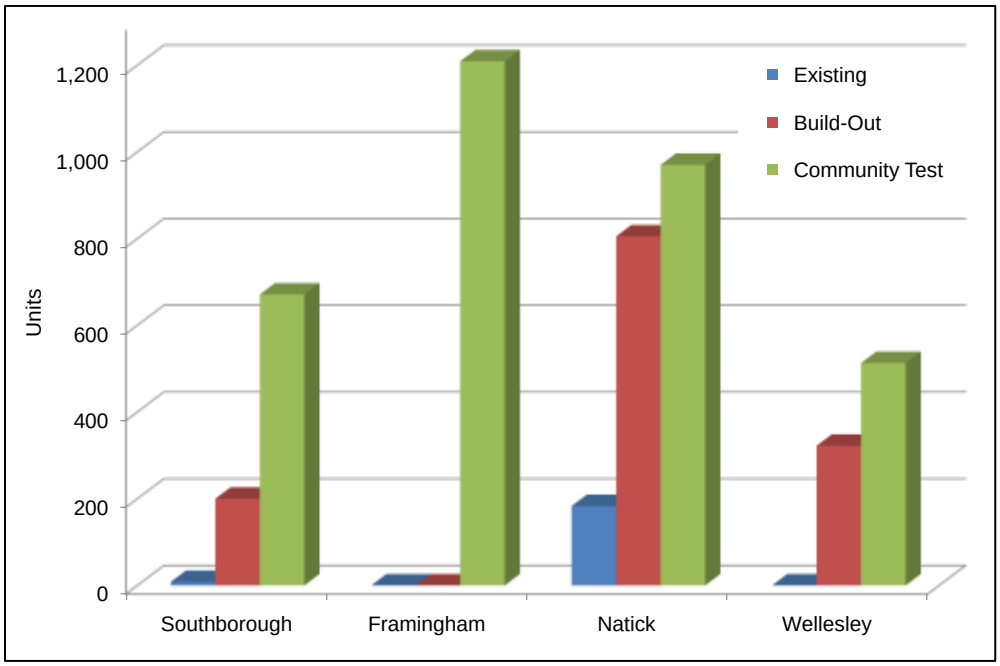
Meetings were held with each community to confirm development assumptions, review initial analyses, and determine alternative assumptions to model for the Community Test scenario. The Community Test Scenario evaluated the impacts of alternative zoning and applied an alternative mix of uses and other development assumptions. The Community Test scenario examined alternative zoning and lands use that may better fit a community goal (e.g., housing or mixed-use development), tested the impacts of an alternative land use on SOV trips, and provided an opportunity for comparison to community and regional goals.

Commercial Development

The Community Test assumptions included changes to both land use and density of development. In some cases, the alternative future analyses included less total Build-Out potential, in others more square footage, and in others a change of land use (e.g., from retail to office or from retail to residential). The types of land uses in the Community Test land use scenarios can be compared with the Build-Out land use scenarios by examining Appendix D, *Land Use Scenarios – Build-Out and Community Test*. Appendix D also provides information about the projected Build-Out for Community Test as well as the number of dwelling units assumed to be included in each of the Analysis Sections for the two scenarios.

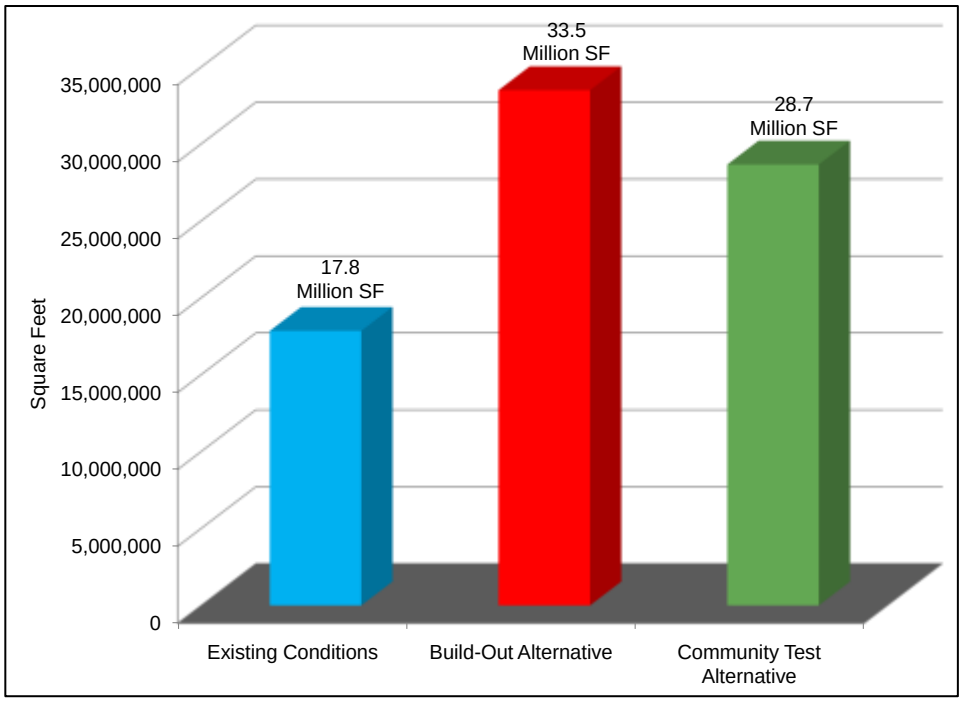
Table 1, *Number of Dwelling Units*, illustrates the number of dwelling units assumed for the Build-Out and Community Test scenarios. Significantly more dwelling units were assumed for the Community Test scenario.

Table 1 *Number of Dwelling Units*



As shown in Table 2, *Commercial Development*[1] *along the Corridor*, there is the potential for 28.7 million square feet to be constructed under the Community Test scenario along the Route 9 Corridor; 61% greater than existing conditions or 14% less than the Build-Out scenario.

Table 2 *Commercial Development along the Corridor*



[1] Commercial development is defined as office, retail and industrial.

Community Test assumptions for Wellesley generated only a small increase in the amount of commercial development (only approximately 6,800 square feet overall), but this was a result of increases in some areas, and decreases (to accommodate mixed use development) in others. The number of residential units increased to more than 500 (over the zero currently in the corridor and approximately 200 more than the Build-Out assumptions).

In Natick, the Community Test land use assumptions resulted in only a slight reduction in commercial square footage from the Build-Out assumptions, and a small increase in the overall number of residential units assumed in this corridor. Commercial square footage is projected to increase from 6.0 million square feet to 7.3 million square feet (for an overall growth of approximately 1.3 million square feet), and the number of housing units is projected to grow from183 to 787 total units.

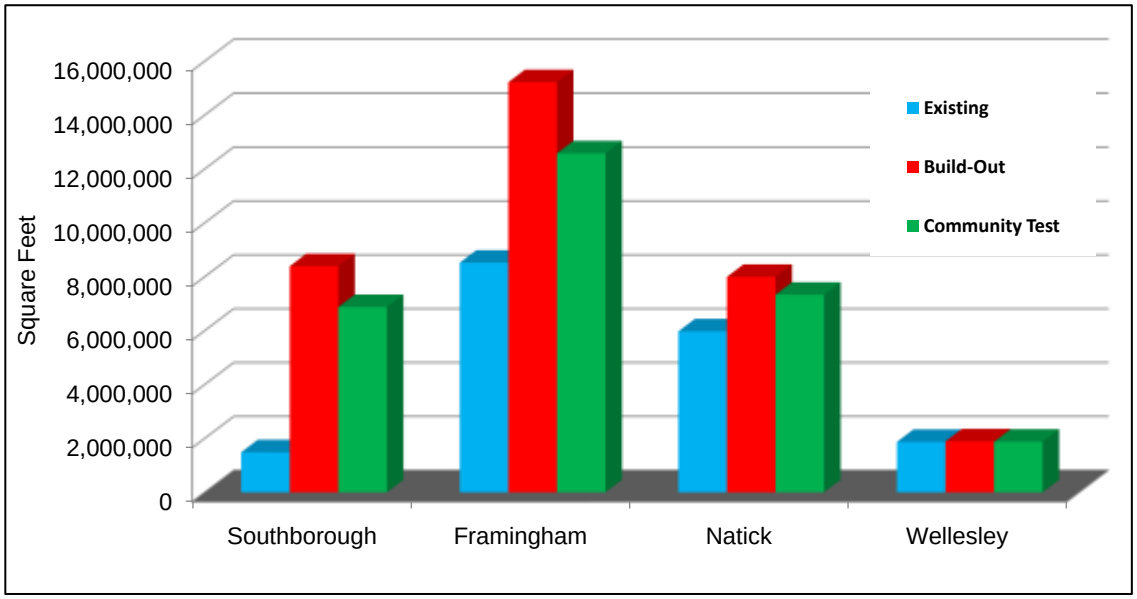
Under the Community Test scenario, the potential commercial and industrial development in Framingham would grow only to 12.6 million square feet, or about 4 million square feet over the existing 8.5 million square feet, but there would be an increase in the amount of residential growth within the corridor. This is in keeping with municipal efforts to consider diversification of development along this corridor, to provide for housing choices as well as to lower commercial growth. The total potential housing in the Community Test model is 1,209 units.

In Southborough, the total amount of commercial growth was also projected to be somewhat lower, and the residential somewhat higher, compared to the Build-Out scenario. Additionally, the residential uses were relocated to several more village-oriented areas. Total commercial development was projected to grow from the existing 1.5 million square feet to approximately 6.9 million square feet, and residential was projected to grow from the existing 8 units to more than 660. Analysis sheets illustrating the Community Test assumptions and calculations for each of the communities are in Appendix E, *Community Test Analysis Spreadsheets by Community*.

Table 3, *Commercial Development by Community*, depicts the projected commercial development along the Route 9 corridor as a whole and individually by community for the Build-Out and Community Test scenarios and compares them to Existing Conditions.

It should be emphasized that the Build-Out and Community Test scenarios are touchstones for comparison to each other and that the build-out under either scenario may never be reached. What is more important are the trends in single occupant vehicle use versus the potential to have a different mode split, which are enabled by the land use changes and associated infrastructure improvements included in the Community Test assumptions.

Table 3 *Commercial Development by Community*

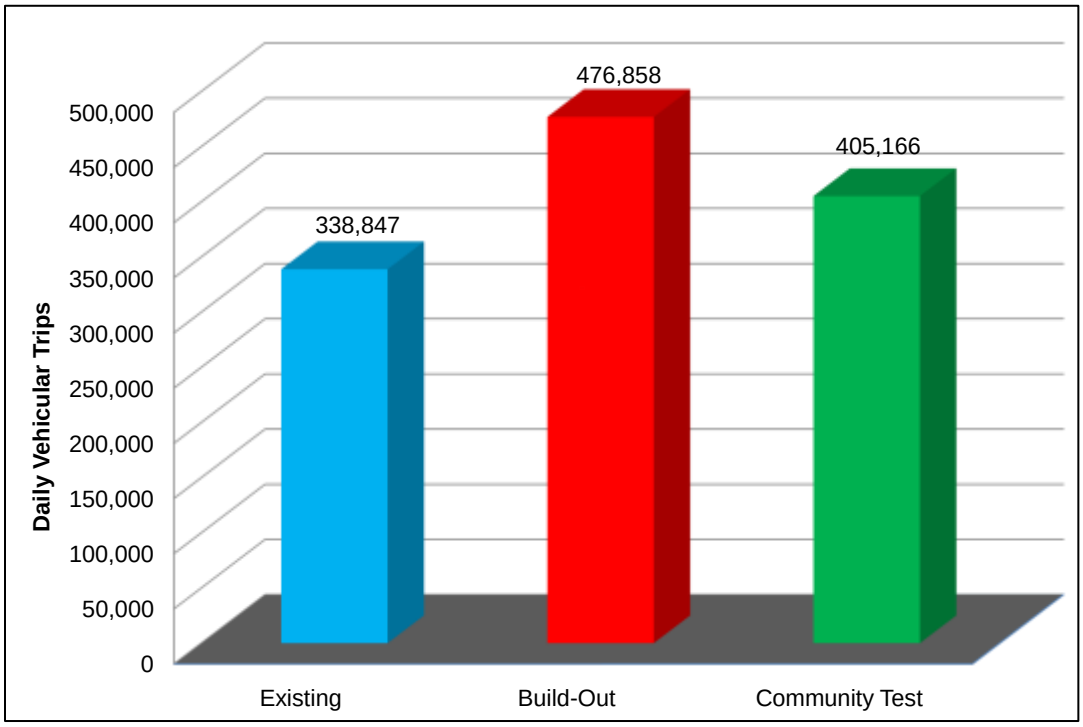


Daily Vehicular Trips

If the four communities were built to the maximum extent allowed by existing zoning regulations, the resulting traffic would significantly increase under both the Build-Out or Community Test scenarios as shown in Table 4, *Daily Vehicular Trips along the Corridor*. The total number of single occupant vehicle trips in the corridor is expected to grow from the existing estimated 339,000 trips per day up to approximately 405,000 trips under the Community Test scenario. This equates to approximately 66,000 trips per day less than the Build-Out projection. However, this reduction is by no means across the board; some areas of the corridor show an increase in vehicle trips generated (either because of increased density of because of land use assumptions), while other areas show decreases in trip generation. Some of the reductions in trip generation are due to assumptions related to increase in pedestrian, bicycle and bus trips for the mixed use areas.

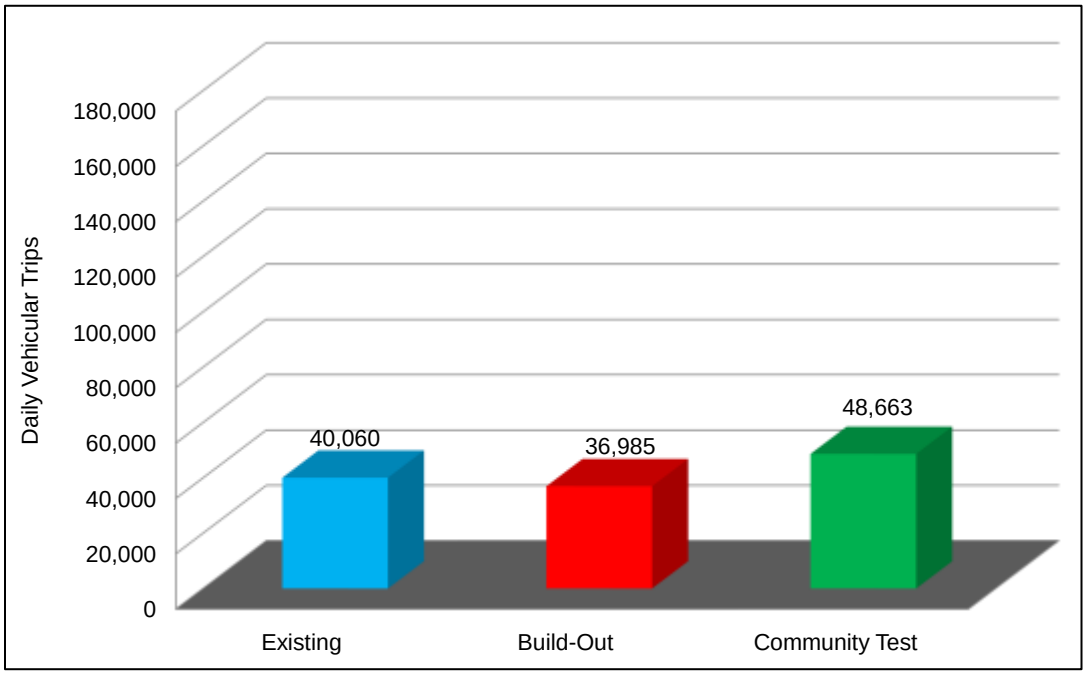
Traffic impacts of the Community Test projected developments, as compared to the Build-Out developments, were adjusted by several factors. One factor was that in many Analysis Sections, the total amount of projected growth was lower than in the original Build-Out scenario, due to a re-thinking by the municipal staff regarding the total amount of space that would reasonably be expected to be developed in a particular area. A second factor was changes in land uses. For example, uses such as office or residential generate less traffic on a per-square-foot basis than does retail. Lastly, in areas where the uses were mixed in the Community Test scenarios, there was an assumption that the developments would include design elements (interconnected pathways/sidewalks, bicycle parking, shuttle bus stop, etc.) that, along with the mixed use nature of the developments, would enable a reduction in single occupant vehicle trips.

Table 4 *Daily Vehicular Trips along the Corridor*



In the Community Test Scenario, Framingham is forecast to have the highest reduction in vehicular trips and Southborough the lowest, due to the development potential for both communities and greater mixing of land uses in Framingham. Daily vehicular trips in Natick could be reduced from current levels even with further development under the Community Test scenario. Increased development outweighs mode split and results in increased daily vehicular trips in Wellesley. Tables 5-8, depict the forecasted daily vehicular trips for the Build-Out and Community Test scenarios for Wellesley, Natick, Framingham, and Southborough and compares these trips to Existing Conditions.

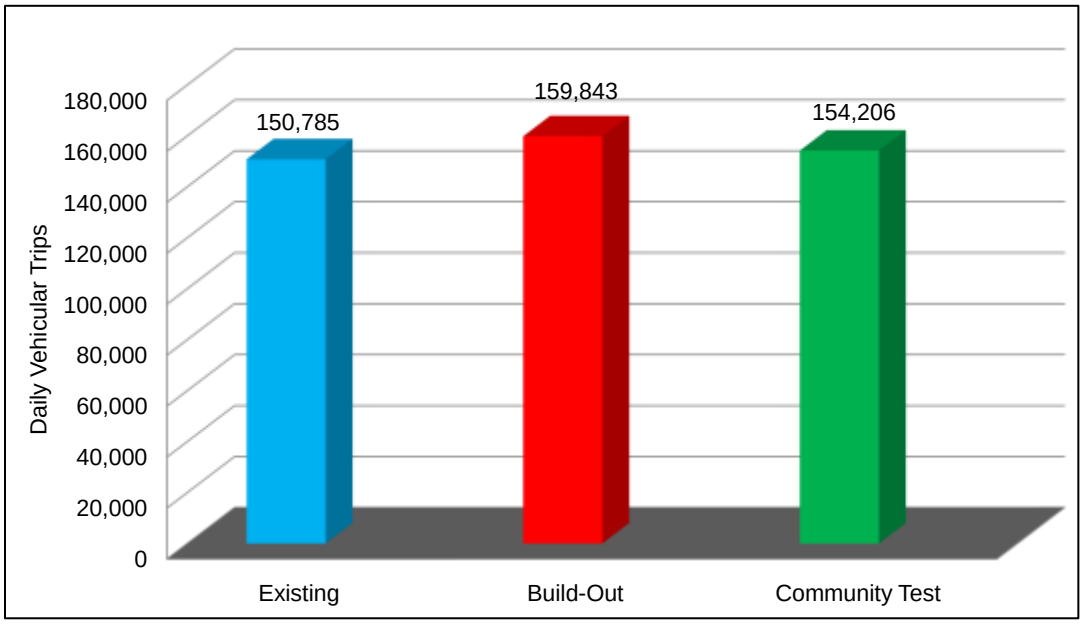
Table 5 *Wellesley Daily Vehicular Trips*



Compared to Existing Conditions, the number of daily vehicular trips in Wellesley is expected to decline by 8% in the Build-Out scenario but increase by 21% in the Community Test scenario.

Build-Out - SOV trips drop due to a change from retail use in one Analysis Section to lower SOV-generating residential and office uses (Analysis Sections 5, 8, 11 and 12). The overall increase in SOV in the Community Test scenario is due to the addition of residential units to a number of smaller commercial nodes, without significant reduction in commercial space (Analysis Section 12). It is also due to an assumed increase in floor area of office use near Route 128 (Analysis Sections 1 and 2). The result is an overall increase in SOV use in spite of the increase in walking, bicycling and public transit trips due to mixing of uses.

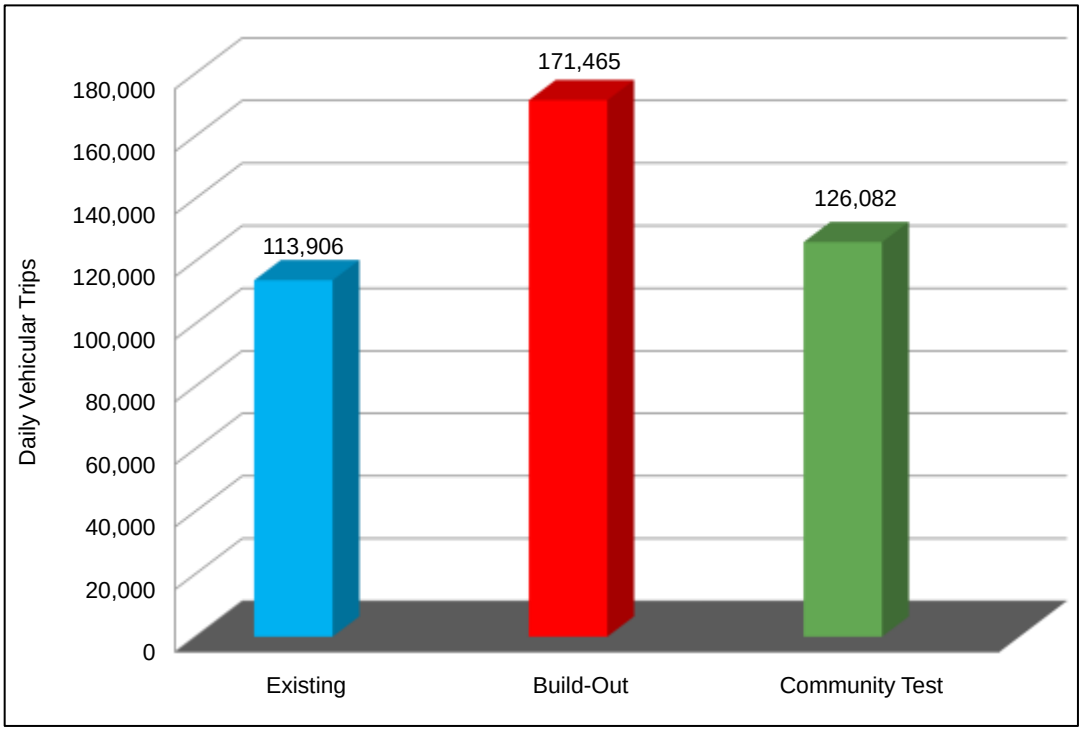
Table 6 *Natick Daily Vehicular Trips*



Daily vehicular trips in the Build-Out and Community Test scenarios for Natick are forecasted to increase by 6% and 2% respectively compared to Existing Conditions.

The increase in SOV use under the Build-Out scenario is due to an overall increase in floor area for retail and office uses throughout the corridor. The lower SOV increase under the Community Test Scenario is largely a result of an overall decrease in built square footage of commercial use (relative to Build-Out) (Analysis Sections 11 and 12), plus a shift to mixed-use development in a few Analysis Sections (i.e.; Analysis Section 7).

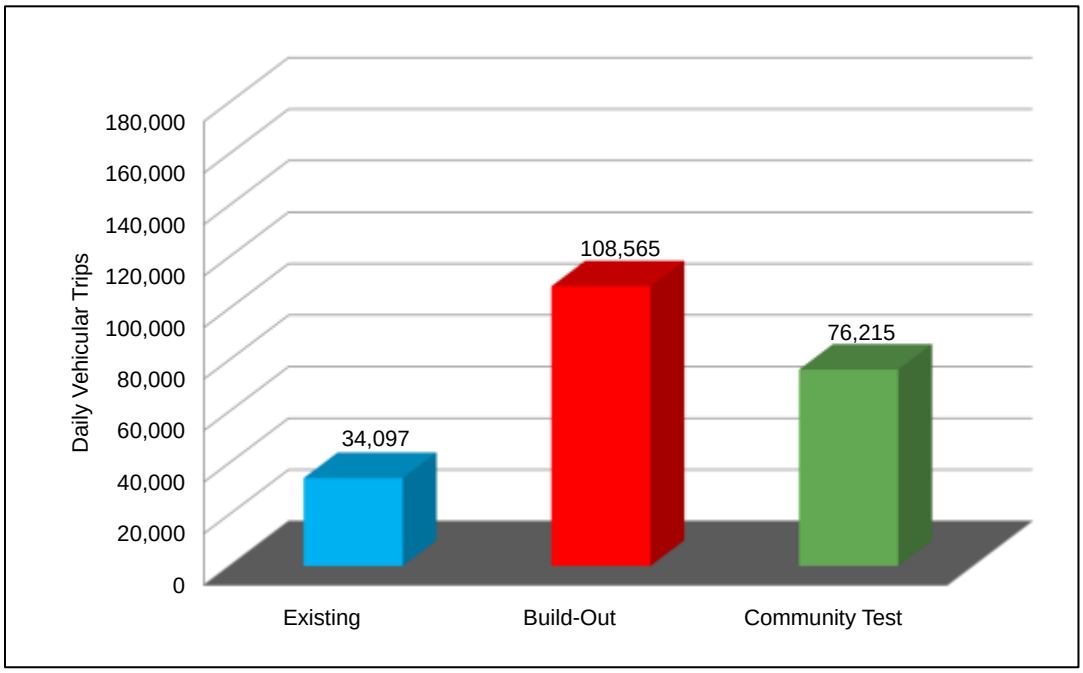
Table 7 *Framingham Daily Vehicular Trips*



Framingham's Build-Out scenario is projected to increase by 51% while the number of daily vehicular trips in the Community Test scenario is anticipated to increase to a lesser extent (11%) when compared to Existing conditions.

The increase in SOV under the Build-Out scenario is due to an overall increase in floor area for retail and office uses throughout the corridor. The Community Test scenario's reduction in SOV use is the result of an overall decrease in built square footage of commercial, plus a shift to lower-SOV generating mixed use development in a number of Analysis Sections (Analysis Sections 1, 7, 9 and 10).

Table 8 *Southborough Daily Vehicular Trips*



Southborough's Build-Out and Community Test scenarios are anticipated to have the most significant increases in the number of daily vehicular trips at 218% and 124% respectively compared to Existing conditions, but Community Test is significantly lower than Build-Out.

The increase in SOV use in the Build-Out scenario is due to the largest overall increase in floor area for retail and office uses in the entire corridor. Changes land use assumptions (lower square footages in some areas, higher in others, mixed-use in some areas, change of use from commercial to residential in others, etc.) results in an overall small increase in SOV use (relative to Build-Out) for the Community Test scenario (ie.; Analysis Sections 1, 11 and 13).

Conversion to Pedestrian, Bicycle and Public Transit Trips

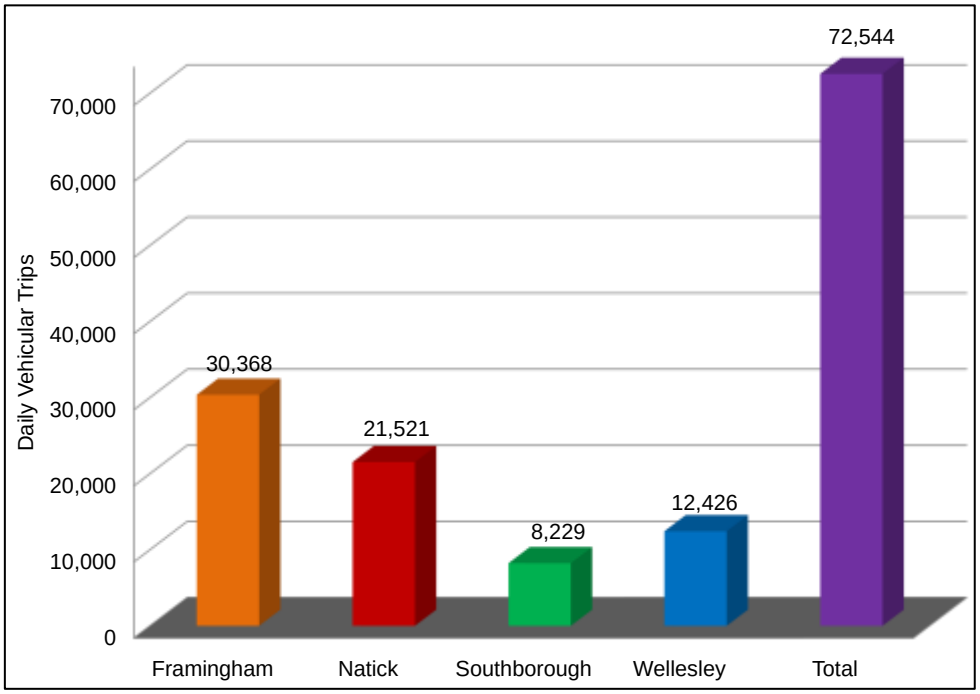
As part of the Community Test Scenario, a calculation was performed to determine the number of SOV trips that could be converted to pedestrian, bicycle, and public transit trips. It was determined that approximately 72,544 SOV trips, or 15 percent of the total trips in the Community Test scenario, could be converted to pedestrian, bicycle or public transit trips. Table 9, *Percent of Community Test Scenario SOV Trips that could be Converted to Walking, Bicycling and Public Transit Trips*, shows the percentage breakdown by community.

Table 9 *Percent of Community Test Scenario Trips that can be Converted to Walking, Bicycling and Public Transit Trips*

Community	Percent
Framingham	19
Natick	12
Southborough	10
Wellesley	20
Corridor Total	**15**

As shown in Table 10, *Walking, Bicycle and Public Transit Trips from the Community Test Scenario*, Framingham and Natick comprise 72% of the SOV trips that could be converted to pedestrian, bicycle or public transit trips.

Table 10 *Pedestrian, Bicycle and Public Transit Trips from the Community Test Scenario*



Recommendations to Mitigate the Impacts of Future Development and Traffic

Development growth and an increase in SOV trips will continue in the future under all scenarios (Existing, Build-Out and Community Test). It is forecasted that Route 9 will not be able to accommodate the projected increase in vehicular trips under either the Build-Out or Community Test scenarios. However, there are several ways to mitigate the impacts of growth and traffic along the Route 9 Corridor.

Lowering traffic can be achieved by reducing development densities, shifting to lower traffic generating land uses, and mixing land uses, in conjunction with on-site design and off-site infrastructure to promote use of alternative modes. Recommendations also include land use development design elements that would enhance public transit viability. For example, large amounts of built space could be clustered in major nodes easily accessible to buses along Route 9 versus locations that are more scattered or accessible only from long driveways off of Route 9. Measures that improve inter-connectivity of uses, as well as measures that enhance walkability and safety of bicycling, all in an effort to further reduce SOV usage are recommended. Establishing land uses that take pressure off of peak hour travel is another means of mitigating future growth.

There are locations on Route 9 where land use and transportation infrastructure is well designed. However, there is significant room to implement the following land use and transportation recommendations along the corridor:

Land Use

- *Revisit existing zoning to obtain the future land densities that are desired by the communities.*

Future land densities desired by communities may not be identical with existing zoning. In some cases, existing zoning represents a lower density or different use than future land densities desired by the communities. Changes to land densities will most likely necessitate zoning amendments.

Framingham Tech Park comprises almost 200 acres located northwest of the Route 9/29 intersection near the Framingham/Southborough town line. The Park was developed with an initial concept of creating an area supportive of industrial uses. However recent development is now trending towards a mixture of research and development and office type uses.

Framingham Tech Park, Framingham

- *Promote redevelopment that includes lower traffic generating uses (residential, office) over higher traffic generating uses (retail), or mix uses.*

In Southborough's Fayville Village (Analysis Sections 11 and 13), the Community Test scenario attains the goal of lowering traffic while promoting the community goal of increased housing. Compared to Existing Conditions, Community Test SOV trips decrease in Southborough while the total building square footage increases (over 85 percent) compared to Existing Conditions as shown in the table below. Land use assumptions in Existing Conditions and Build Out are a combination of retail and office whereas the Community Test land use assumptions are retail and residential. The table also illustrates that if square footage increases and land use assumptions remain the same, the number of daily trips will increase exponentially.

Southborough Analysis Sections 11 and 13	Existing Conditions	Build-Out	Community Test
Square Footage	46,828	160,508	87,190
Number of Daily Vehicular Trips	3,880	8,813	3,470

Interestingly, a smaller building square footage does not always yield less traffic than a larger building square footage. For instance, a smaller square footage of retail use yields more traffic than a mix of office and residential which may be larger in square footage.

- *Promote redevelopment including uses that can be served by transit.*

Mathworks in Natick is an example of a site with high density nodes near the Route 9 Corridor. Mathworks is a high density single-use site that can be easily served by public transit due to its proximity to Route 9 and internal site design (i.e, buildings in close proximity to each other).

Mathworks, Natick

- *Include design criteria that require site features that promote transit, walking and bicycle use. Design criteria examples include:*

  Establish bus pull-offs and bus shelters
  Establishing bus pull-offs and bus shelters at specific nodes enables safe access while not holding up traffic in the travel lane. Bus pull-offs should be located in close proximity to areas with high concentrations of pedestrians and be part of all large developments.

  Jefferson Hills Apartments in Framingham has a well-sighted and well-protected bus shelter on its property adjacent to Route 9. MWRTA's Routes 7 and 9 and MBTA's paratransit service, The RIDE, provide services for Jefferson Hills' residents. The bus shelter shown below on the right is located in the Shoppers World parking lot off of Route 9 in Framingham. Although it is well-designed and in good condition, there is no signage directing passengers to the bus shelter and there is no schedule (route or time) information available at the bus shelter. Additionally, the bus shelter is also not visible from Route 9.

Jefferson Hills Apartments in Framingham

Bus shelter in Shoppers World parking lot, Framingham

Aerial View of Jefferson Hills Apartments

Aerial View of Shoppers World

  Promote connections between parking lots
  Promoting connections between parking lots will allow for pedestrians to frequent multiple sites without moving their vehicles. Accordingly, this will contribute to reducing traffic along Route 9, support safe connections for pedestrians and encourage shared parking. Changes in local parking requirements may be necessitated to allow shared parking.

A well designed pedestrian crossing between The Crossings, a retail establishment, and an adjacent office building in Southborough is shown below.

Well designed pedestrian crossing in Southborough.

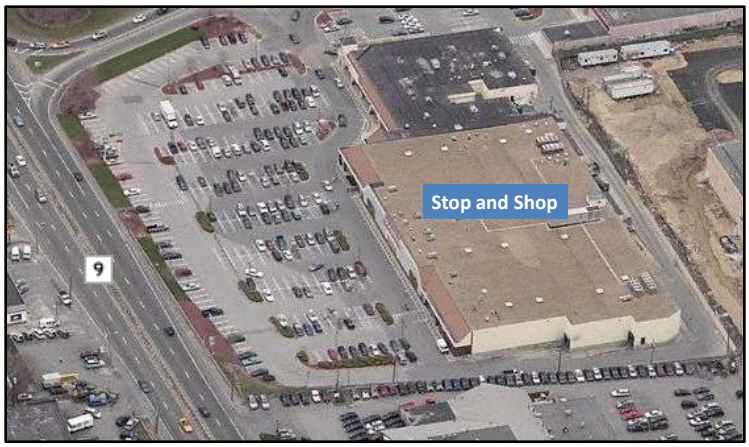
The image below depicts a pedestrian using a well worn path, or desire line, instead of a sidewalk or set route to go between two parking lots in Framingham. This type of pedestrian activity shows there is a need to formally establish a sidewalk or path connecting the two parking lots at this location.

Informal access between two parking lots in Framingham.

Site buildings and entrances near Route 9

As new properties are designed, buildings and entrances should be located close to Route 9 to encourage pedestrian activity and reduce walking distances to bus stops. This will require zoning regulations that put parking behind all buildings.

Retail business in Framingham with building sited near Route 9 and a well-landscaped buffer. Parking is at rear of building.



Retail business in Natick with building sited away from Route 9. Parking is in front of building.

- *Promote mixed-use development.*

Transportation options increase when jobs, housing and commercial activities are in close proximity. Pedestrian and bicycle travel are promoted and auto dependency is reduced. Mixed-use development promotes efficient use of land and infrastructure and spurs economic development. In addition, mixed-use developments often have higher property values.

Ex-Intersection of Route 9 & 27 in Natick (Whitney Assisted Living, Mathworks, retail, recreation)

<u>Transportation</u>

- *Promote Bicycling, Walking and use of Public Transportation*

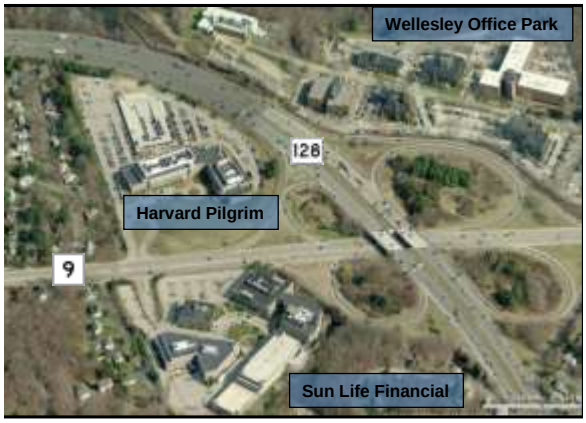
  The image in the lower left is a well designed sidewalk paralleling Route 9 at the Natick Collection in Natick. The sidewalk is a curvilinear path with a distinct buffer protecting pedestrians and bicyclists from vehicles on Route 9. A poorly maintained and exposed sidewalk paralleling Route 9 in Wellesley is shown in the lower right. Pedestrians and bicyclists would be more inclined to use the sidewalk shown in the lower left.

Well designed and maintained sidewalk in Natick

Poorly maintained sidewalk in Wellesley

- *Promote Commuter Shuttles, Carpooling and Vanpooling*
  Two Transportation Management Associations (TMA) provide service along the Route 9 corridor. The128 Business Council serves Wellesley and the MetroWest/495-TMA serves Natick, Framingham, and Southborough. Currently the 128 Business Council does not have any members in Wellesley or provides services to Wellesley. The MetroWest/495 TMA has 15 members in Natick, Framingham, and Southbough that comprise a total of almost 19,000 employees[2]. Expanding membership and services provided by these two TMAs is recommended.

  While there is a framework in place for commuter shuttles, there is room to enhance coordination and increase ridership. For example, there are three office parks near the intersection of Route 9 and Route 128. Each office park has independently hired a private shuttle service, Local Motion, to provide employee access to and from Riverside Station in Newton during the morning and evening commutes. However, the three office parks operate their shuttle services independently from each other. If they worked in concert, ridership and the number of trips could potentially increase.



Office Parks in Wellesley at the Intersection of Route 9 and Route 128

- *Improve Signalization and Crossings*

To maximize the efficiency of Route 9, all existing signals should be retrofitted with new equipment, which will allow for vehicle detection on all approaches. Signal timings should be optimized to minimize underutilized green time in order to promote roadway efficiency and safety. In addition to vehicles, signals should be timed to accommodate pedestrians (be pedestrian-actuated), bicyclists and buses in a safe and timely manner.

There is a need for well-designed pedestrian crossings along the corridor. Crossings should be at signalized intersections and ideally at every ½ mile through areas where there are destinations on either side of the highway.

[2] As of the end of 2010.

Signals should be clearly visible and accompanied with appropriate signage and lane markings as shown in the bicycle/pedestrian bath at the Natick Collection in the lower left. Shoppers World by Framingham, shown in the lower right, is a location where signalization can be improved.

Bicycle/Pedestrian Path at the Natick Collection, Natick
Note bollard with directions 'Push Button for Green Light.'

Framingham by Shoppers World

- *Improve Sidewalk Coverage*

To allow for walking between properties, sidewalks need to be available along the Route 9 corridor to the maximum extent possible. Sidewalks should be well-maintained, clear of obstacles, and efficiently cleared of snow and ice. The images on the left of sidewalks along Route 9 in Framingham and in front of Mathworks in Natick are both examples of well designed and maintained sidewalks. Access from other office buildings in close proximity to The Crossings in Southborough could be improved if there was a continuous sidewalk provided along Route 9 as shown in the image on the right. The other image on the right is an example of a discontinued sidewalk in Wellesley.

Mathworks, Natick

Discontinued sidewalk in Wellesley

Framingham

- *Relocate Guardrails between the Road and Sidewalk*
  Locating guardrails between the road and sidewalk as shown in the lower left in Wellesley is encouraged as pedestrian and bicycle access is safer. Placing guardrails on the 'private' side of the sidewalks as shown in the photo on the right, also in Wellesley, is discouraged.

Guardrail located between Route 9 and sidewalk.

Guardrail located on the 'private' side of the sidewalk.

- *Consolidate Curb Cuts*

Since Route 9 has numerous curb cuts and signalized intersections that provide left turn movements, solutions that address efficient use of the roadway and ways to increase the number of trips without cars are recommended. Consolidating curb cuts is one recommendation. Increasing vehicular speeds and widening Route 9 is not recommended.

Framingham west of Route 30 (Cochituate Road), a location with numerous curb cuts.

- *Improve Bus and Shuttle Services*

There needs to be frequent bus service along the entire corridor, running in the breakdown lane whenever possible. Providing bus service along the shoulder/breakdown lane and allowing for bus 'queue jumping' is recommended where appropriate. To allow for efficient traffic, buses should be given signal priority, be equipped with GPS for tracking purposes. There should be 'smart' and

highly visible bus stops that provide shelter, fare collection, information on next arrival and route, as well as schedule information.

Formed in 2006, the Metro West Regional Transit Authority (MWRTA) has been providing bus service along and in the vicinity of the Route 9 corridor. Of the 11 bus routes offered by the MWRTA, nine access locations along Route 9. Route 9, Natick/Framingham/Worcester Road, is the only route that provides access east and west access along Route 9 for an extended distance. The other routes cross Route 9 and provide access to destinations on either side of the highway. In 2009, there were over 265,000 passenger trips along and across the Route 9 corridor. Between Fiscal Years 2008-2010, MWRTA's fixed route ridership has increased by approximately 31 percent. The Route 9 route has a significantly lower ridership in comparison to the other routes. All fixed route vehicles are 16 seat passenger/2 wheelchair capacity.

Table 11, *MWRTA Routes in Vicinity of the Route 9 Corridor*, summarizes each route's ridership and key destination points.

Table 11 *MWRTA Routes and Ridership in Vicinity of the Route 9 Corridor*

Route Number	Route Name	Stops along or in Proximity to Route 9	2009 Ridership (calendar year)
Route 1	Green Line Shuttle	Staples Drive, Mathworks, Woodland Green Line T Stop, 9/27 Plaza, Natick Collection, Flutie Pass Park & Ride, Central Hub.	21,509
Route 2	Framingham Circuit (clockwise)	Central Hub, Downtown Framingham, MetroWest Medical Center, Callahan Senior Center, Framingham State College, Shoppers World, Natick Collection, Logan Shuttle, Nobscot Shopping Center.	40,239
Route 3	Framingham Circuit (counter clockwise)	Same stops as Route 2.	49,394
Route 4	Market Basket/Beaver Park/Natick Collection	Central Hub, Downtown Framingham, MetroWest Medical Center, Beaver Park, Natick Collection, Shoppers World, Sherwood Plaza.	14,138
Route 7*	Southborough/ Marlborough Line	Central Hub, Downtown Framingham, Downtown Southborough, Staples, Park & Ride, Route 9/California Avenue, Stop & Shop, Jefferson Hills, Framingham State University.	71,014
Route 9	Natick/Framingham/ Worcester Road	Sherwood Plaza, Natick Collection, Flutie Pass Park & Ride, Staples Park & Ride, Logan Shuttle, Shoppers World, Framingham State University, Stop & Shop, Jefferson Hills, Technology Park, 9/90 Corporate Center.	3,716
Route 10	Natick Daily	Central Hub, Natick Train Stations (West Natick and Downtown Natick), 9/27 Shopping Plaza, Natick Collection, Sherwood Plaza.	36,284
Route 11	Natick Mid-Day	The Natick Mid-Day route makes the same stops as the Natick Daily (Route 10), going in the opposite direction. It starts later and ends earlier.	10,899
Boston Science Shuttle		Boston Scientific, Mathworks, Natick Army Labs and Downtown Natick Commuter Rail.	2,186
Natick Commuter Shuttle		Boston Scientific, Mathworks, Cognex and Downtown Natick Commuter Rail.	16,504
		Total	**265,883**

* Includes the Route 7 – Southborough/Marlborough Line, Route 7 – Southborough/Marlborough Line Saturday Service, Route 7C – Inner City Marlborough, and Route 7C – Inner City Marlborough Saturday Service.

The Central Hub stop, located at 37 Waverley Street in Framingham, is a major route transfer point.

The Boston Science and Natick Commuter Shuttles are not fixed routes.

The MWRTA bus routes provide access to regional transportation connections; the Green Line (Riverside D-Line), the Framingham/Worcester Train Commuter Rail, and the Logan Airport Shuttle. Two Park& Ride facilities are also accessible by MWRTA bus routes. There is a framework in place for regional transportation connections, but it needs to be expanded. MWRTA needs increased support to develop strategies to increase ridership for these routes.

There are two Park and Rides in Framingham, one at Shoppers World (at the Flutie Pass near Routes 9 and 30) and the other is sited on Route 9 Eastbound near Mass Turnpike Exit 12. The Park and Ride by Shoppers World has 114 spaces and the Park and Ride near Mass Turnpike Exit 12 has 120 spaces. With an average occupancy rate of 32 percent for both Park and Ride facilities, the average occupancy of each is low. Five MWRTA routes currently provide service to the two Framingham Park and Rides. If the Logan Express Lot at Framingham is included, there are a total of 810 parking spaces for commuter use in Framingham.

Starting in November 2010, riders can utilize MWRTA buses by using MBTA Charlie Cards. MWRTA also has a 'Real Time MWRTA Bus Tracking' link on its website. Passengers are able to tell where the buses are and when the bus is expected to arrive at the stop they are waiting at. MWRTA is also participating in Google's Transit Trip Planner which is also available on-line and on some mobile phones.

MWRTA Route Map and MWRTA Bus.

Overpasses/Underpasses

Overpasses and underpasses allow for pedestrian or bicycle access and provide complete separation from vehicular traffic. However, due to their high-cost and visual intrusiveness, overpasses and underpasses should be considered as a last resort. Alternatively, in locations where Route 9 operates at high speeds making crossing difficult and where there are destinations on both sides, an at-grade connection across a sunken section of Route 9 could be explored (e.g., Framingham by Shoppers World).

Overpasses along Route 9 in Wellesley

Alternative Funding Sources

It is critical that there be a commitment to ongoing funding of transit operations, as well as providing sidewalks, crosswalks and bicycle paths, and keeping them cleared. In addition to obtaining funds from local resources, state programs and federal authorizations, there are other means to obtain funding for transportation improvements along Route 9 such as through developer mitigation and establishing District Improvement Financing or Business Improvement Districts.

Developer Mitigation

Mitigation funds could be invested in a local mitigation fund that will be used to pay for transit operations and other non-vehicular needs instead of designing and implementing roadway improvements.

District Improvement Financing (DIF)

A DIF is a locally driven public financing alternative that enables municipalities to fund transportation, infrastructure and development projects by allocating future, incremental tax revenues collected from a predefined district to pay for project costs. As tax revenues increase, a portion of the increase will be allocated directly to a fund for specific transportation services.

Business Improvement District (BID)

A BID is a defined area within which businesses pay an additional tax or fee in order to fund improvements or services. The assessments are collected and expended within the district and are in addition to what is already provided by the municipality. BID improvements, such as constructing pedestrian and streetscape enhancements, can be transportation-related.

Conclusion

Development growth and an increase in SOV trips will continue in the future for both the Build-Out and Community Test Scenarios. Route 9 will not be able to handle the projected increase in auto trips. MAPC's primary recommendation is to focus on solutions which use the existing roadway most efficiently, and solutions which increase the number of trips that can be made without vehicles.

Decreasing SOV traffic can be achieved by lowering development density, shifting to lower SOV generating land uses as well as mixing land uses in conjunction with on-site design and off-site infrastructure to promote the use of alternative modes of transportation. The orientation throughout the corridor needs to serve as many trips as possible by walking (e.g., park once and walk), not to move cars in and out of the area as quickly as possible.

Expand

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Noonan, Erica, 'Route 9 Reaches a Milestone,' Boston Globe, 9/16/10.

Central Massachusetts Regional Planning Commission, '*Route 9 Development and Traffic Analysis – Shrewsbury, Northborough and Westborough*', December 2010.

Metropolitan Area Planning Council, '*Golden Triangle Build-Out Analysis*', October 1987.

Appendix C *Land Use Scenarios – Build-Out and Community Test*

Framingham	Existing	Land Use Code	Build Out	Land Use Code	Smart Growth	Land Use Code	Total Number of Existing Dwelling Units	Total Net Future Dwelling Units (Build Out)	Total Net Future Dwelling Units (Smart Growth)
Analysis Section 1: Technology Park District	R & D	760	R & D	760	R & D	760	0	0	0
Analysis Section 2: M-1 Manufacturing District	office, hotel	710, 310	office	710	office	710	0	0	0
Analysis Section 3: "B" Business District	retail, office	820, 710	retail, office	820, 710	retail, office	820, 710	0	0	0
Analysis Section 3: "B" Business District (Eastern Section 3E)	retail	820	retail, office	820, 710	retail, office, residential	820, 710, 220	0	0	80
Analysis Section 4: M-1 Manufacturing District	office	710	office	710	office	710	0	0	0
Analysis Section 5: Business District	retail, office	820, 710	retail, office	820, 710	retail, office, dining	820, 710, 230	0	0	400
Analysis Section 6: Business District	retail, office	820, 710	retail, office	820, 710	retail, office	820, 710	0	0	0
Analysis Section 7: Business District	retail	820	retail	820	retail, office, residential	820, 710, 220	0	0	54
Analysis Section 8: Business District	retail, office	820, 710	retail, office	820, 710	retail, office, residential	820, 710, 220	0	0	70
Analysis Section 9: Business District	retail, office	820, 710	retail, office	820, 710	retail, office, residential	820, 710, 220	0	0	427
Analysis Section 10: Business District	retail, office	820, 710	retail, office	820, 710	retail, office, residential	820, 710, 220	0	0	170
Analysis Section 11: M-1 Manufacturing District	office	710	office	710	office	710	0	0	0
Total							**0**	**0**	**1,200**
Natick									
Analysis Section 1: Natick Mall	retail, residential	820, 220	retail, residential	820, 220	residential, retail	820, 220	0	213	213
Analysis Section 2	retail, hotel, industrial	820, 310, 130	retail, office	820, 710	retail, office	820, 710	0	0	0
Analysis Section 3	retail, office, residential	820, 710, 220	retail, office, residential	820, 710, 220	retail, office, residential	820, 710, 220	103	407	407
Analysis Section 4	retail, office	820, 710	retail, office	820, 710	retail, office	820, 710	0	0	0
Analysis Section 5	R & D	760	R & D	760	R & D	760	0	0	0
Analysis Section 6	retail	820	office	710	retail, office	820, 710	0	0	0
Analysis Section 7	office	710	office	710	residential, retail	820, 220	0	0	70
Analysis Section 8	retail, office	820, 710	retail, office	820, 710	retail, office	820, 710	0	0	0
Analysis Section 9	office	710	office	710	residential	220	0	0	95
Analysis Section 10	retail	820	retail, office	820, 710	retail, office	820, 710	0	0	0
Total for Sections 11 and 12	retail	820	retail, office	820, 710	retail	820	0	0	0
Analysis Section 13	office	710	office	710	office	710	0	0	0
Analysis Section 14	retail	820	retail, office	820, 710	retail	820	0	0	0
Analysis Section 15	retail	820	retail, office	820, 710	retail	820	0	0	0
Analysis Section 16	office	710	office	710	office	710	0	0	0
Analysis Section 17	retail	820	retail, office	820, 710	retail	820	0	0	0
Total							**103**	**622**	**787**
Southborough									
Analysis Section 1: Industrial Park Zone	vacant		office	710	residential	210	0	0	10
Analysis Section 2: Industrial Park Zone	vacant		office	710	office	710	0	0	0
Total for ID and IP Section 3	office	710	office	710	office	710	7	-7	-7
Analysis Section 4 BH Zone	retail, office	820, 710	retail, office	820, 710	retail, office	820, 710	0	0	0
Analysis Section 5 IP Zone (EMC)	office	710	office	710	office	710	0	0	0
Analysis Section 6 IP Zone	office	710	residential	220	office	710	0	200	0
Analysis Section 7: Industrial Park Zone	office, industrial	710, 110	office	710	office	710	0	0	0
Analysis Section 8 Industrial Zone	vacant		office	710	office	710	0	0	0
Analysis Section 9	retail, office	820, 710	retail, office	820, 710	retail, office	820, 710	1	-1	0
Analysis Section 10: Business Highway Zone	retail, office	820, 710	retail, office	820, 710	retail, residential	821, 210	0	0	112
Analysis Section 11: Business Village	retail, office	820, 710	retail, office	820, 710	retail, residential	821, 220	0	0	80
Analysis Section 12: Business Highway	retail, office	820, 710	retail, office	820, 710	retail, office	821, 710	0	0	0
Analysis Section 13: Business Village	retail, office	820, 710	retail, office	820, 710	retail, residential	821, 220	0	0	94
Analysis Section 14: Business Highway	retail, office	820, 710	retail, office	820, 710	institutional	520	0	0	0
Analysis Section 15: Industrial (Rte 30)	office, industrial	820, 710	office	710	residential	230	0	0	263
Analysis Section 16: Industrial (Rte 85)	retail, office	820, 710	retail, office	820, 710	retail, residential	821, 210	0	0	112
Total							**8**	**192**	**664**
Wellesley									
Analysis Section 1: Administrative and Professional Zone	office	710	office	710	office	710	0	0	0
Analysis Section 2: Administrative and Professional Zone	office	710	office	710	office	710	0	0	0
Analysis Section 3: Limited Business Zone	office	710	office	710	office	710	0	0	0
Analysis Section 4: Administrative and Professional Zone	office	710	office	710	office	710	0	0	0
Analysis Section 5: Cedar Street B, BA and ASP Zones	retail, office	820, 710	retail, office	820, 710	retail, office, residential	820, 710, 220	0	0	286
Analysis Section 6: Community College ED Zone	vacant		residential	210	residential	210	0	274	120
Analysis Section 7: Wellesley Center	no change		no change		no change		0	0	0
Analysis Section 8: Weston Road B, BA Zones	retail, office	820, 710	retail, office	820, 710	retail, office, residential	820, 710, 220	0	0	36
Analysis Section 9: Administrative and Professional Zone	office	710	office	710	office	710	0	0	0
Analysis Section 10: St. James Church area	vacant		residential, office	210, 710	recreational facility	495	0	16	0
Analysis Section 11: Business Area	retail	820	retail, office, residential	820, 710, 220	retail, office, residential	820, 710, 220	0	32	36
Analysis Section 12: Business A Area	retail, office	820, 710	retail, office	820, 710	retail, office, residential	820, 710, 220	0	0	25
						Total	**0**	**322**	**513**
						Grand Total	**191**	**1,136**	**3,173**

Appendix F
Central Massachusetts Regional Planning Commission – Route 9 Corridor Study

In 2010, the Central Massachusetts Regional Planning Commission (CMRPC) conducted a companion transportation and build-out study of three additional communities between I-495 and Worcester. Continuing east from MAPC's Route 9 Corridor Study, the three communities that comprised CMRPC's corridor study were Westborough, Northborough and Shrewsbury. CMRPC's study also concluded that traffic on Route 9 will reach unacceptable levels if nothing is done to alleviate traffic.

This study estimates that the average number of daily trips along Route 9 is between 29,000 to 55,000. Under the Build-Out Scenario, in which all developable properties along the corridor are constructed, more than 120,000 vehicles could be added to this section of Route 9.

The study also analyzed seven specific intersections along the corridor during peak morning and evening hours. CMRPC determined that cars waited at traffic signals for more than 35 seconds at 10 of the intersections. By 2015, CMRPC predicts that six of those intersections could have average wait times of more than one minute and 20 seconds per vehicle.

Some of the recommendations in the CMRPC study include:

- Encouraging pedestrian and bicycle traffic to ease vehicle traffic.
- Increasing public transportation use and accessibility.
- Using back roads to connect developments so that not all traffic is funneled onto Route 9.