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Executive Summary

Introduction

The Massachusetts Department of Transportation (MassDOT) requested that Southeastern Regional Planning & Economic Development District (SRPEDD) conduct a study of the Route 140 Corridor through the towns of Norton, Mansfield and Foxborough. This was precipitated by a letter of request dated August 20, 2015, delivered to the MassDOT District 5 Office from Massachusetts Senator James Timilty and Massachusetts Representatives Jay Barrows and Steven Howitt. The area of concern includes Route 140 at the intersection with Route 123 in Norton, extends north through the entire length of Mansfield into Foxborough up to Leonard Street and includes the Foxborough Regional Charter School (FRCS).

Public Outreach

Before the commencement of the Route 140 transportation study, a public outreach strategy was devised. This public outreach effort was developed to inform the public, including local residents, business owners and any interested parties of the study and to encourage and garner feedback on the issues facing the corridor in all three communities.

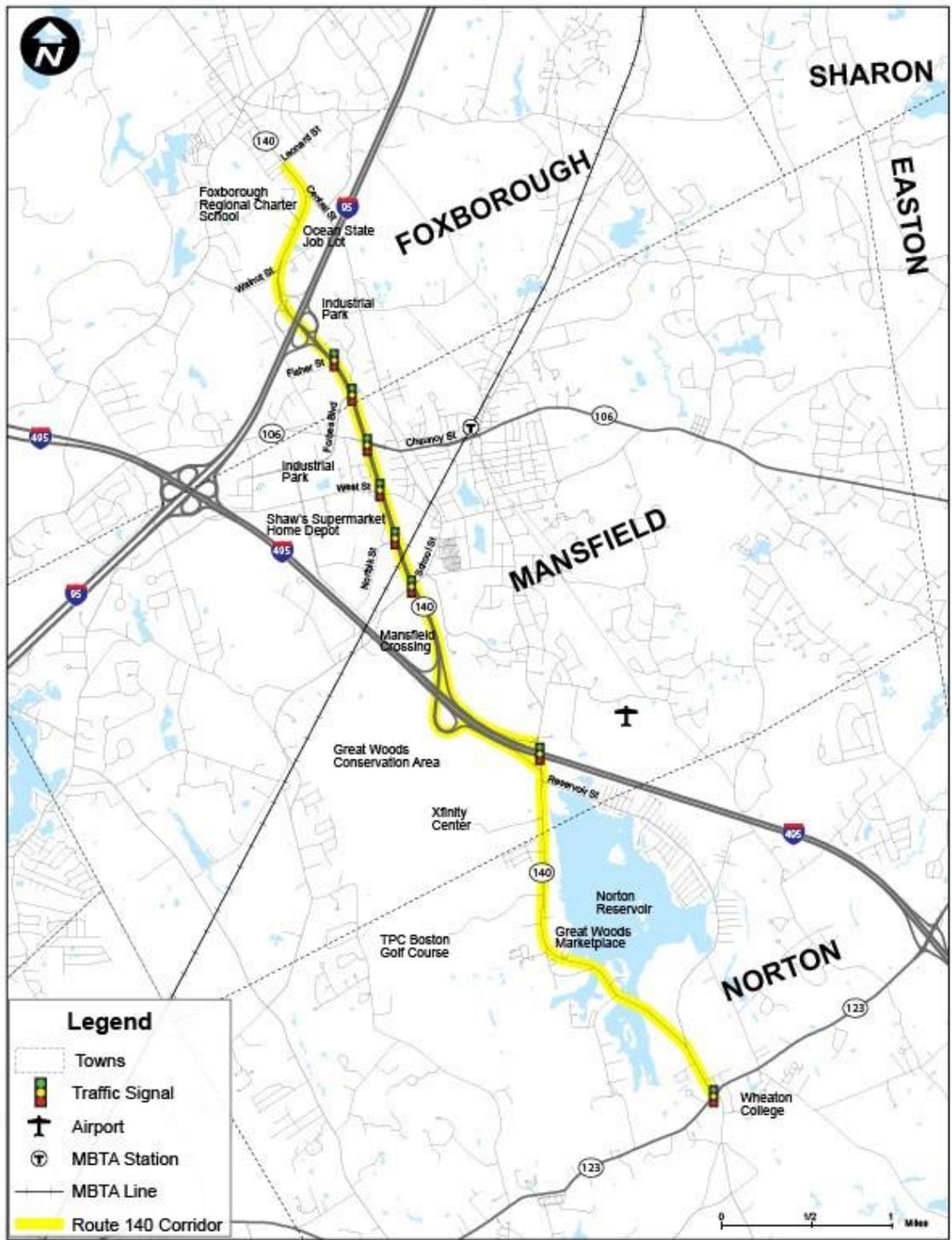
The strategy consisted of a total of 7 public meetings during the course of the study, as well as a public survey that garnered over 550 responses. These responses, as well as written and verbal comments received during meetings and by e-mail assisted greatly in the findings of the study. The public outreach also allowed concerned residents, business owners and others who utilize Route 140, to express their concerns, voice their opinions and be allowed the opportunity to participate in the planning process.

The Study Area

The Route 140 corridor, also known as Mansfield Avenue in Norton, South Main Street and Commercial Street in Mansfield, and Commercial Street and Central Street in Foxborough, is a north/south running corridor, owned and maintained by MassDOT. The Route 140 study area encompasses nearly 8 miles of roadway and begins at the intersection with Route 123 in Norton, extending north through the entire expanse of Mansfield and continues into the town of Foxborough just past the Foxborough Regional Charter School to Leonard Street.

In Norton, beginning with the signalized intersection of Route 140 at Route 123, the study area encompasses parts of Wheaton College, the Norton Reservoir, the Great Woods Marketplace (Roche Brothers, Dunkin Donuts and McDonalds), and the TPC Boston Golf course. At the town line with Mansfield the study area includes the Xfinity Center and the Great Woods Conservation area, followed by an interchange to I-495 which is controlled by two separate traffic signals. Route 140 shares a brief stretch of highway with I-495, before it then splits off and continues north past a shopping plaza that includes Home Depot and Shaw's Supermarket, as well as the signalized intersections at School Street, Norfolk Street, West Street and Chauncy Street (Route 106). Route 140 crosses into Foxborough and includes signalized intersections with Forbes Boulevard and Fisher Street, an interchange with I-95, Walnut Street, the Foxborough (Ocean State Job Lot) Shopping Plaza, Central Street with the study area ending just past the Foxborough Regional Charter School.

There are 9 signalized intersections within the study area, as well as two highway interchanges with Interstate 495 and Interstate 95. (See Figure 1- the Study Area.)



The Route 140 Study Area

Common Concerns

Common concerns voiced in all three communities were additional traffic/congestion due to ongoing and future development and safety concerns, particularly with the difficulty and danger associated with left turns onto Route 140 from uncontrolled intersections.

A significant number of people commented on the lack of multimodal accommodations throughout the corridor, especially for pedestrians. Representatives from GATRA commented on the need for Bus Turnouts.

In the town of Norton, the most prevalent concerns included:

- The signalized intersection of Route 140 at Route 123;
- The access and egress driveways to the Roche Brothers Plaza. Specifically, the desire and requests for signalization at the most northern driveway that intersects with the Wingate / EPOCH Assisted Living & Senior Health Care Center;
- The significant lack of sidewalks and other accommodations for pedestrians and bicyclists;
- The difficulty in accessing their own homes during an event at the Xfinity Center; and
- There were also a significant number of comments concerning the access to New England Ice Cream and how it was allowed directly onto Route 140, adding to the access management, safety and congestion issues already present along this stretch of road.

In the town of Mansfield, the most prevalent public concerns included:

- The congestion at the intersection of Route 140 at Route 106 (Improvements planned by MassDOT for FFY2019 project # 608053);
- The malfunctioning of the signal system causing vehicular conflicts and a large number of crashes at the intersection of Route 140 at School Street (Improvements planned by MassDOT for FFY2017 project # 608751);
- Red-light-running and the need for additional enforcement along the corridor;
- Traffic congestion caused by events at the Xfinity Center;

- Most comments were in favor of the addition of an I-495 northbound on-ramp to allow traffic to go southbound; and
- Unnecessary traffic control for northbound thru movements at the Route 140 (South Main Street) at I-495 ramps intersection (Improvements planned by MassDOT for FFY2017 project #608751).

In the town of Foxborough, the most prevalent public concerns included:

- The lack of safety for left-turning vehicles both to access or egress the Route 140 corridor, particularly at the intersection of Route 140 at Walnut Street, at the intersection of Route 140 at Central Street, and at the access to the Ocean State Job Lot Plaza (Foxborough Plaza) and the Dunkin Donuts within; and
- The congestion caused by the Foxborough Regional Charter School during drop-off and pick-up times.

Additional issues of concern mentioned include the intersection of Route 140 at Fisher Street and its close proximity to Interstate 95, the intersection of Route 140 at Forbes Street, and the development within the Foxborough Plaza.

Corridor Wide Recommendations

In order to address common concerns related to safety and the lack of multimodal accommodations throughout the corridor it is recommended that the cross section of the Route 140 corridor have a consistent layout with multi-modal accommodations for all road users. Also, to accommodate transit, bus turn-outs need to be included in the design where deemed appropriate. Ideally, the roadway layout should consist of two 11-foot travel lanes, two 5-foot bicycle lanes and two 6-foot sidewalks. A consistent lane width of 11 feet throughout the corridor will provide clear delineation and promote lower speeds.



A pedestrian walking on the gravel shoulder on Route 140 across from the Produce Barn in Norton.

To address overall safety and congestion along the corridor, serious consideration needs to be given to an Access Management Plan by the communities.

This plan should include the consolidation of curb cuts, as well as promoting and making cross access between businesses available. There are numerous areas along the Route 140 corridor where Access Management is needed. These locations have a good number of curb cuts located in close proximity to one another, have curb cuts that are located too closely to an intersection or have curb cuts that are not clearly marked or are much too wide, contributing to safety and congestion issues on the corridor.

Curb cut access should be limited and opening widths of curb cuts reduced whenever possible. Such driveways create opportunities for crashes that can be fatal or injurious. Access

Management should also be considered in all future development along the corridor. For more detail, please see Safety & Access Management on page 79 of the study.



The Route 140 Study Area in Norton

Norton Recommendations

Route 123 (East & West Main Street) Intersection

Consideration should be given to the realignment of Route 140 to create a four-way intersection with Route 123. Two options for consideration include: a realignment of Mansfield Avenue through Library Square in a southerly direction; or a realignment of Taunton Avenue through the church parking area in a northerly direction. Because the realignment through Library Square would infringe on the heart of the Norton Center Historic District, and was met with great opposition from the public and town officials alike during the public process it is recommended that the realignment through the church parking lot be considered as the sole option.

Realignment of this intersection would include the need for additional/extended storage lanes. Ideally, the northbound approach would consist of three lanes (an exclusive left-turn lane, a thru lane and a right-turn lane) to accommodate the heavy volumes of turning vehicles. The westbound, eastbound, and southbound left-turn lanes would all be extended to 150 feet. If these improvements were to be implemented today the intersection would operate at a LOS C. In 2040 the intersection is forecasted to operate at LOS D with motorists experiencing 46 seconds of delay. Future traffic growth projections only worsen the existing delay at this intersection.

Regardless of improvements, the addition of signal pre-emption equipment should be incorporated into the signal system. This equipment provides a temporary right-of-way for emergency vehicles to travel quickly and safely through the intersection. In addition, the pedestrian signal timing for the Route 140 northbound approach should be upgraded to meet current standards as outlined by the Manual on Uniform Traffic Control Devices (MUTCD).

There is a need for improvements at the pedestrian crosswalk at the northern terminus of Howard Street. The most pressing need is to repair the pedestrian signal. Future improvements for enhanced visibility should consider removing/relocating the utility box and pole blocking pedestrian sight lines here and the installation of pedestrian signage.

Reservoir Street to Smith Street

The overall improvement recommendation for the Route 140 corridor in Norton is for a consistent cross section with multi-modal accommodations (consistent travel lanes, bicycle lanes and sidewalks). There is also a need for improved lighting along the corridor.

In addition, curb cut access should be limited and opening widths of curb cuts reduced whenever possible. Reducing the number of curb cuts will reduce conflict points and any potential confusion for motorists when multiple driveways and/or turning movements are involved. These driveways create situations where crashes can be fatal or injurious.

Great Woods Marketplace / Roche Brothers Plaza

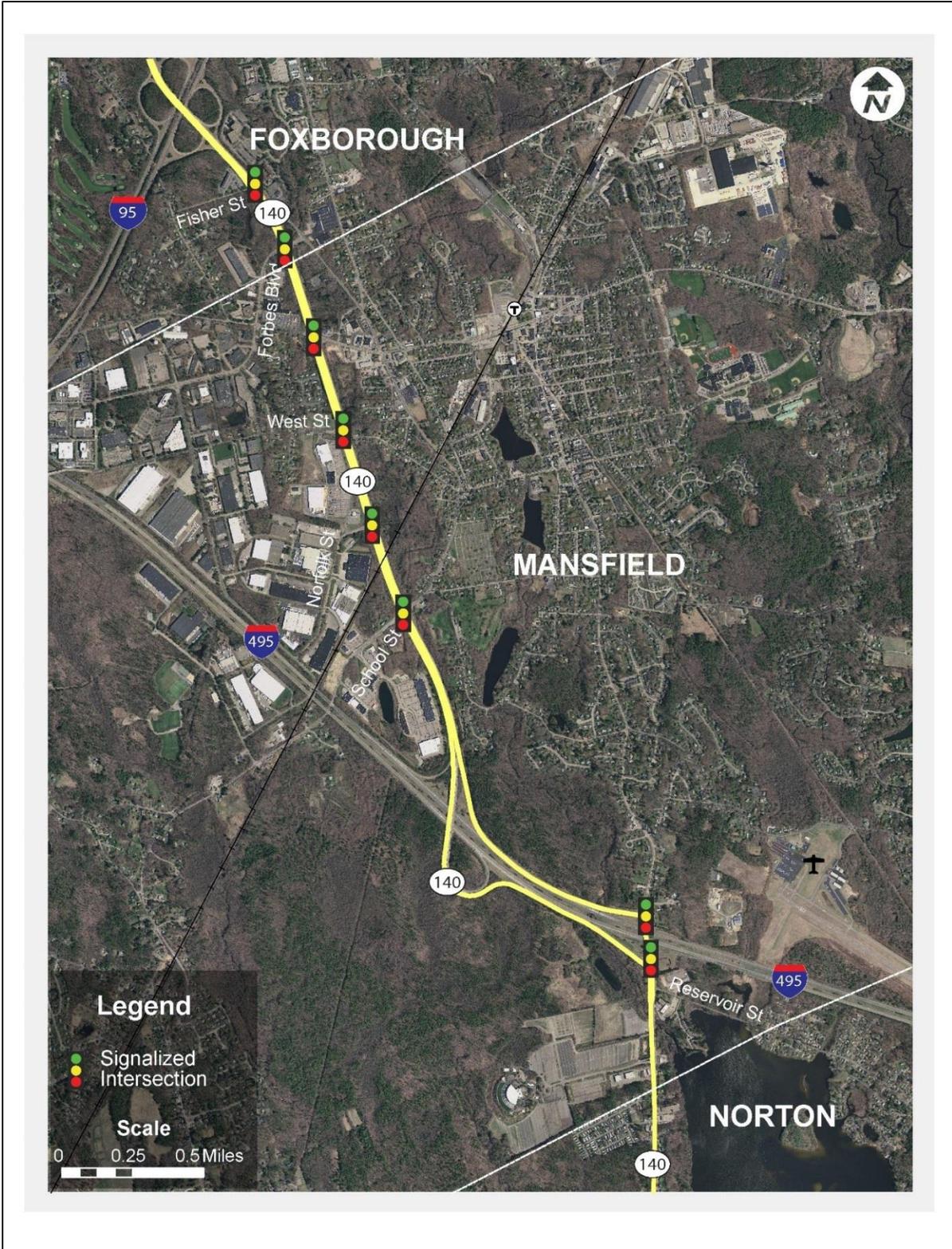
Although the crash rate was low at the southern driveway at the Great Woods (Roche Brothers) Plaza, local business employees stated that there are many “near misses” at this driveway. A 2005 study conducted by SRPEDD recommended access at this secondary driveway be limited to *right-turns-in* and *right-turns-out* only with geometric modifications to physically prevent left turns in and out of this entrance. These changes were never implemented by the management of the Great Woods Plaza.

In addition, the overall recommendation for a consistent cross section along the corridor with multi-modal accommodations (consistent travel lanes, bicycle lanes and sidewalks) will assist with reducing speeds along the corridor and provide safer opportunities for left turning vehicles along this segment of roadway.

Arnold Palmer Boulevard to the town line

The numerous driveways along this section of Route 140 create conflict points that increase the potential for vehicle crashes. Compounding this problem is the geometry of the roadway, with narrow lanes, little to no shoulders and traffic traveling at high speeds. The town should adopt an Access Management Plan to alleviate conflict points and delay due to left-turning vehicles.

This plan should include the consolidation of curb cuts and promote cross access between adjacent businesses. Cross access is when two or more adjacent properties share an access driveway or allow access between properties. There are numerous areas along the Route 140 corridor where Access Management is needed. These locations have a number of curb cuts located in close proximity to each other, are located too close to an intersection, are not clearly marked, are too wide, or contribute to safety and congestion issues throughout the corridor.



The Route 140 Study Area in Mansfield

Mansfield Recommendations

Interstate 495 on- and off-ramps

There is currently no existing I-495 northbound off-ramp to Route 140 (South Main Street). A northbound off-ramp was not initially built into the interchange due to public opposition from nearby residents over the proposed land takings, involving one or more private homes, needed for the construction. These same objections could continue to prove to be a challenging obstacle to the future construction of this ramp as was evident through our public outreach efforts during this study.

During the course of this study, an analysis was conducted using SRPEDD's Regional Travel Demand Forecasting Model. The model analyzes existing traffic operations for the entire SRPEDD region and forecasts future traffic patterns based on projected growth in the region. This area is expected to see a robust amount of continued development.

The analysis indicates that a northbound exit ramp from Interstate 495 to Route 140 will be heavily used and will accommodate the projected traffic from future developments, providing easier access to Route 140 southbound, the XFINITY Center and Norton. The analysis also shows a substantial savings in Vehicle Miles Traveled due to an estimated 6,850 vehicle trips per day using the new ramp if built. These nearly 7,000 vehicle trips would have direct access to South Main Street (Route 140) from I-495 northbound and would no longer be forced to take alternate routes, alleviating congestion on Route 123 in Norton, School Street in Mansfield and other surrounding roads. The expected increased development will only worsen traffic congestion on these alternate routes without the addition of the ramp.

School Street Intersection

The most pressing issue is to repair or replace the pedestrian signal button located at the northwest corner of the School Street intersection. It has components missing and is completely inoperable at this time.

There are improvements planned at this intersection by MassDOT. This intersection is included in the list of Transportation Improvement Program (TIP) projects for FFY2017 (project # 608751). SRPEDD is in contact with MassDOT to determine if the pedestrian signal button and issues concerning westbound left turning traffic is included in the scope of the project. Following the completion of the project SRPEDD recommends that traffic and crashes be reevaluated to determine if additional measures are warranted.

Consideration should be given to an Intelligent Transportation System (ITS) warning sign to alert motorists of the approaching signal being red.

Optimization of the signal system will improve the existing delay from 41 to 39 seconds, however the LOS remains at D.

Traffic growth projections indicate operations at this intersection, will decline and operate at a LOS E with vehicles experiencing 56 seconds of delay by 2040. Signal optimization will improve operations to a LOS D with motorists experiencing 51 seconds of delay.

Norfolk Street Intersection

By optimizing the existing signal phasing, the intersection at Norfolk Street will still operate at a LOS D but the delay will only decrease by 5 seconds from 52 to 47. In 2040 the intersection is forecasted to operate at LOS E with motorists experiencing 73 seconds of delay. Optimization of the signal will decrease future delay by 10 seconds to 63.

West Street Intersection

By optimizing the signal phasing the intersection at West Street will still operate at a LOS B as the delay will only decrease by 2 seconds from 20 to 18. In 2040 the intersection is forecasted to operate at LOS C with motorists experiencing 26 seconds of delay. Optimization of the signal will decrease future delay by 4 seconds to 22. The pedestrian signal timing is presently inadequate and should be upgraded to meet current standards as outlined by the Manual on Uniform Traffic Control Devices (MUTCD).

Chauncy Street (Route 106) Intersection

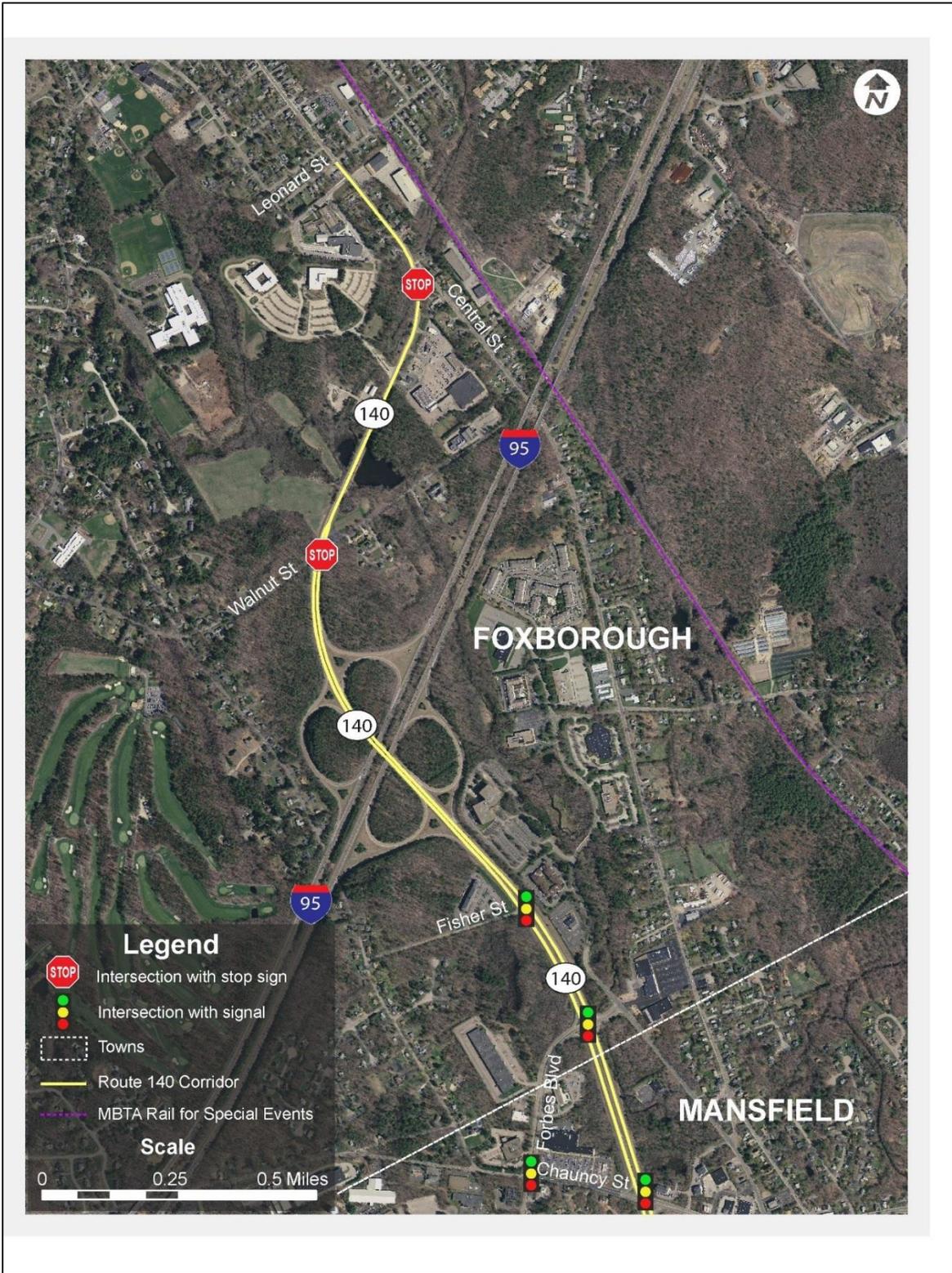
Based on the analysis of the Chauncy Street intersection, SRPEDD offers the following recommendations for geometric modifications:

- the addition of a southbound left-turn lane;
- the extension of the westbound approach to 350 feet; and
- the extension of the southbound right-turn lane to 300 feet.

In addition, optimization of the signal timing will potentially improve the LOS to D with 49 seconds of delay per vehicle, a substantial improvement over current conditions.

Without any improvements the intersection will continue to operate at a LOS F with motorists experiencing more than 120 seconds of delay in 2040. Optimization of the signal system with the

future projected traffic growth will improve the delay to 101 seconds of delay per vehicle. Implementation of the recommendations with optimization will improve the LOS to E with 72 seconds of delay per vehicle, a substantial improvement over a 'no-build' scenario.



The Route 140 Study Area in Foxborough

Foxborough Recommendations

Forbes Boulevard Intersection

Based on traffic growth projections to the year 2040, the intersection of Route 140 at Forbes Boulevard will worsen to LOS F with 96 seconds of delay per vehicle. Based on the traffic distribution through the intersection, an additional westbound right lane and an additional eastbound approach lane to provide two left-turn lanes and one thru lane is recommended. Implementation of these improvements will improve the operation to a LOS D with 49 seconds of delay, a substantial improvement. Traffic conditions at LOS D are considered tolerable.

Consideration should be given to an Intelligent Transportation System (ITS) warning sign to alert motorists, especially those exiting from I-95, of the approaching signal being red.

A roundabout is proposed east of the intersection at Forbes Boulevard and Foxborough Boulevard to assist with traffic mitigation for the Foxfield Plaza redevelopment project. At this time, the roundabout project is on hold.

Fisher Street Intersection

Consideration should be given to extending the all-red clearance interval at this signal system, as and additional signage, such as “Intersection Ahead” for vehicles exiting I-95 north of the intersection. Consideration should also be given to an Intelligent Transportation System (ITS) warning sign to alert motorists of the approaching signal being red.

Walnut Street Intersection

A signal warrants analysis was conducted for the intersection which analyzes traffic conditions, pedestrian characteristics, and physical conditions to determine whether installation of a traffic control signal is justified. Based on this analysis, this intersection is a candidate for a signal.

Implementation of a signal would improve the existing LOS from a B to an LOS A with 5 seconds of delay per vehicle and would improve safety by protecting vehicles making turns onto Route 140. The addition of future traffic growth will not worsen the LOS, as the delay will increase slightly to 7 seconds of delay per vehicle with signalization in 2040.

Included with any design of a signal system should be an advanced warning signs (Signal Ahead) on Route 140 due to the layout of the roadway.

Foxborough (Ocean State Job Lot) Plaza

With 4 driveways providing access to the plaza, this leads to confusion over which driveway to use and where cars are actually turning. There are also sight distance issues related to the curvature of the road and obstructions along the side of the road that make exiting the plaza difficult. The wide cross-section of the roadway at this location lends itself to higher speeds and evasive driver movements.

Reducing the width of the travel lanes and adding infrastructure such as bicycle lanes will help to calm traffic. Consideration should also be given to investigating whether driveways can be combined or reconfigured at the plaza to reduce the number of conflict points and if obstructions to sight distance can be removed or minimized. Wayfinding signage should also be considered to allow for better guidance in and out of the plaza.

Central Street Intersection

A signal warrants was conducted for the Central Street intersection which analyzes traffic conditions, pedestrian characteristics, and physical conditions to determine whether installation of a traffic control signal is justified. The results indicated that this intersection is a candidate for a signal. If a signal were installed under current traffic volumes the intersection would improve from an LOS D to an LOS C with 21 seconds of delay per vehicle. It would also make turning onto Route 140 easier and safer.

By 2040 the intersection will continue to operate at a LOS C with 31 seconds of delay per vehicle based on projected traffic patterns. LOS A through C is considered acceptable because it provides an adequate quality of service to motorists.

Included with any design of a signal system should be an advanced warning sign (Signal Ahead) on the approaches of Route 140 due to the layout of the roadway.

As an interim improvement, consideration could be given to stripe the roadway to allow for a free-flow right turn from Central Street.

The Foxborough Regional Charter School (FRCS)

Since the commencement of this study, the school has expanded and added a secondary access which has alleviated some of the congestion at the primary entrance. Since the beginning of the school year the Foxborough Police Department has voiced concerns with the traffic flow into the Charter School at the new secondary Commercial Street entrance. Motorists driving along Route

140 are delayed by left-turning vehicles attempting to enter the new school entrance with many motorists using the break down lane to pass left-turning vehicles on the right.

Since that time, a project has been initiated to realign the Route 140 northbound approach to the secondary driveway (33 Commercial Street) providing a left-turn lane. The school and town officials are coordinating this effort with MassDOT.

SRPEDD recommends that traffic conditions continue to be monitored once the realignment is implemented to determine the effectiveness of this change to traffic flow

The Route 140 Corridor Study

Introduction

The Massachusetts Department of Transportation (MassDOT) requested that Southeastern Regional Planning & Economic Development District (SRPEDD) conduct a study of the Route 140 Corridor through the towns of Foxborough, Mansfield and Norton. This was precipitated by a letter of request, dated August 20, 2015, delivered to the MassDOT District 5 Office from Massachusetts Senator James Timilty and Massachusetts Representatives Jay Barrows and Steven Howitt. The area of concern includes Route 140 at the intersection with Route 123 in Norton, extends north through the entire length of Mansfield into Foxborough up to Leonard Street and includes the Foxborough Regional Charter School (FRCS). The letter cited growing congestion and safety concerns at various intersections along the corridor and anticipated development surrounding this particular corridor might exacerbate the existing problems. The town managers, town planners & DPW directors of all three communities were consulted during this process.

The study began in the spring of 2016 with the collection of data (traffic counts, crash reports, levels of service, etc.) to determine the locations and the extent of both safety and congestion issues currently along the corridor. SRPEDD also looked at land use and development in the three communities and attempted to anticipate how this growth will affect the existing traffic issues into the future.

SRPEDD is able to forecast future traffic by using the Travel Demand Model, a computer program that analyzes existing traffic operations for the entire SRPEDD region and forecasts future traffic patterns based on projected growth in the region.

The intent of this study is to address present issues, recommend measures to address future issues and provide recommendations on specific improvements necessary to resolve traffic congestion and safety issues for consideration by MassDOT and the three communities.

Public Outreach

Before the commencement of the Route 140 transportation study, a public outreach strategy was devised. This public outreach effort was developed to inform the public, including local residents, business owners and any interested parties of the study and to encourage and garner feedback on the issues facing the corridor in all three communities. The initial strategy entailed holding three public outreach meetings, one in each of the three communities and to conduct a public survey.

Meeting notices were created and distributed to inform as many residents and business owners as possible about the study and to encourage comments and feedback from anyone who lives, works and travels on or near the Route 140 corridor in any of the three communities. The unique experiences and insight from people who live, work and travel in the area is invaluable.

SRPEDD is holding public information meetings to discuss potential improvements to the **Route 140 Corridor** from the Regional Charter School in **Foxborough** through **Mansfield** to Route 123 in **Norton**. Foxborough, Mansfield and Norton residents and business owners are invited to come and learn more, as well as to offer comments and express concerns. Everyone is welcome.

Please come to one of the public information meetings: 

The Boyden Library ~ 10 Bird Street, Foxborough, MA
Monday, May 16, 2016 ~ 4 pm to 7 pm

The Norton Public Library ~ 68 E. Main Street
Monday, May 23, 2016 ~ 4 pm to 6:30 pm

The Mansfield Public Library ~ 255 Hope Street
Tuesday, May 24, 2016 ~ 4 pm to 7 pm

<p>TO COMMENT ANYTIME:</p> <p>Call: 508 824-1364 Use Postal Mail: Fax: 508 823-1803 88 Broadway E-mail: lcabral@srpedd.org Taunton, MA 02780</p> <p style="text-align: center;">~ or ~</p> <p>Visit our website at www.srpedd.org</p> <p style="text-align: center;"><small>Or SRPEDD Facebook Page</small></p>	<p>Please Take a Survey about the Route 140 Corridor</p> <div style="text-align: center;">  </div> <p style="text-align: center;">https://www.surveymonkey.com/r/Route140</p>
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 Si ou bezven sa a tradui yo nan lang angle tanpri kontakte nou.



These locations are accessible to people with disabilities. Norton site is within ¼ mile and Mansfield site is ½ mile from a public transit route. Upon request, every effort will be made to provide accommodation or language assistance. Please contact SRPEDD's Title VI Coordinator by phone (508 824-1367), fax (508 823-1803), or by email lcabral@srpedd.org. Requests should be made as soon as possible prior to the meeting.

Figure 1 - The Public Meeting Notice with information on the first 3 public meetings

A meeting notice for each of the three meetings was distributed within each respective community. An additional meeting notice, including information for all three meetings, was also created for wider distribution. (See *Figure 1 on the previous page.*)

The notice for the Mansfield public meeting was distributed at the Mansfield town meeting on May 3, 2016, while the Foxborough and Norton meeting notices were distributed at those community's respective town meetings, both held on May 9, 2016. Meeting notices were also sent to the town clerks in each town for public posting and to the tri-town Chamber of Commerce, as well as distributed by SRPEDD staff to businesses along the Route 140 corridor and surrounding areas in all three communities. The meeting notices were also posted on SRPEDD's webpage, Facebook page, Twitter feed and on all three of the communities' websites. Over 1,000 public meeting notices were distributed. All meeting notices can be found in Appendix A.



Figure 2- the public meeting held at the Boyden Library in Foxborough on May 16, 2016

All three public meetings were well attended. The Foxborough meeting was held on Monday, May 16, 2016 at the Boyden Library from 4-7 pm with over 50 participants in attendance. (See *Figure 2 above.*) The Norton meeting was held on Monday, May 23, 2016 at the Norton Public Library from 4-6:30 pm with over 40 participants in attendance. The Mansfield meeting was held on Tuesday, May 24, 2016 at the Mansfield Public Library from 4-7 pm with approximately 30 participants in attendance. Participants at all three public meetings included representatives of MassDOT, officials from the respective towns of Foxborough, Mansfield and Norton, including

planning, DPW, fire and police, and selectmen, as well as Massachusetts Representative Jay Barrows and staff from Representative Howitz and Senator Timilty's offices. (The last 3 public meetings, held at the end of 2017 to present recommendations, were all attended by a representative of Senator Paul R. Feeney's office, who filled the open Senate seat created by Senator Timilty's resignation.)

Additional attendees at one or more of the meetings included representatives from Norwood Hospital, the Councils on Aging and the tri-town Chamber of Commerce, Keep Mansfield Beautiful, North Easton Savings Bank, Clemco, GATRA, the Xfinity Center, members of the news media, and other local business owners and residents of all three communities.

The hand distribution of meeting notices to businesses along the corridor presented the opportunity for person-to-person contact and conversations which resulted in valuable information and comments with employees, business owners, and local residents of all three communities. All comments received through the public process, both written and verbal, can be found in Appendix B.

All meeting notices included the location, date and time of the meeting, as well as other options and methods for commenting such as e-mail, phone, fax, SRPEDD's website and Facebook page in lieu of attendance at any of the meetings. Also included were offers of translations into three other languages, an offer of accommodations and accessibility information, as well as a Title VI notification of nondiscrimination. The meeting notices also included a web address and a QR reader that linked to the public survey on Survey Monkey concerning the travel experience on the Route 140 Corridor. Sign-in sheets from all public meetings are attached as Appendix C.

The survey enabled the collection of travel data for Route 140, including the origin and destination of motorists, the frequency, the length, and the purpose of travel trips, and how often alternate routes are taken to avoid Route 140 congestion.

The survey was live from May 2, 2016 through June 6, 2016 and netted 510 responses. Out of the 510 respondents, 286 left additional comments ranging from general comments related to the lack of facilities for walking and bicycling such as lanes and sidewalks; the overdevelopment of the corridor; congestion along the corridor; and speeding and red light running. These comments also enabled us to focus on specific areas and intersections most mentioned by respondents as having safety and congestion issues. A summary of the survey findings can be found in Appendix D.

The first round of public meetings netted approximately 20 written comments and dozens of additional verbal comments, suggestions and concerns. SRPEDD also received over 450 comments through the survey, by e-mail, our Facebook page and the open house meetings. The

comments from the public meetings and from the survey dealt with many of the same issues and concerns along the corridor.

Four additional public meetings were subsequently held to present initial findings and recommendations. Notices were distributed along the corridor, placed on SRPEDD's Facebook page and Twitter account. The first meeting, held on February 16, 2017 at the Mansfield Town Hall was to present the initial findings of the study and to keep all interested parties apprised of progress. The final three meetings were held in each community to discuss the findings of this study and to present recommendations.

The first meeting to present the study's recommendations was held in Mansfield on Tuesday, November 14, 2017 at the Mansfield Town Hall and presented the recommendations for the Mansfield portion of Route 140. The second meeting was held in Foxborough at the Boyden Library on Thursday, November 30, 2017 to present recommendations for the Foxborough portion of Route 140, while the third meeting was held at the Norton Public Library on Tuesday, December 5, 2017 to present recommendations for the Norton portion of the corridor.

The Study Area

The Route 140 corridor, also known as Mansfield Avenue in Norton, South Main Street and Commercial Street in Mansfield, and Commercial Street and Central Street in Foxborough, is a north/south running corridor, owned and maintained by MassDOT. The study area encompasses nearly 8 miles of roadway beginning at the intersection with Route 123 in Norton, extending north through the entire expanse of Mansfield and continues into the town of Foxborough just past the Foxborough Regional Charter School to Leonard Street. (*See Figure 3 next page.*)

Route 140 varies from a two-lane road through commercial properties and residential neighborhoods in Norton to a four-lane divided highway in Mansfield and back to a two-lane road in Foxborough leading to the center of town. It is designated as an urban minor arterial from Route 123 in Norton to Route I-495 in Mansfield, where its designation changes to an urban principal arterial north to I-95 in Foxborough. At this point, its designation changes once again and becomes an urban minor arterial from I-95 to Leonard Street. This road provides access to various retail, commercial, industrial and residential land use within all three communities and directly connects to the neighboring communities of Taunton to the south and Wrentham to the northwest.

In Norton, beginning with the signalized intersection of Route 140 at Route 123, the study area encompasses parts of Wheaton College, the Norton Reservoir, the Great Woods Marketplace (Roche Brothers, Dunkin Donuts and McDonalds), and the TPC Boston Golf course. Route 123

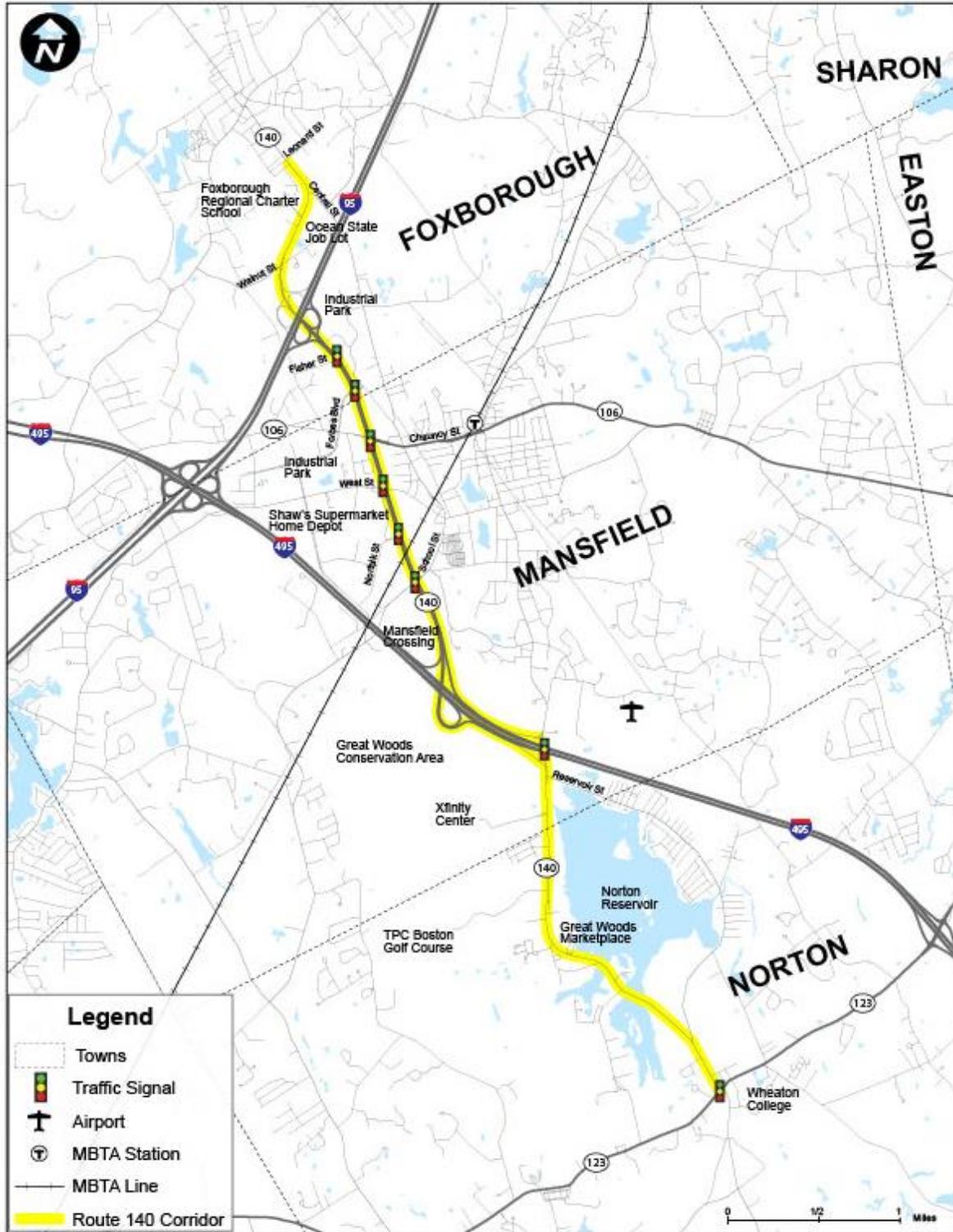


Figure 3 - The Route 140 Study Area

provides a direct connection to the city of Attleboro to the east and to the town of Easton to the west.

At the town line with Mansfield the study area includes the Xfinity Center and the Great Woods Conservation area, followed by an interchange to I-495 which is controlled by two separate traffic signals. Route 140 shares a brief stretch of highway with I-495, before it then splits off and continues north past a shopping plaza that includes Home Depot and Shaw's Supermarket, as well as the signalized intersections at School Street, Norfolk Street, West Street and Chauncy Street (Route 106). School Street provides access to Mansfield Crossing, which includes over 30 retail outlets and several restaurants. Both Norfolk & West Streets provide access to the Cabot Business Park and to the shopping plaza that houses Home Depot, Shaw's Supermarket, Staples and Longhorn Steakhouse. Chauncy Street (Route 106) also provides access to the Cabot Business Park and to the town of Plainville to the west, and access to the Mansfield MBTA train station to the east.

Route 140 continues into Foxborough and includes signalized intersections with Forbes Boulevard and Fisher Street, an interchange with I-95, Walnut Street, the Foxborough (Ocean State Job Lot) Shopping Plaza and Central Street, with the study area ending just north of the Foxborough Regional Charter School. There are 9 signalized intersections within the study area, as well as two highway interchanges with Interstates 495 and 95. Forbes Boulevard provides access to the Red Roof Inn, a Super Stop & Shop, and the Cabot Business Park to the west, and Foxborough Boulevard and the Foxfield Plaza to the east. Fisher Street provides access to the Comfort Inn and the 99 Restaurant, as well as to the Red Roof Inn and Route 106 via South High Street to the west.

Common Concerns

Common concerns voiced in all three communities were additional traffic and congestion due to ongoing and future development. In addition to congestion, comments included safety concerns, particularly with the difficulty and danger associated with left turns onto Route 140 from uncontrolled intersections.

A significant number of people commented on the lack of multimodal accommodations throughout the corridor, especially for pedestrians. Representatives from GATRA commented on the need for Bus Turnouts.

In the town of Norton, the most prevalent concerns included:

- The signalized intersection of Route 140 at Route 123. Issues at this intersection include traffic congestion, the difficulty with truck turning movements, the absence of an Emergency Pre-Emption System (traffic signal priority control for police, fire and other emergency vehicles), the proximity of the Post Office driveway to the intersection and the queued vehicles that block this particular driveway and contribute to congestion;
- The access and egress driveways to the Roche Brothers Plaza. Specifically, the requests for signalization at the most northern driveway that intersects with the Wingate/EPOCH Assisted Living & Senior Health Care Center. Also, the need for right-turn-in only and right-turn-out only control at the southern driveway which provides direct access to the Dunkin Donuts within the Plaza and intersects with the North Eastern Savings Bank driveway directly across from the west. (The right-turn-in and right-turn-out only control was recommended at this location in the Mansfield Avenue study completed in 2004 and revised in January 2005, SRPEDD);
- The significant lack of sidewalks and other accommodations for pedestrians and bicyclists. Local residents mentioned the difficulty in accessing their own homes during an event at the Xfinity Center. Residents of Norton Estates stated that it was quicker to access their desired destinations on foot rather than by vehicle during Xfinity events; and

- There were also a significant number of comments concerning the disappointment that access to New England Ice Cream was not being provided through the TPC Boston Golf Course property but instead directly onto Route 140, adding to the access management, safety and congestion issues already present along this stretch of road.

In the town of Mansfield, the most prevalent public concerns included:

- The congestion at the intersection of Route 140 at Route 106. (Improvements planned by MassDOT for FFY2019, project # 608053);
- The malfunctioning of the signal system causing vehicular conflicts and a large number of crashes at the intersection of Route 140 at School Street. (Improvements planned by MassDOT for FFY2017, project # 608751);
- Red-light-running and the need for additional enforcement along the corridor;
- Traffic congestion caused by events at the Xfinity Center;
- Ten people specifically mentioned and favored the addition of an I-495 northbound off-ramp to Route 140 which would allow traffic to go southbound while one comment opposed the addition of the ramp; and
- Unnecessary traffic control for northbound thru movements at the Route 140 (South Main Street) at I-495 ramps intersection traffic signal. (Improvements planned by MassDOT for FFY2017, project #608751).

In the town of Foxborough, the most prevalent public concerns included:

- The lack of safety for left-turning vehicles both to access or egress the Route 140 corridor, particularly at the intersections of Route 140 at Walnut Street, Route 140 at Central Street, and at the access to the Ocean State Job Lot Plaza (Foxborough Plaza) and the Dunkin Donuts within; and
- The congestion caused by the Foxborough Regional Charter School during drop-off (AM) and pick-up (PM) times. This congestion causes impatient motorists to use side streets, as well as the Central Street Office Park as a cut-through, often speeding through a parking area for a pediatrician's office.

Additional concerns include the intersection of Route 140 at Fisher Street and its close proximity to Interstate 95, the intersection of Route 140 at Forbes Street, and the development within the Foxborough Plaza.

Corridor Wide Recommendations

In order to address common concerns related to safety and the lack of multimodal accommodations throughout the corridor it is recommended that the cross section of the Route 140 corridor have a consistent layout with multi-modal accommodations. In other words, consistent travel lanes, bicycle lanes and sidewalks. (See *Figure 4 below.*) Also, to accommodate transit, bus turn-outs need to be included in the design where deemed appropriate. Ideally, the roadway layout should consist of two 11-foot travel lanes, two 5-foot bicycle lanes and two 6-foot sidewalks. A consistent lane width of 11 feet throughout the corridor will provide clear delineation and promote lower speeds. The MassDOT design guide states that minimal lane widths can reduce vehicle speeds and that lane widths of 11 feet are appropriate on arterials. (Please see *Figures 5 & 6 on next page.*)



Figure 4 - A pedestrian walking on gravel shoulder on Route 140 across from the Produce Barn in Norton

To address overall safety and congestion along the corridor, serious consideration needs to be given to an Access Management Plan by the communities for existing or future development. Access Management is the regulation of interchanges, intersections, driveways and median openings (curb cuts) to a roadway, enabling access to land uses while maintaining roadway safety and mobility.

This plan should include the consolidation of curb cuts and promote cross access between adjacent businesses. Cross access is when two or more adjacent properties share an access driveway or allow access between properties. There are numerous areas along the Route 140 corridor where Access Management is needed. These locations have a number of curb cuts located in close proximity to each other, are located too close to an intersection, or are not clearly marked, are too wide, or contribute to safety and congestion issues throughout the corridor.

Curb cut access should be limited and opening widths of curb cuts reduced whenever possible. Reducing the number of curb cuts will reduce conflict points and any potential confusion for motorists when multiple driveways and turning movements are involved. Curb cuts that are excessively wide create confusion for motorists who may have difficulty deciding where to position themselves, and to pedestrians, who will have a greater distance to cross and are vulnerable to being struck by an entering vehicle. Such driveways create opportunities for crashes that can be fatal or injurious.

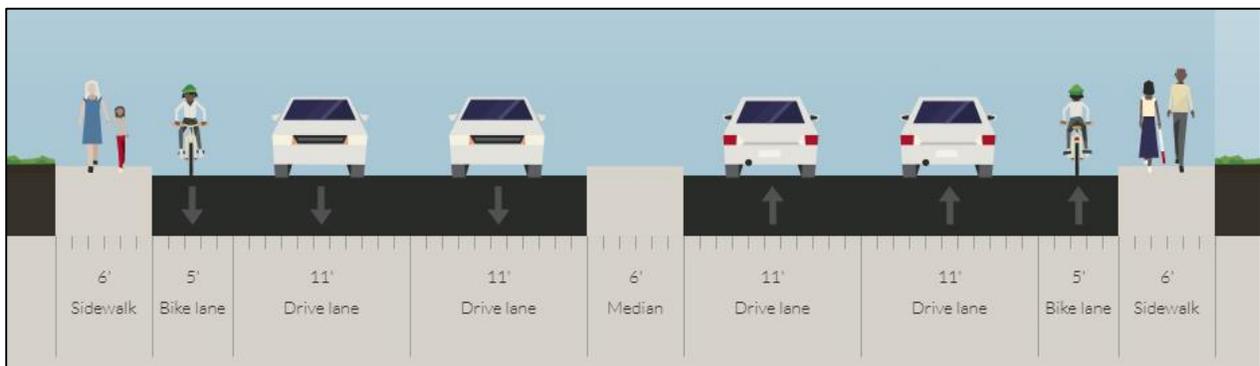


Figure 5 -Cross section of a two-lane roadway such as Route 140 in Norton

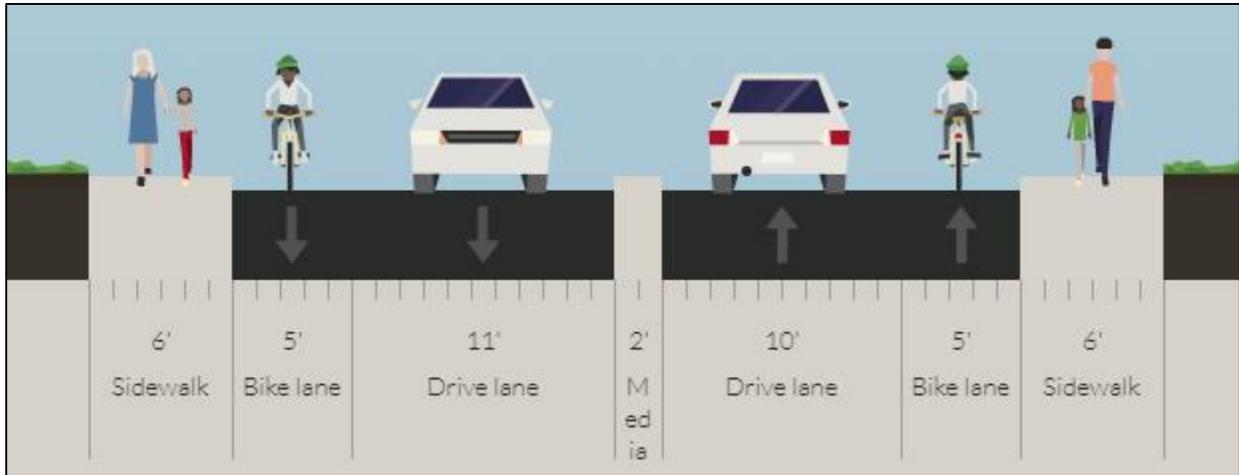


Figure 6 -Cross section of a four-lane roadway such as Route 140 in Mansfield & Foxborough

Access Management should also be considered in all future development along the corridor. For more detail, please see Safety & Access Management on page 80. For guidance, please see SRPEDD’s Access Management: Model Curb Cut Bylaw, available in the Resource Library of our website at www.srpedd.org or contact the SRPEDD office for further assistance.

The Route 140 Corridor in Norton

Existing Conditions

The Norton section of the study area, between Route 123 and the Mansfield town line, includes only one traffic signal. Route 140 in Norton is generally narrow, with travel lanes measuring between 11.5 to 12 feet with solid white edge lines with small or no usable shoulder throughout. The roadway is separated by a double yellow centerline, indicating no passing, with the exception of an area just north of Route 123 to 80 Mansfield Avenue, which is just prior to the Norton Reservoir when traveling northbound.

Within the study area, land uses on Route 140 are a combination of residential areas interspersed with businesses including small retail plazas, stand-alone businesses and restaurants, as well as Wheaton College. The college, as well as the intersection of Routes 140 & 123, and the town common, are located within the Norton Center Historic District.

The largest retail plaza is the Great Woods Marketplace, which includes the Roche Brothers Supermarket, Dunkin Donuts and McDonalds restaurant. There is also an assisted living complex, Wingate Residences, as well as North Easton Savings Bank located directly across from the plaza. Route 140 also crosses the southern end of the Norton Reservoir. Route 123 provides a direct

connection to the city of Attleboro to the east and to the town of Easton to the west. (See *Figure 7 on the next page.*)

Route 140 in Norton provides an 11.5 to 12-foot single lane of travel in both directions with uncontrolled channelized left-turn lanes at three locations. In the southbound direction, there is an uncontrolled channelized left-turn lane at the north entrance to the Great Woods Marketplace/Roche Brothers plaza. In the northbound direction, there are two locations that provide left-turn lanes. The first of these uncontrolled channelized left-turn lanes is at the entrance to Autopart International, which is located just north of the Great Woods Marketplace and the second uncontrolled channelized left-turn lane is located at Arnold Palmer Boulevard, which serves as the entrance to a business park and the TPC Boston Golf Course.

With the exception of a short span of asphalt sidewalk on the west side of the Route 140 roadway between Route 123 and Reservoir Street and a second span from the Norton Estates to the town line of Mansfield, there are no sidewalks along Route 140 in Norton. The sections of roadway adjacent to or crossing the Norton Reservoir provide guardrails, but no shoulder. These conditions provide no adequate accommodations for pedestrians and bicyclists along this section of the Route 140 roadway in Norton. There is also a lack of adequate lighting along the roadway.

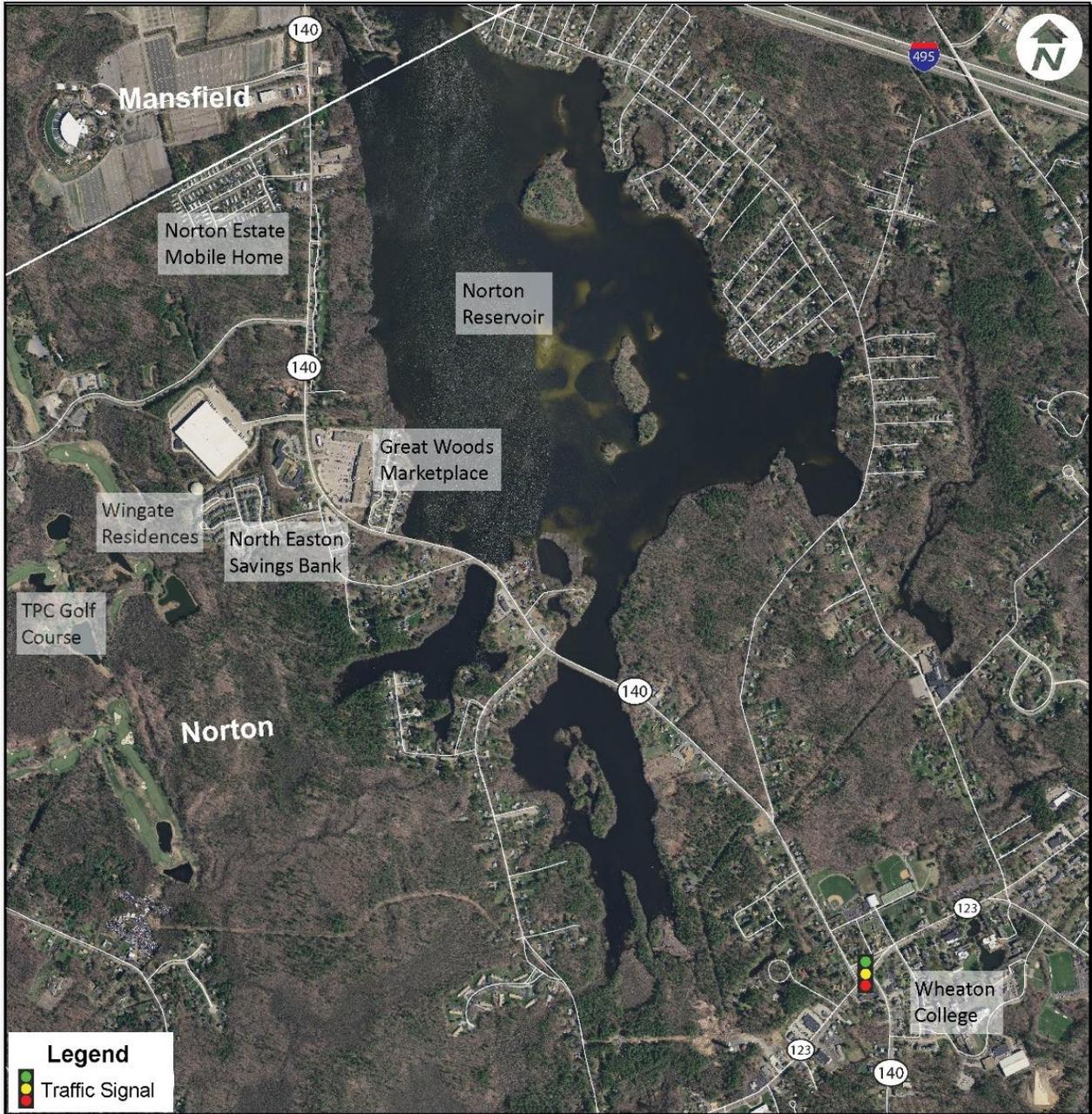


Figure 7 - The Route 140 Study Area in Norton

Automatic Traffic Recorders (ATR) were placed along various location on Route 140 to gather traffic data for the study. ATRs are regularly used to record the volume, speed and classification of vehicles for planning and design purposes. The volume of traffic on a roadway is calculated as Average Daily Traffic (ADT), which is an average of 24-hour volumes over a designated span of time (days and/or weeks). Vehicle speed is recorded as 85th percentile speed, which is the

speed at which 85% of vehicles are traveling at, or below, under free flowing traffic conditions. In other words, the speed that motorists tend to travel according to the road layout.

Vehicles counted are separated into 13 separate classes, from motorcycles to multi-trailer trucks. To simplify this, vehicles can be broken down into three general categories: the first being passenger vehicles, motorcycles and buses; the second being small (light) trucks of up to 3 axles; and the third category are vehicles of 4 or more axles such as construction vehicles and tractor trailers (heavy trucks). The second and third categories will be noted at each location counted. Anything over 2% for heavy truck traffic is considered significant.

Counters were placed on Route 140 at three locations in Norton with ADTs as follows:

- North of Smith Street - 16,400 ADT
- South of Arnold Palmer Boulevard - 17,500 ADT
- Mansfield Town Line - 17,800 ADT

The 85th percentile speeds were as follows:

- North of Smith Street - **46** mph
- South of Arnold Palmer Boulevard - **44** mph
- Mansfield Town Line - **44** mph

However, the posted speed limit is 40 mph between Route 123 and the Mansfield town line. This indicates that most motorists are exceeding the speed limit on this roadway.

Heavy and light truck percentages were as follows:

- North of Smith Street - light trucks **7%**, heavy trucks 1.2%
- South of Arnold Palmer Boulevard - light trucks **3.2%**, heavy trucks 1.1%
- Mansfield Town Line - light trucks **4.5%**, heavy trucks 1.5%

Based on this data, there is a significant volume of light truck traffic (vehicles with three axles), traveling the Route 140 corridor in Norton.

All of the traffic data collected, including the Average Daily Traffic, the 85th percentile speed and the percentage of trucks at each location counted is displayed on the map (*see Figure 8 on the next page*), which also shows the posted speed limits.

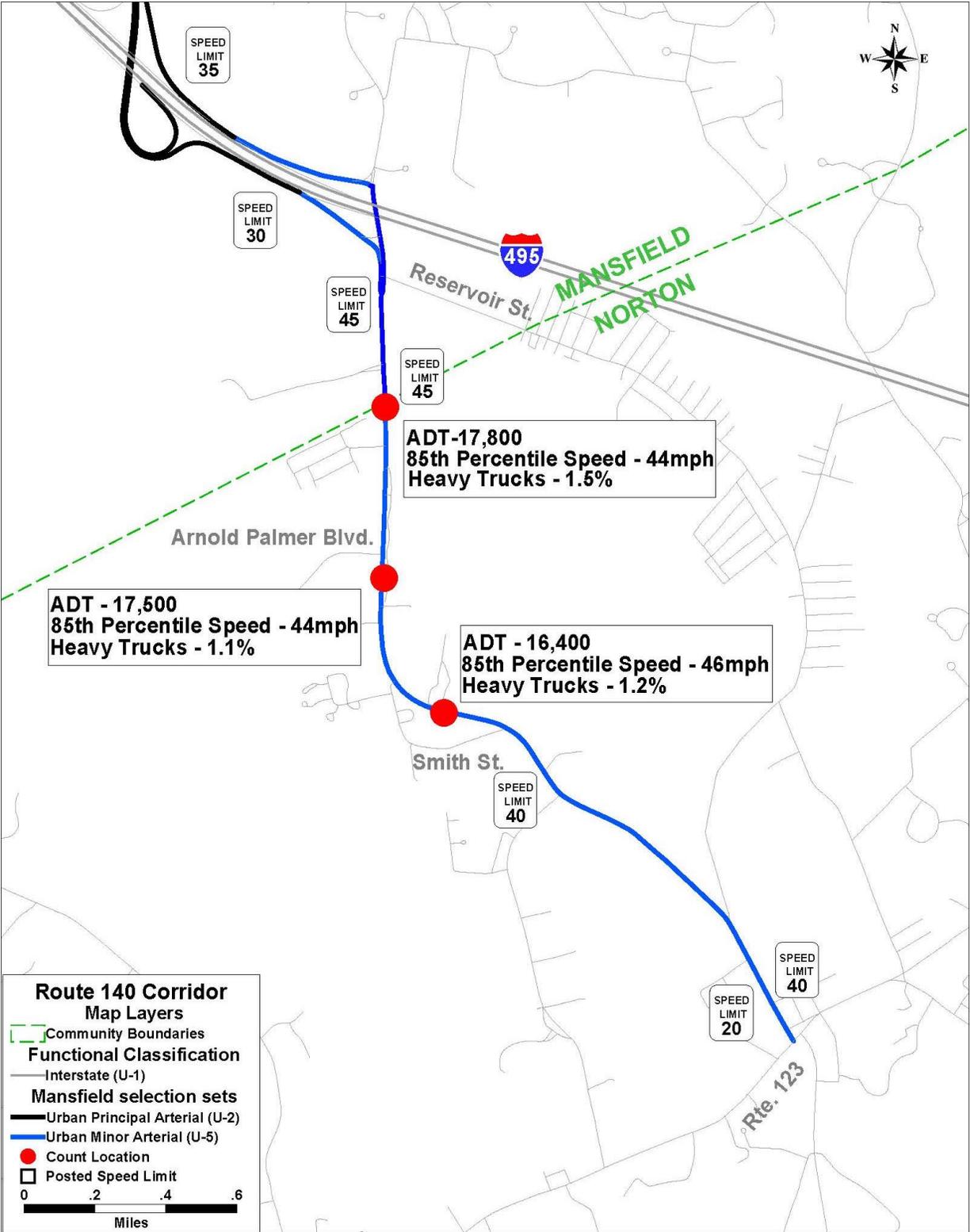


Figure 8 - Traffic Data on Route 140 in Norton

As part of SRPEDD's efforts to analyze the mobility and safety conditions along the Route 140 corridor, a Road Safety Team Review was held in each community. These meetings included a multidisciplinary team that reviewed crash data, discussed traffic volumes and speeds, and bicycle and pedestrian facilities along the corridor.

This multi-disciplinary team, including stakeholders such as the community's town managers/planners, police and fire departments, boards of selectmen, DPW's, as well as members of the staffs of SRPEDD and the MassDOT District 5 office, met on September 12, 2016 at the Norton Town Hall. The team discussed observations made in the field that could be contributing to safety and congestion issues along the corridor, which are discussed in more detail in the following section. The Road Safety Team Review report for the Norton portion of Route 140 can be found in Appendix E.

Intersections & Conflict Points

Route 123 (East & West Main Street) Intersection

The intersection of Route 140 (Taunton Avenue & Mansfield Avenue) with Route 123 (East & West Main Street) is a 4-way traffic signal controlled intersection, with the Route 140 approaches being misaligned or offset from each other. This separation causes northbound and southbound thru movements to be diverted to left-turn movements followed by right-turn movements through the intersection to continue travel on Route 140. In other words, a motorist traveling north on Route 140 is forced to take a left turn and then an immediate right to continue on Route 140. *(Please see Figure 9 on the next page.)*

The intersection of Routes 140 & 123 is located within the Norton Center Historic District, which encompasses the town common and Wheaton College. The Norton Town Common, a small triangular shaped park, (also called Library Square), is located at the southeast corner of this intersection. The common is bordered on its three sides by Mansfield Avenue (Route 140), East Main Street (Route 123), and Library Square, an approximately 500-foot roadway, designated as one-way westbound from East Main Street to Mansfield Avenue. Motorists often use Library Square as a cut-through from East Main Street to Route 140 northbound to avoid the wait at the traffic signal.

The Route 140 northbound approach, designated as Taunton Avenue, widens to two lanes at the intersection. There is an exclusive right lane that provides travel onto Route 123 eastbound and a left lane that provides travel onto Route 123 westbound or travel onto Route 140 northbound. These lanes can accommodate 7-8 queued vehicles each. Motorists can extend these queues by

3-4 additional vehicles by using the shoulder at the approach. Queueing on the Route 140 northbound approach can extend well beyond Howard Street (the southern terminus) during commuting hours which is approximately 25-30 vehicles. (Please see Figure 10 on the next page.)

The Route 140 southbound approach, designated as Mansfield Avenue, also widens to two lanes, an exclusive right lane provides continued travel onto Route 123 westbound and the left lane provides travel onto Route 123 eastbound or continued travel onto Route 140 southbound. These lanes can each accommodate 9-10 queued vehicles at the approach.



Figure 9 - Route 140 at Route 123 in Norton

The Route 123 eastbound approach widens to two lanes at the intersection, an exclusive left-turn lane onto Route 140 northbound and the right lane acting as a thru lane providing continued travel on 123 eastbound or a right turn onto Route 140 southbound. Both of these lanes can accommodate 4-5 vehicles at the approach. During the Road Safety Team Review and subsequent field visits, it was observed that there is often a much longer queue for left-turning vehicles that can be accommodated and motorists extend this queue by encroaching over the double yellow line into the westbound travel lane.

The Route 123 westbound approach widens to two lanes, an exclusive left turn lane onto Route 140 southbound, which accommodates approximately 8-9 vehicles, and a right lane acting as a thru lane providing continued travel on Route 123 westbound or a right turn onto Route 140 northbound.

The Route 140 at Route 123 intersection is equipped with crosswalks on three of the four approaches and pedestrian signal phasing, including pushbutton activated pedestrian signal heads. The eastbound approach provides no crosswalk. Currently the timing is not sufficient to meet pedestrian crossing timing standards as outlined in the Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD, published by the Federal Highway Administration (FHWA), defines the standards used nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public travel.



Figure 10-Traffic queuing at the Route 140 northbound approach to Route 123 in Norton during the AM commute.

This intersection experiences more than two minutes of delay, operating at a Level of Service (LOS) F during the PM peak period. Level of Service (LOS) is used to determine the efficiency of an intersection. LOS reflects the operating conditions of an intersection, approach and/or specific movement. There are six LOS categories, ranging from A to F, LOS A representing the best operating conditions and LOS F representing the worst. LOS A through C is considered acceptable because it provides an adequate quality of service to motorists. LOS D indicates that traffic flow is worsening but still tolerable. At LOS E and F, traffic flow is considered unacceptable. At LOS F, traffic at this intersection is considered unacceptable.

To determine LOS, SRPEDD uses Synchro, an analysis and optimization software that evaluates the existing and future operation at both signalized and unsignalized intersections. All synchro analyses, existing and future, can be found in Appendix H.

Crash rates are an effective tool to measure the relative safety at a particular location. Data points such as crash frequency, traffic volumes and miles traveled results in a crash rate. This is the Accidents per Million Entering Vehicles (ACC/MEV) rate. The average ACC/MEV threshold rates for our region are 0.76 for signalized intersections and 0.58 for unsignalized intersections. Any location that has an ACC/MEV rate that exceeds these averages is considered a safety problem.

Another method ranks intersections on crash severity. This is the Equivalent Property Damage Only (EPDO) index. The regional EPDO threshold is 15.0 and any location that has an EPDO exceeding this is considered a safety problem.

Over the 3-year period of 2013-2015, there were 24 crashes that occurred at the intersection of Route 140 and Route 123; 18 of which involved property damage only and 6 of which involved injury. The ACC/MEV crash rate at this intersection is 1.05, above the regional average of 0.76. The EPDO is 16, just above the regional threshold of 15. Both of these rates indicate that there are safety issues at this intersection. *(Please see Figure 11 on the next page.)*

The majority of crashes (76%) at this location were rear-end type crashes, totaling 16 crashes. Rear-end type crashes are usually attributed to inattention, speeding, following too closely or inadequate signal clearance time. The offset configuration of the intersection could be the cause of some of these crashes. The geometry of the intersection makes it challenging to traverse due to its offset / misaligned configuration. Motorists are often confused about the appropriate place to stop, especially on the Route 123 westbound approach and in the area between the northbound and southbound legs of Route 140. Observations in the field confirmed that drivers have a particularly hard time determining where to stop as the intersection has several stop lines and the offset configuration is unexpected and confusing.

There were 5 (24%) sideswipe type crashes at the intersection. Sideswipe crashes are generally attributed to lane confusion/jockeying and inattention. Two of the sideswipe crashes involved large trucks encroaching on smaller vehicles while making a right turn from Taunton Avenue (Route 140) northbound to West Main Street (Route 123) eastbound. The geometry also does not allow ample space for large trucks to make a turn while maintaining correct lane position.

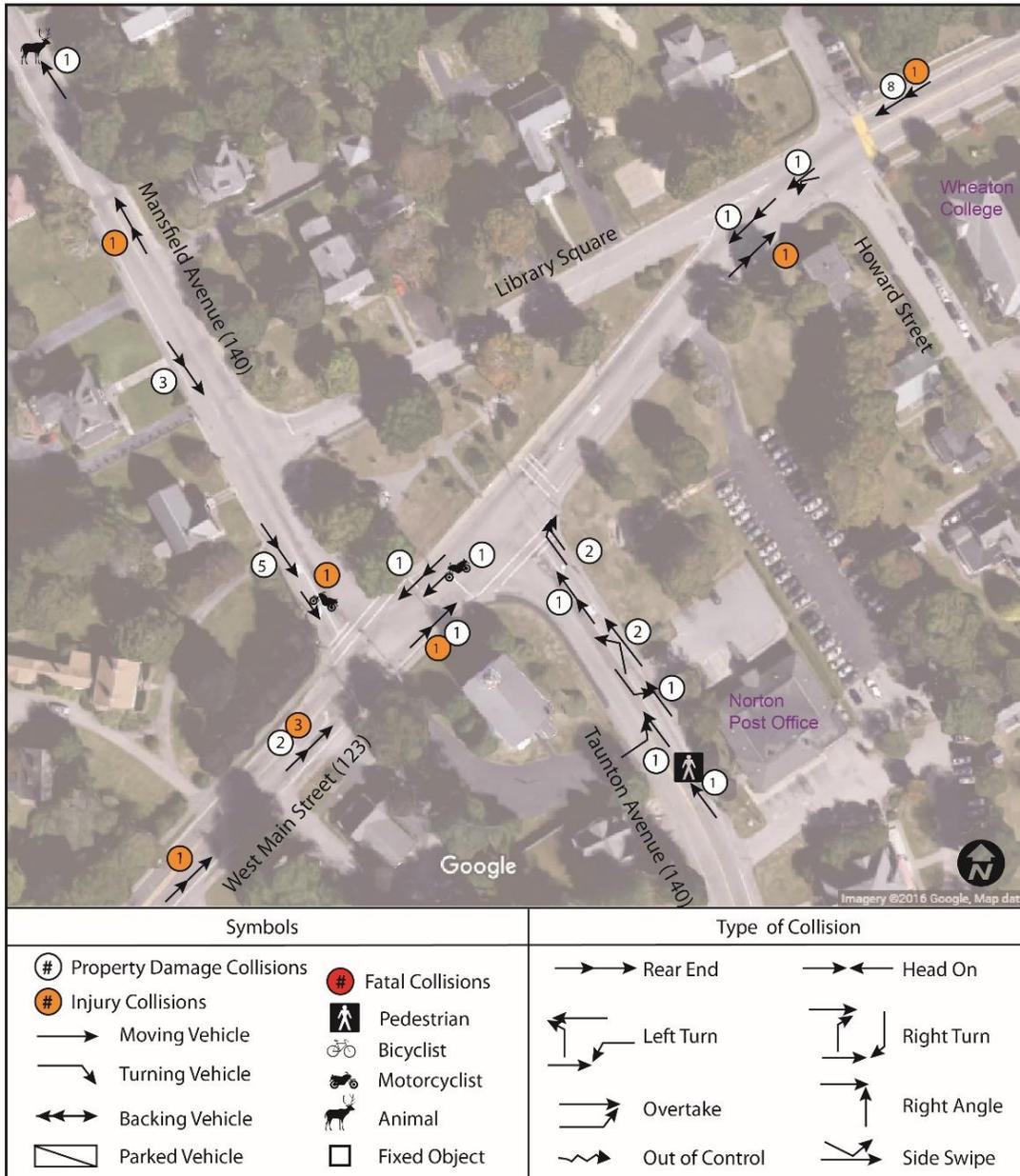


Figure 11- Crash Diagram-Route 140 at Route 123 in Norton

An additional 12 crashes occurred at or close to the crosswalk located east of the intersection at the northern terminus of Howard Street, which is controlled by a flashing yellow signal that turns red with the activation of the pedestrian button. Most of these were rear-end crashes, likely due to motorists stopping suddenly for pedestrians in the crosswalk. Of the 12 crosswalk crashes, 2 of them involved injuries. This crosswalk is frequently used by Wheaton College students. During a field visit, staff discovered that the pedestrian signal is currently inoperable. (Please see Figure 12 below.)



Figure 12 - Inoperable pedestrian signal at Howard Street & East Main Street in Norton

Adding to the delay at this intersection is the lack of shoulder and/or a bus turn-out for a public transit stop. The U.S. Post Office, located in Norton on the Route 140 northbound approach, currently serves as a bus stop for two GATRA bus routes. The first is the Wheaton T connector/Route 140 that provides services to the MBTA commuter rail station, and the second is the Attleboro/Norton/Taunton Route 18. When stopped to pick up or drop off passengers, due to the lack of shoulder here, the bus blocks traffic, creating further congestion and driver frustration.

There were numerous public comments expressing concern over traffic congestion at this intersection, especially the length of vehicle queues that form here during commuting times. Other concerns include the absence of an Emergency Pre-Emption system (traffic signal priority control for emergency response vehicles), and the proximity of the Post Office driveway to the intersection with the queued vehicles that block the access and add to congestion.

Recommendations

Consideration should be given to the realignment of Route 140 to create a four-way intersection with Route 123. Two options for consideration include: a realignment of Mansfield Avenue through Library Square in a southerly direction; or a realignment of Taunton Avenue through the church parking area in a northerly direction. Because the realignment through Library Square would infringe on the heart of the Norton Center Historic District, and was met with great opposition from the public and town officials alike during the public process it is recommended that the realignment through the church parking lot be considered as the sole option.

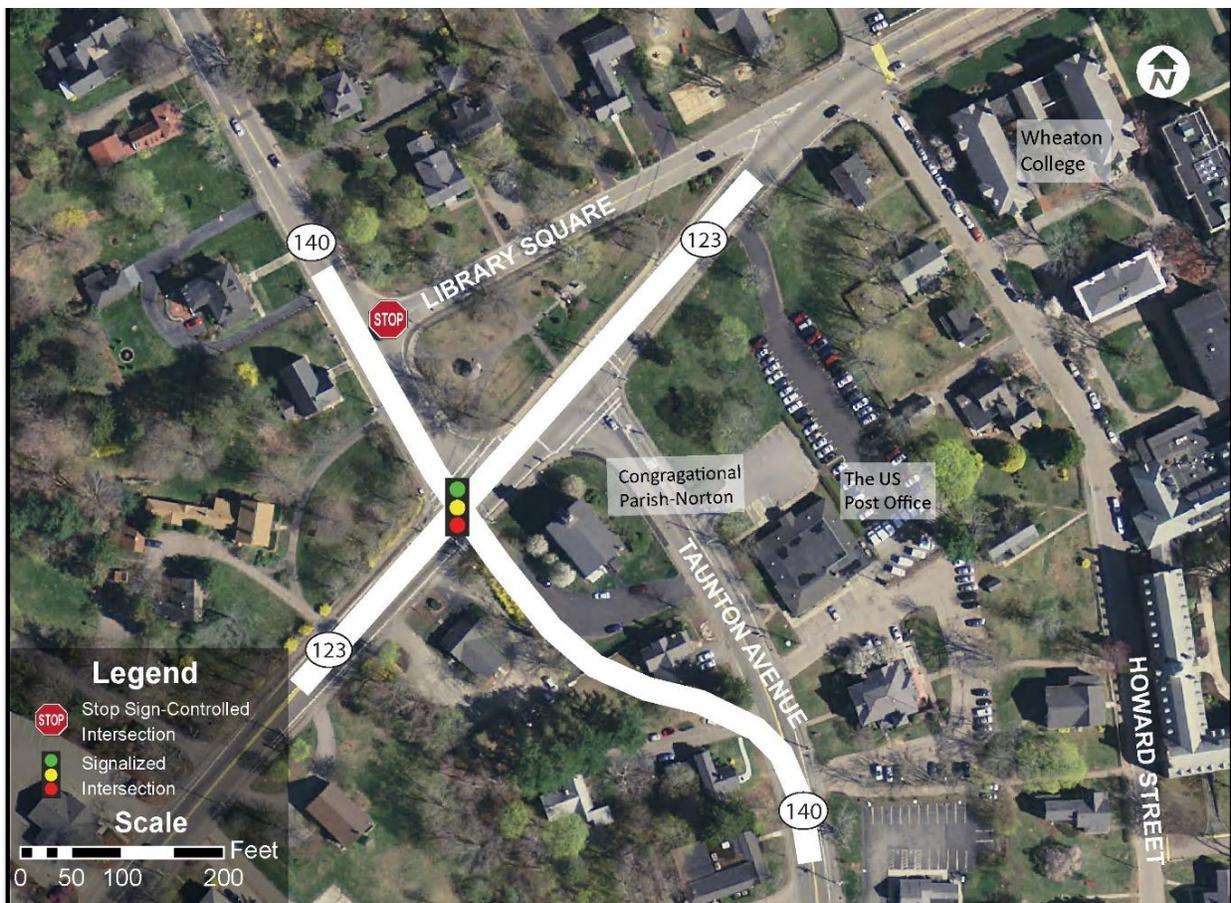


Figure 13 - Proposed Realignment of Route 123 & Route 140

Realignment of this intersection would include the need for additional/extended storage lanes. Ideally, the northbound approach would consist of three lanes (an exclusive left-turn lane, a thru lane and a right-turn lane) to accommodate the heavy volumes of turning vehicles. The westbound, eastbound, and southbound left-turn lanes would need to be extended to 150 feet. If these improvements were to be implemented today, the intersection would operate at a LOS C with motorists experiencing a maximum of 22 seconds of delay, a significant improvement over present conditions. *(Please see Figure 13 on the previous page.)*

Future traffic growth projections only worsen the existing delay at this intersection. Vehicles will continue to experience excessive delays well beyond the existing conditions of over 2 minutes of delay per vehicle. The previously mentioned realignment of this intersection and capacity changes will alleviate delay well into the future. In 2040, the intersection is forecasted to operate at LOS D with motorists experiencing 46 seconds of delay.

Regardless of improvements, the addition of Signal Pre-Emption equipment should be incorporated into the signal system. This equipment provides a temporary right-of-way for emergency vehicles to travel quickly and safely through the intersection. In addition, the pedestrian signal timing for the Route 140 northbound approach should be upgraded to meet current standards as outlined by the Manual on Uniform Traffic Control Devices (MUTCD).

There is a need for improvements at the pedestrian crosswalk at the northern terminus of Howard Street. The most pressing need is to repair the pedestrian signal. Future improvements for enhanced visibility should also consider removing/relocating the utility box and pole blocking pedestrian sight lines and the installation of pedestrian signage.

Reservoir Street to Smith Street

Crashes on Route 140 (Mansfield Avenue) from Reservoir Street to Smith Street were sporadic and occurred primarily at various driveways to local businesses. This area also includes a portion of roadway that traverses the Norton Reservoir, a popular fishing spot for local residents. Unfortunately, there are no sidewalks and a very small shoulder between the roadway and the guardrail at the edge of the reservoir to accommodate pedestrians, or access to the reservoir, adding to safety issues on this roadway.

There were numerous public comments concerning the significant lack of sidewalks and other accommodations for pedestrians and bicyclists throughout the entire corridor.

Recommendations

The overall improvement recommendation for the Route 140 corridor in Norton is for a consistent cross section with multi-modal accommodations (consistent travel lanes, bicycle lanes and sidewalks). There is also a need for improved lighting along the corridor.

In addition, curb cut access should be limited and opening widths of curb cuts reduced whenever possible. Reducing the number of curb cuts will reduce conflict points and any potential confusion for motorists when multiple driveways and/or turning movements are involved. Curb cuts that are too wide create confusion for motorists, who may have a hard time deciding where to position themselves, and to pedestrians, who will have a greater distance to cross and are vulnerable to being struck by an entering vehicle. These driveways create situations where crashes can be fatal or injurious.

Great Woods Marketplace / Roche Brothers Plaza

Route 140 (Mansfield Avenue) from Smith Street to Arnold Palmer Boulevard had crashes concentrated at the Great Woods Marketplace/Roche Brothers Plaza driveways. The northern driveway or main entrance is situated directly across from the entrance to Wingate (Epoch Assisted Living Facility) while the southern driveway is situated directly across from the driveway to the North Easton Savings Bank. There is an uncontrolled channelized left-turn lane on Route 140 southbound at the main entrance to the Great Woods Marketplace / Roche Brothers plaza to prevent the through traffic from slowing down for turning vehicles. This is a busy shopping plaza with a high volume of traffic through an unsignalized intersection. Conditions worsen when there is an event at the Xfinity Center as people often use this parking lot.

Over the 3-year period from 2013-2015 there were 12 crashes at the main entrance and 5 crashes at the southern entrance to the Roche Brothers Plaza. Five of the 12 crashes at the main entrance were injury related. The EPDO rate (crash severity) for the main entrance is 14, just below the regional threshold of 15. *(Please see Figure 14 on next page.)*

The crash types at the intersection of Route 140 and the Great Woods Plaza main entrance were split between rear-end crashes (4 or 33%), single vehicle crashes (4 or 33%) and angle crashes (3 or 25%).

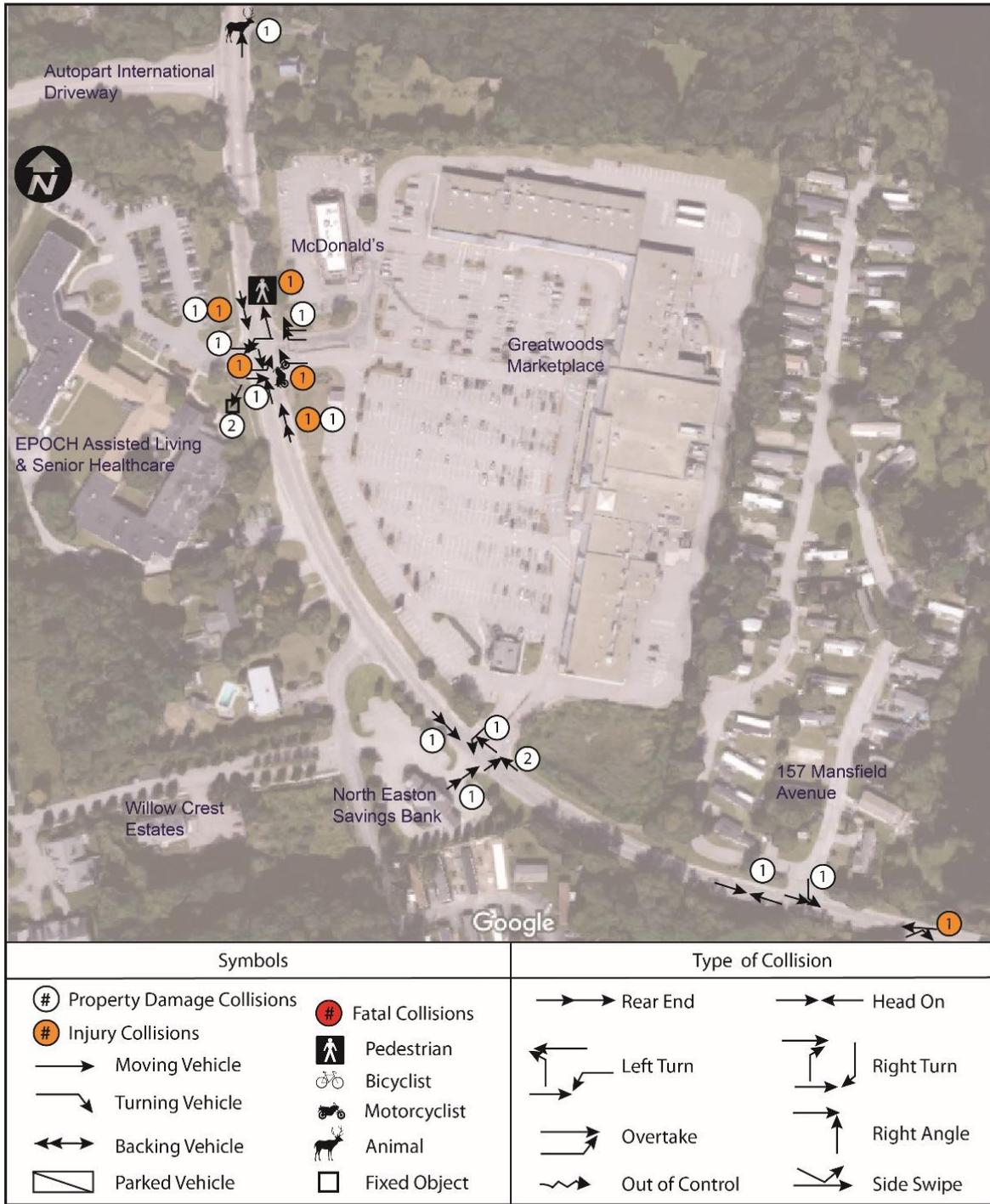


Figure 14
Crash Diagram-Great Woods Marketplace (Roche Brothers) Entrances in Norton

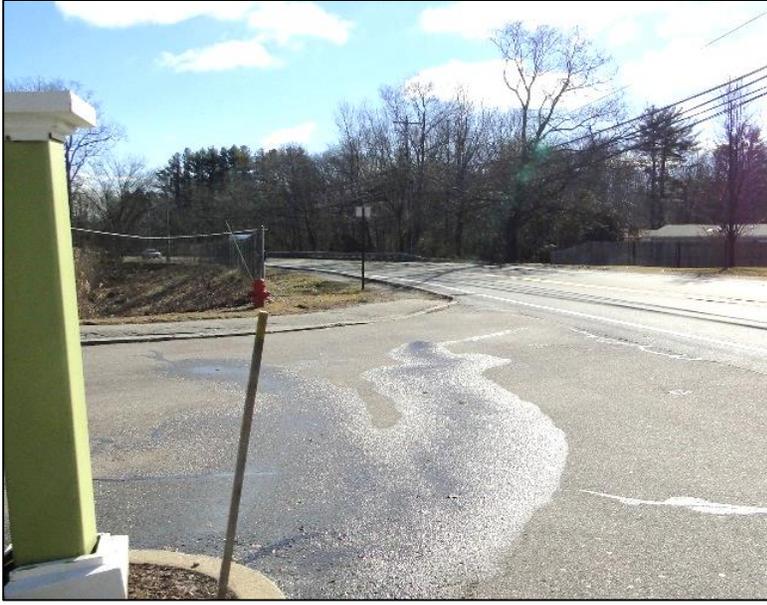


Figure 15- Limited sight distance at the south entrance to Roche Brothers plaza looking south.

The crash types at the intersection of Route 140 and the Great Woods Plaza (southern access) entrance were split between angle crashes (3 or 60%) and rear-end crashes (2 or 40%).

Motorists use the northern entrance as the primary entrance, but there are motorists regularly using the southern entrance to access a Dunkin Donuts. This secondary southern entrance is difficult to maneuver due to the sharp curve and excessive vehicle speeds on Route 140. *(Please see Figure 15 above).*

There were numerous public comments made concerning the difficulty in safely accessing and exiting the entrances to the Roche Brothers Plaza. Specifically, the desire for signalization at the main entrance, which directly intersects with the Wingate/EPOCH Assisted Living & Senior Health Care Center. During the public outreach effort, the management and residents of EPOCH Assisted Living also expressed their desire to see the northern entrance signalized. There were additional comments regarding the need for *right-turn-in* only and *right-turn-out* only control at North Eastern Savings Bank driveway.

Recommendations

Although the crash rate was low at the southern driveway of the Great Woods (Roche Brothers) Plaza, local business employees stated that there are many “near misses” at this driveway. A 2005 study conducted by SRPEDD recommended access at this secondary driveway be limited to *right-turns-in* and *right-turns-out* only. The study also recommended geometric modifications to

physically prevent left turns in and out of this driveway. These changes were never implemented by the management of the Great Woods Plaza.

In addition, the overall recommendation for a consistent cross section along the corridor with multi-modal accommodations (consistent travel lanes, bicycle lanes and sidewalks) will assist with reducing speeds along the corridor and provide safer opportunities for left turning vehicles along this segment of roadway.

Arnold Palmer Boulevard to the town line

Route 140 from Arnold Palmer Boulevard to the town line in Mansfield is awash with driveways to businesses on a straightaway with a high volume of traffic traveling at excessive speeds. Within a 600-foot section of Route 140, there are entrances to Mini Golf, New England Ice Cream, Norton Estates, Norton Kayak, Great Woods Art Glass, two driveway accesses each at Cumberland Farms, Alberto's / Lake View Plaza and the plaza at 253 Mansfield Avenue, and six private residence driveways for a total of seventeen (17) access points within this short distance. *(Please see Figure 16 on the next page)*. There were 22 crashes in this area from 2013-2015, with 15 of these crashes concentrated at the driveways of this 600-foot section.

Numerous comments by residents of Norton expressed concerned over the gridlock conditions during events at the Xfinity Center and the difficulty in accessing their own homes during these events. Norton Estate residents shared that it was quicker to access their desired destinations on foot rather than by vehicle during Xfinity events. However, they also stated that they did not feel safe walking in the area without sidewalks.

There were also comments concerning resident's disappointment that access to New England Ice Cream was not provided through the TPC property, but directly onto Route 140, adding to the safety and congestion issues already present along this section.

The town should work with local businesses to combine curb-cuts where possible. Based on our review of existing curb-cuts there are opportunities to consolidate and create shared access on the east side of Route 140. Businesses that have two curb-cuts should review their internal circulation to determine if it is possible to provide one access/egress curb-cut.



Figure 16 - A total of 17 access points (12 retail and 5 private) within 600 feet, just south of the Mansfield town line in Norton

Recommendations

The numerous driveways along this section of Route 140 create conflict points that increase the potential for vehicle crashes. Compounding this problem is the geometry of the roadway, with narrow lanes, little to no shoulders and traffic traveling at high speeds. The town should adopt an Access Management Plan to alleviate conflict points and delay due to left-turning vehicles

Access Management is a set of techniques that State and local governments can use to control access to highways, major arterials, and other roadways. The benefits of access management include improved movement of traffic, reduced crashes, and fewer vehicle conflicts while still enabling access to land uses and maintaining roadway safety and mobility. Planned development can coexist with good access management and can promote safe and efficient transportation for the general public.

This plan should include the consolidation of curb cuts and promote cross access between adjacent businesses. Cross access is when two or more adjacent properties share an access driveway or allow access between properties. There are numerous areas along the Route 140 corridor where Access Management is needed. These locations have a number of curb cuts located in close proximity to each other, are located too close to an intersection, are not clearly marked, are too wide, or contribute to safety and congestion issues throughout the corridor.

The Route 140 Corridor in Mansfield

Existing Conditions

The Route 140 corridor in Mansfield begins at the Norton town line and ends at the town line with Foxborough. It is designated as South Main Street before merging with Route I-495 and as Commercial Street to the north. Land use along the corridor is mainly commercial and includes the Xfinity Center and the Great Woods Conservation area, as well as access to a retail plaza including Home Depot, Shaw's Supermarket, Staples and Longhorn Steakhouse, access to Mansfield Crossing retail area and the Forbes Industrial Park. The Xfinity Center is an outdoor entertainment venue with a capacity of 12,000. The season for the venue is typically from mid-May until late September.

Also on the corridor is an interchange with Interstate 495. The portion of Route 140 from the Norton town line to the I-495 interchange is classified as an Urban Minor Arterial and the portion north of the I-495 interchange is classified as an Urban Principal Arterial.

At the town line with Norton, Route 140 consists of one southbound and one northbound lane until the approach to the entrance of the Xfinity Center. At this point, Route 140 widens to two southbound approach lanes and two northbound approach lanes to the venue, as well as three egress lanes from the venue to help clear traffic at the conclusion of an event. The Route 140 two-lane configuration continues north until Reservoir Street where it widens to 3 lanes, one which serves as an on-ramp to I-495 south. There is an uncontrolled, channelized left-turning lane just past the Xfinity Center in the southbound direction, providing access into the northern terminus of Reservoir Street.

The Commercial Street stretch contains four signalized intersections including School Street, Norfolk Street, West Street and Chauncy Street (Route 106). *(Please see Figure 17 on the next page.)*

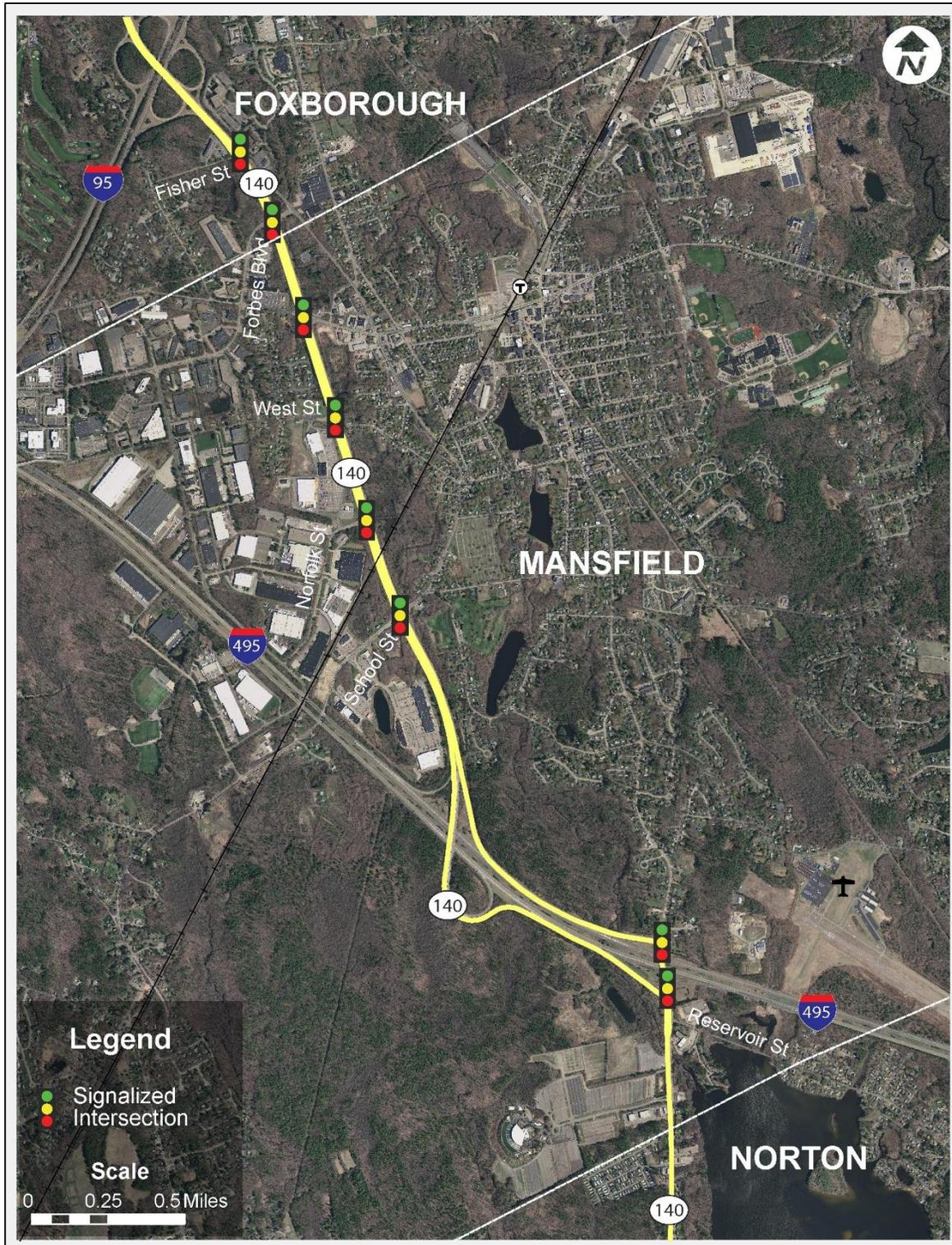


Figure 17-The Route 140 Study Area in Mansfield

The intersection of South Main Street (Route 140) and the Interstate 495 interchange is controlled by two separate traffic signals. Route 140 ramps from South Main Street merge briefly with I-495 north (for approximately 2500 feet) before the road continues to the two-lane limited access highway (Commercial Street) to the Foxborough town line. Commercial Street is divided throughout by a grassy median that varies in width from approximately 10 feet to nearly 40 feet.

Commercial Street (Route 140) has four separate traffic signals that provide access to School Street, Norfolk Street, West Street and Chauncy Street (Route 106). These cross streets provide access to shopping plazas and areas beyond. Limited access and high speeds along this stretch does not lend itself to other modes of travel, such as bicycles and pedestrians, however, there are crosswalks at the signalized intersections, which are discussed in more detail in the next section. No properties have direct access to Commercial Street.

There are few locations with sidewalks along Route 140 in Mansfield. Sidewalks are located on the west side of the road beginning at the Norton town line and extending to the Xfinity Center driveway. The sidewalk then transitions to the opposite (east) side of the roadway and extends past the north terminus of Reservoir Street to the I-495 southbound on-ramp and over the I-495 bridge past the signal for northbound access. The remainder of Route 140 (Commercial Street) does not have sidewalks. There are no dedicated bicycle facilities on the Route 140 corridor in Mansfield.

Automatic Traffic Recorders were placed at five locations in Mansfield along Route 140. Locations and Average Daily traffic were as follows:

- Norton town line - 17,800 ADT
- South of School Street - 24,300 ADT
- North of School Street - 21,400 ADT
- North of West Street - 23,000 ADT
- South of Chauncy Street (Route 106) - 22,800 ADT

The 85th percentile speeds were as follows:

- Norton town line – 44 mph
- South of School Street – 48 mph
- North of School Street – 55 mph
- North of West Street – 52 mph
- South of Chauncy Street (Route 106) – 50 mph

However, the posted speed limit is 45 mph at each of these locations. This indicates that most motorists are speeding on this roadway with the exception of the area at the town line with Norton.

Heavy and light truck percentages were as follows:

- Norton town line – light trucks **4.5%**, heavy trucks 1.5%
- South of School Street – light trucks 1.2%, heavy trucks 1.7%
- North of School Street – light trucks 2%, heavy trucks **5%**
- North of West Street – light trucks 1.3%, heavy trucks 1.4%
- South of Chauncy Street (Route 106) – light trucks 1.4%, heavy trucks 2%

Since anything over 2% for truck traffic is considered significant, based on this data, there is a significant volume of light truck traffic (vehicles with three axles), traveling at the Norton town line and a significant amount of heavy trucks traveling north of School Street on the Route 140 corridor in Mansfield.

All of the traffic data collected, including the Average Daily Traffic, the 85th percentile speed and the percentage of trucks at each location counted is displayed on a map, which also shows the posted speed limits. *(See Figure 18 on the next page.)*

As part of SRPEDD's efforts to analyze the mobility and safety conditions along the Route 140 corridor, a Road Safety Team Review was held in each community. These meetings included a multidisciplinary team that reviewed crash data, discussed traffic volumes and speeds, summarized bicycle and pedestrian facilities, and documented known safety issues along the corridor.

This multi-disciplinary team, including stakeholders such as the community's town managers/planners, police and fire departments, boards of selectmen, DPW's, as well as members of the staffs of SRPEDD and the MassDOT District 5 office, met on November 2, 2016 at the Mansfield Town Hall. The team discussed observations made in the field that could be contributing to safety and congestion issues along the corridor, which are discussed in more detail in the following section. The Road Safety Team Review for Route 140 in Mansfield can be found in Appendix F.

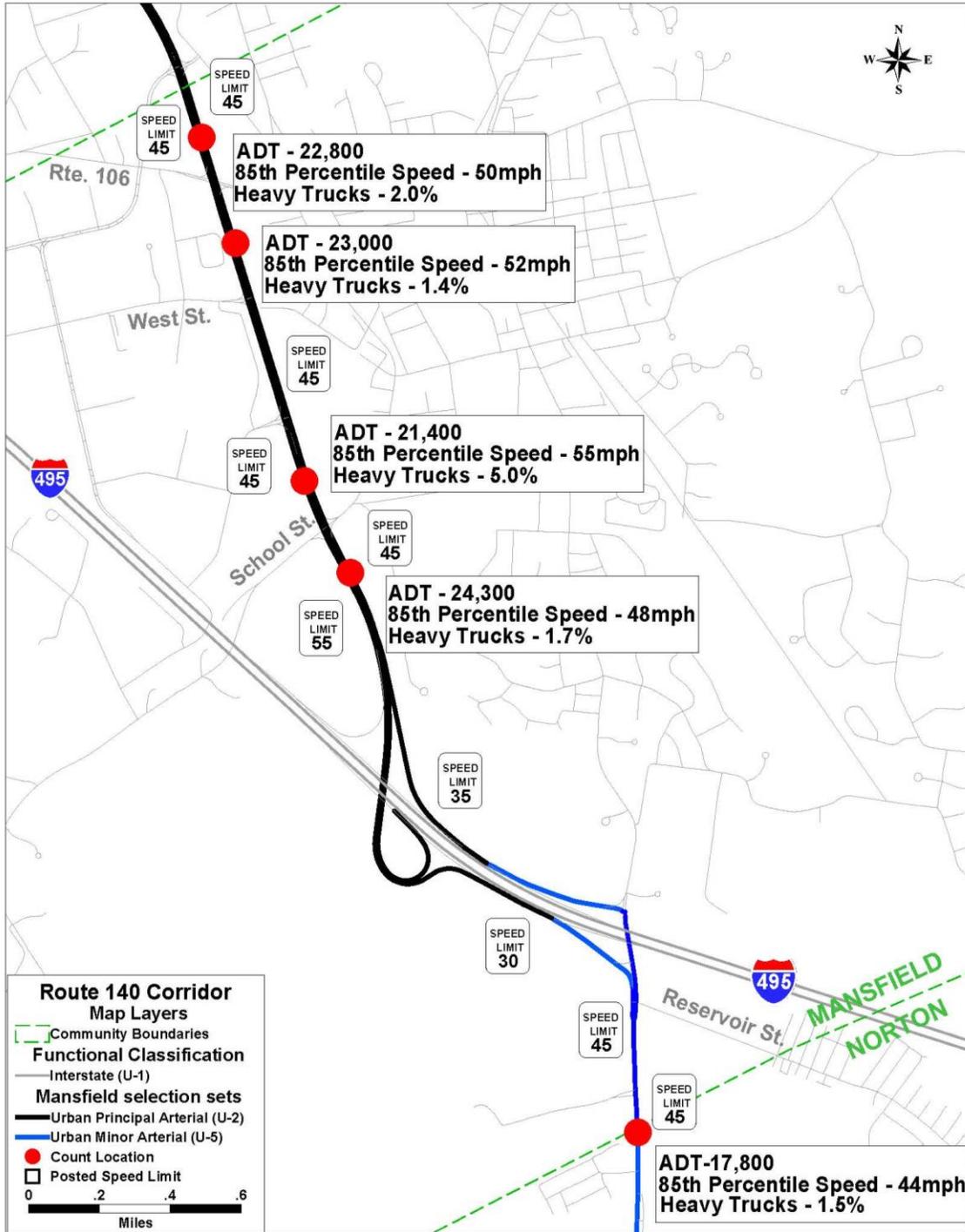


Figure 18 -Traffic Data on Route 140 in Mansfield.

Interchanges and Intersections

Interstate 495 on- and off-ramps

The intersection of South Main Street (Route 140) and Interstate 495 are controlled by two separate traffic signals located at the southbound on- and off-ramps and the northbound on-ramps. There are no northbound off-ramps from I-495.

This intersection operates at a Level of Service (LOS) D. Level of Service (LOS) is used to determine the efficiency of an intersection, grading it from A-F. LOS D indicates that traffic flow is worsening but still tolerable. At LOS E and F, traffic flow is considered unacceptable.

The on-ramps for I-495 northbound are accessed a short distance further north on the west side of the Route 140 roadway and are controlled by a separate traffic signal. The southbound approach provides one 20-foot travel lane which forks to the right into a channelized/free-flow right turn lane and continues as a 15-foot thru lane at the signal. There is no I-495 northbound off-ramp to South Main Street. The southbound approach provides three 11-foot lanes; a left-turn lane, a center lane which acts as a combined left/thru lane and a thru lane. *(Please see Figure 19 on the next page.)*

This intersection experiences minimal delay, operating at a Level of Service (LOS) B. LOS A through C is considered acceptable because it provides an adequate quality of service to motorists.

There were many comments made concerning an unnecessary red phase stop at this signal for vehicles continuing north on Route 140. This intersection is included on the list of projects in both the State Transportation Improvement Program (STIP) and the SMMPO's Transportation Improvement Program (TIP) for Federal Fiscal Year 2017 to address the traffic signal timings and to provide pavement marking upgrades to alleviate these issues.

Over the 3-year period 2012-2014 there were only 7 reported crashes at these signalized intersections and accompanying ramps. The crash rate is 0.49, lower than the regional average of 0.76, and the EPDO (crash severity) is 3.7, well below the regional level of 15. The posted speed limit on this portion of South Main Street is 45 mph.

All of the reported crashes occurred at the signalized intersection of Route 140 and the I-495 northbound on-ramps. Of the total crashes, 6 (86%) resulted in property damage only while 1 (14%) involved an injury. The majority of crashes occurred during daylight hours (71%) with clear or cloudy weather conditions (86%) and on dry surfaces (86%). Approximately half of

the reported incidents involved either an angle type crash (43%) or a rear-end crash (43%) with the remainder being a single vehicle type crash (14%).

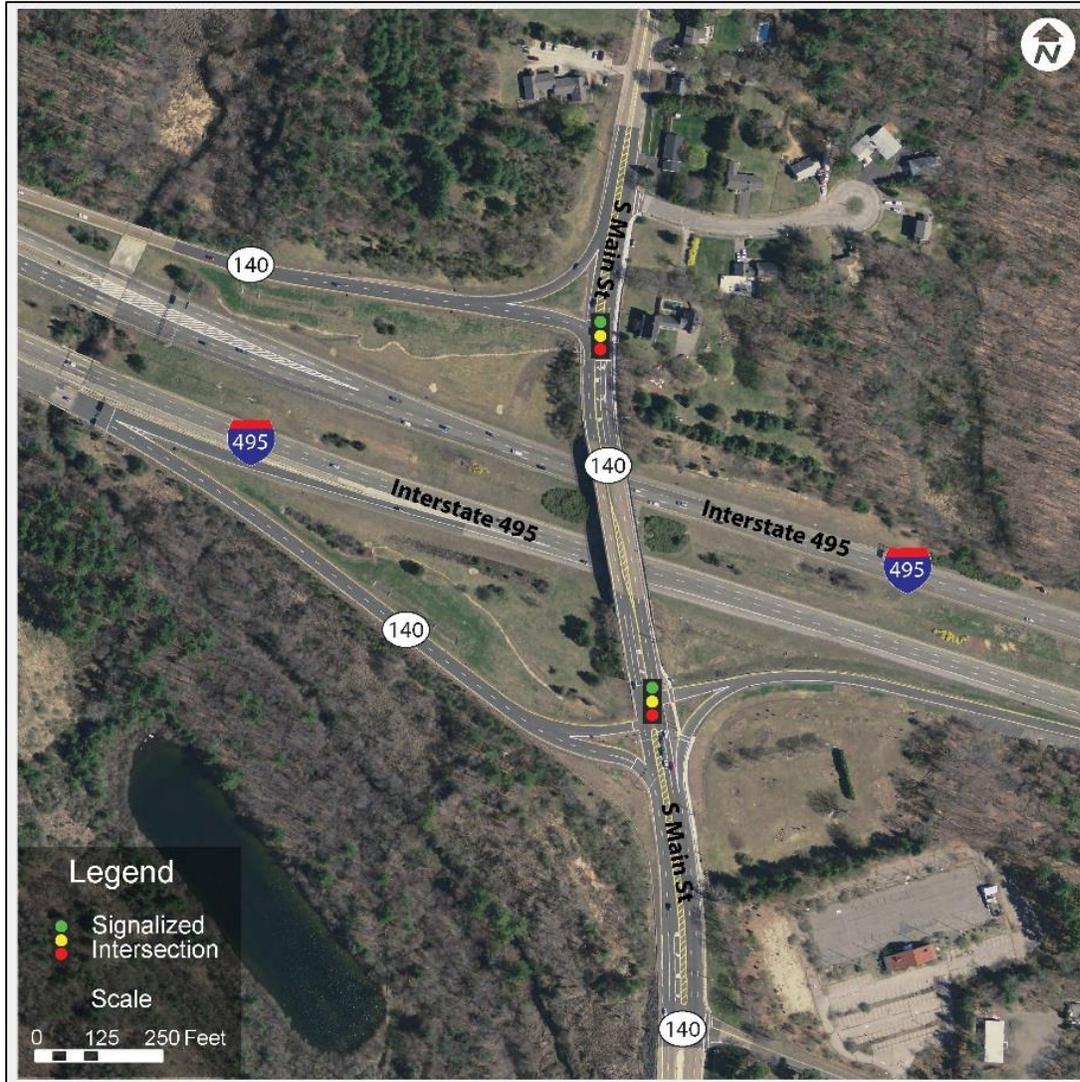


Figure 19 -Route 140 & I-495 on- and off-ramps in Mansfield

It is necessary to access Interstate 495 northbound from this left turn on-ramp to continue north on Route 140 northbound as it merges with I-495 for a short distance. These ramps are designated as Exit 12. A right turn off ramp provides access/separation to continue onto Route 140 northbound, also designated as Exit 12. This portion of Route 140 then becomes Commercial Street. From the southbound direction Route 140 provides direct access to Interstate 495 from loop ramps. These are designated as Exit 11. (Please see Figure 20 on the following page.)



*Figure 20
The Route 140 and I-495 merge in Mansfield.
The merge /conflict areas are highlighted in yellow.*

Over the 3-year period of 2013-2015 there were 27 reported crashes along this highway section, where Route 140 merges with Route I-495 for a short distance. There were 24 crashes (89%) on the northbound traffic merge while the remaining 3 crashes (11%) occurred within the southbound traffic merge. There were a total of 21 crashes that resulted in property damage only (19 on the northbound side and 2 on southbound side) while 6 crashes included an injury (5 on NB side and 1 on SB side). There were no reported fatal crashes during that time period. The majority (63%) of the crashes were rear-end type crashes while the remainder were either single vehicle or sideswipe type crashes. It is important to note that nearly three quarters of the recorded crashes occurred during the hours of darkness which indicates that the roadway is not adequately lit.

Recommendations

A northbound off-ramp was not initially built into the interchange with the opening of I-495 in 1982. Since that time, studies by SRPEDD and the proposed Park at Great Woods have examined the possible expansion of this interchange to accommodate exiting traffic from I-495 northbound with potential development along the Route 140 corridor. However, strong opposition from a homeowner in the path of the proposed ramp, as well as concern from residents of nearby Gladiola Terrace, halted the project. Simultaneously, the Park at Great Woods never materialized, thus eliminating a major traffic generator that would potentially justify this ramp. Although traffic generators such as the Xfinity Center and TCP Boston remain, seasonal events do not currently justify the expense for construction of a new ramp.

During the course of this study, an analysis was conducted using SRPEDD's Regional Travel Demand Forecasting Model. The model analyzes existing traffic operations for the entire SRPEDD region and forecasts future traffic patterns based on projected growth in the region. This area is expected to see a robust amount of continued development.

The analysis indicates that a northbound exit ramp from Interstate 495 to Route 140 will be heavily used and will accommodate the projected traffic from future developments, providing easier access to Route 140 southbound, the Xfinity Center and Norton. The analysis also shows a substantial savings in Vehicle Miles Traveled due to an estimated 6,850 vehicle trips per day using the new ramp if built. These nearly 7,000 vehicle trips would have direct access to South Main Street (Route 140) from I-495 northbound and would no longer be forced to take alternate routes, alleviating congestion on Route 123 in Norton, School Street in Mansfield and other surrounding roads. The expected increased development will only worsen traffic congestion on these alternate routes without the addition of the ramp.

Although the potential for future traffic demands warrant the northbound off ramp from I-495 and is supported by several businesses south of the interchange, the same objections to this ramp remain as was evident through our public outreach efforts during this study. Furthermore, the investment of federal and state funds to construct a new ramp cannot be based on the speculation of increased development.

It is our recommendation that as development continues throughout this particular area of the corridor, periodic traffic evaluations be conducted to determine if demand warrants a new ramp. In addition, any major development in the vicinity of the ramp that would necessitate an Environmental Impact Report through the Massachusetts Environmental Protection Agency (MEPA) should examine the ramp as possible mitigation. If a development triggers the need for a

new ramp, negotiations with the developer should be pursued to contribute to the engineering and construction as part of the MEPA process.

School Street Intersection

The intersection of Commercial Street (Route 140) and School Street is a four-legged intersection which is controlled by a traffic signal. The eastbound, westbound and southbound approaches to the intersection are 4 lanes and consist of two thru lanes, an exclusive left-turn lane and a channelized (free flow) right-turn lane controlled by a yield sign. These approach lanes measure from 10.5 to 12 feet while the channelized right free flow lanes widen to 16 to 20 feet at the curve. *(Please see Figure 21 on the following page.)*

The northbound Commercial Street approach is the only approach that widens to 5 lanes, consisting of 2 thru lanes, 2 exclusive left-turn lanes and a channelized (free flow) right-turn lane controlled by a yield sign. These approach lanes measure 12 feet and the free flow right lane widens to 20 feet at the curve. The southbound exclusive left-turn lane accommodates approximately 12 queuing vehicles and the two northbound exclusive left-turn lanes doubles that capacity to approximately 24 queuing vehicles waiting to take a left turn.

School Street provides access to Mansfield Crossing and other retail plazas to the west, and to West Street which leads to the Mansfield Town Common and the town center to the east. Mansfield Crossing alone includes over 30 retail outlets and several restaurants.

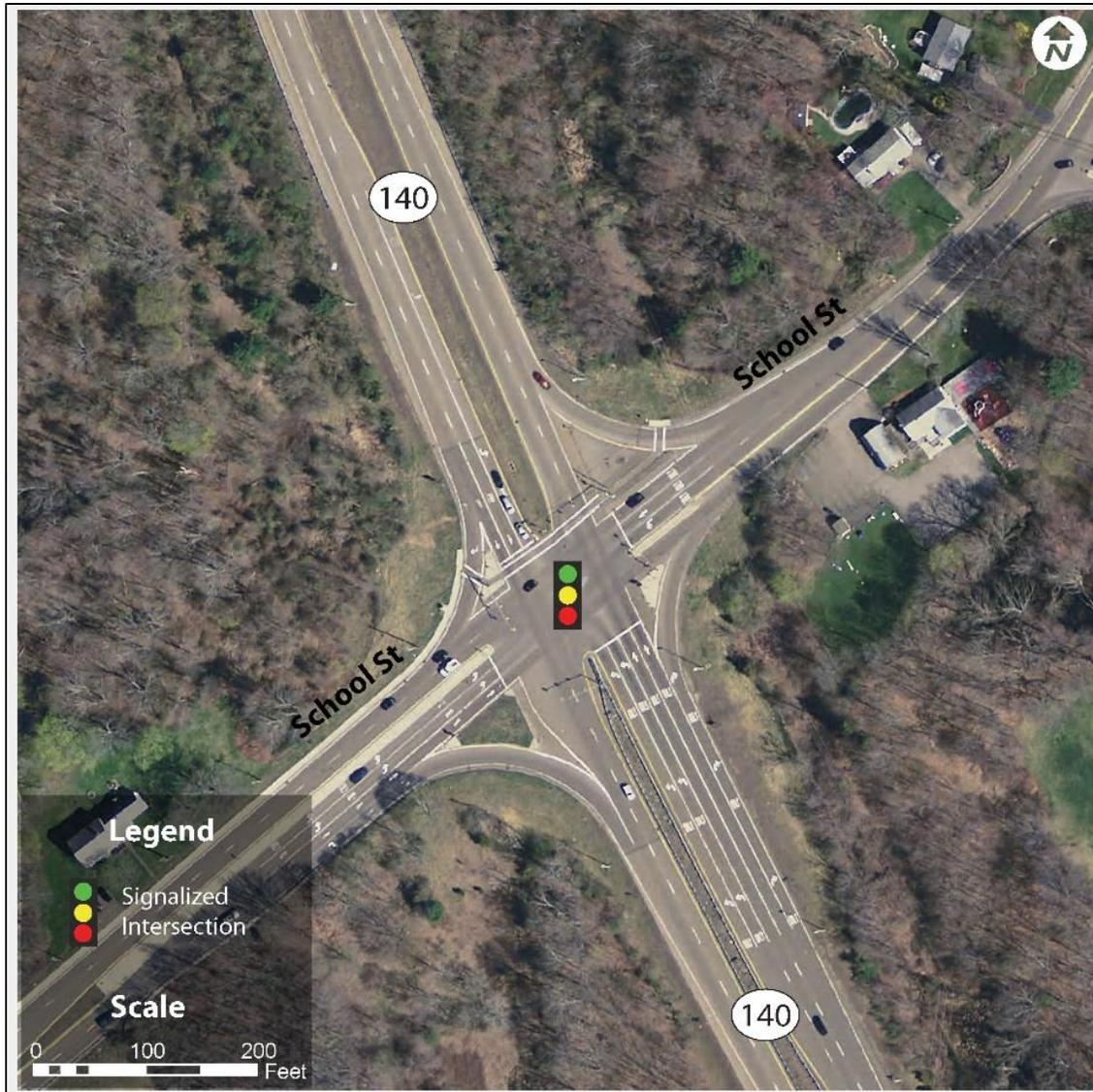


Figure 21 - Route 140 at School Street in Mansfield

There is one crosswalk, providing pedestrian access in an east / west direction, connecting the sidewalks on the north side of School Street. There are no sidewalks on Commercial Street. There are two pedestrian signal buttons at this intersection. One is located on the island on the northeast corner which provides 35 seconds of crossing time. The pedestrian signal button located at the northwest corner has components missing and is inoperable. (See Figure 22 on the following page.)



Figure 22 - Pedestrian signal button at the northeast corner of Route 140 & School Street

This intersection experiences 41 seconds of delay, operating at a Level of Service (LOS) D. Level of Service (LOS) is used to determine the efficiency of an intersection, grading it from A-F. LOS D indicates that traffic flow is worsening but still tolerable.

During the public outreach process, residents indicated that the breakdown lane at this intersection is being used as an additional (4th) travel lane for the southbound approach to the intersection.

The posted speed limits along this section of Route 140 (Commercial Street) is 45 mph, increasing to 55 mph south of School Street.

Over the 3-year period of 2013-2015 there were 53 crashes at this intersection. Of the total crashes, 43 (81%) resulted in property damage only, while 10 (19%) involved an injury. The majority of crashes occurred during daylight hours (70%) with clear weather conditions (57%) and on dry surfaces (60%). A large percentage of the reported incidents involved a rear-end type crash (45%) with the remainder being either an angle (42%), a side-swipe crash (6%), a single vehicle crash (4%), or a head-on or rear-to-rear crash (4%). (See Figure 23 on following page.)

The crash rate was calculated at 1.18, substantially higher than the regional average of 0.76. The EPDO (crash severity) is 31, well above the regional threshold of 15.

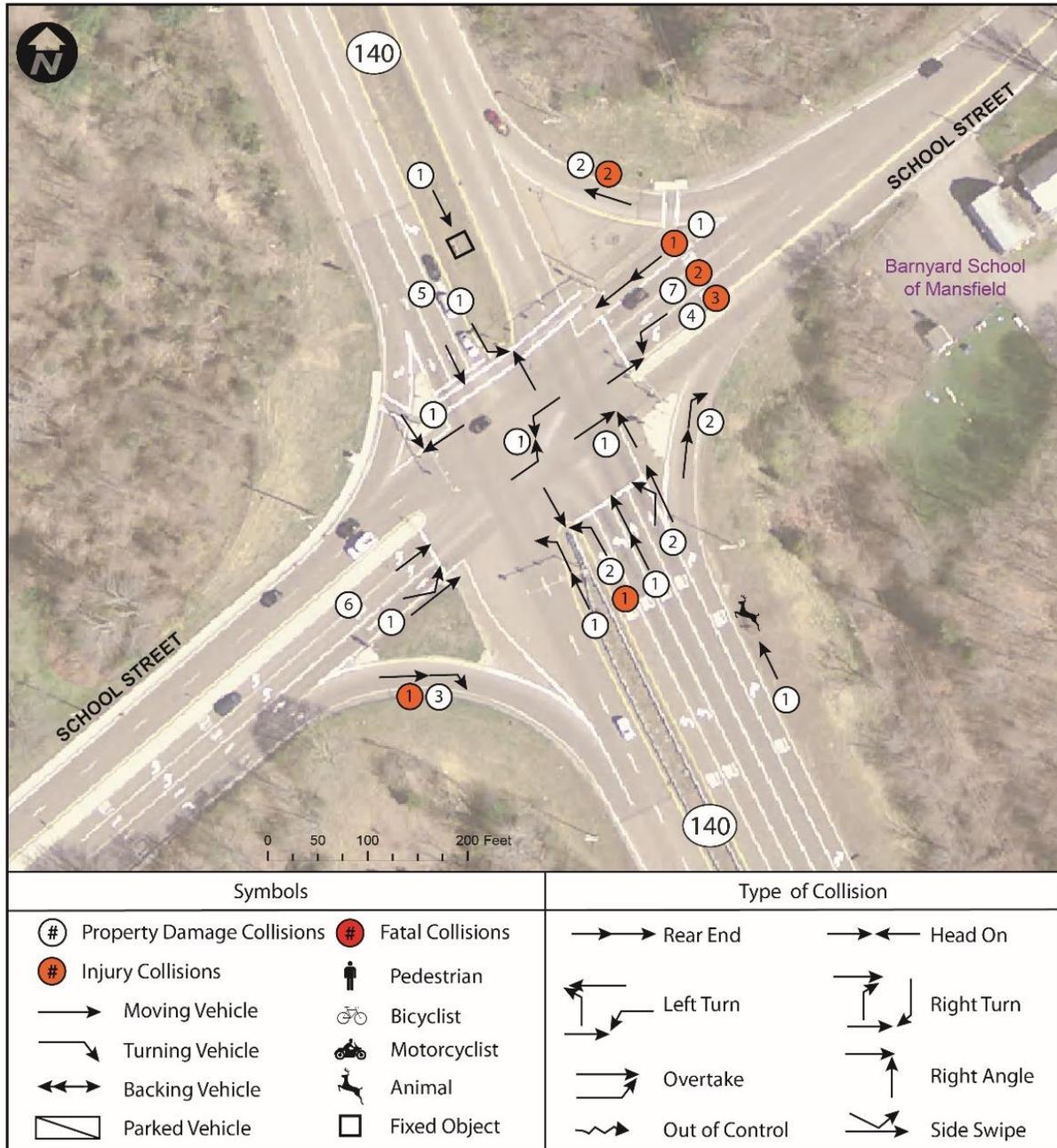


Figure 23 - Crash Diagram - Route 140 at School Street in Mansfield

There were numerous public comments received expressing concern over the number of crashes at this intersection, many indicating that inadequate sight distance due to a rise in the roadway and a signal malfunction may contribute to these crashes. During the Road Safety Audit (RSA) conducted for MassDOT in March 2017 by McMahon Associates and attended by SRPEDD staff, concerns were expressed over the recently installed Flashing Yellow Arrow (FYA) signal on the

westbound approach. This FYA allows permissive left-turns but is not standard for a signal location where one left-turn approach is protected and one is permissive which increases the probability of angle crashes. This may be worsening the existing issues of inadequate sight distance/visibility of eastbound oncoming traffic. It was also noted that the traffic signal, including emergency pre-emption, has malfunctioned on multiple occasions.

This intersection is included on the list of projects in both the State Transportation Improvement Program (STIP) and the SMMPO's Transportation Improvement Program (TIP) for Federal Fiscal Year 2017. Improvements include traffic signal timings and pavement marking upgrades.

Recommendations

The most pressing issue is to repair or replace the pedestrian signal button located at the northwest corner of the School Street intersection. It has components missing and is completely inoperable at this time.

There are improvements planned at this intersection by MassDOT. This intersection is included in the list of Transportation Improvement Program (TIP) projects for FFY2017 (project # 608751). SRPEDD is in contact with MassDOT to determine if the pedestrian signal button and issues concerning westbound left turning traffic is included in the scope of the project. Following the completion of the project SRPEDD recommends that traffic and crashes be reevaluated to determine if additional measures are warranted.

Consideration should be given to an Intelligent Transportation System (ITS) warning sign to alert motorists of the approaching signal being red.

Optimization of the signal system will improve the existing delay from 41 to 39 seconds, however the LOS remains at D.

Traffic growth projections indicate operations at this intersection, will decline and operate at a LOS E with vehicles experiencing 56 seconds of delay by 2040. Signal optimization will improve operations to a LOS D with motorists experiencing 51 seconds of delay.

Norfolk Street

The intersection of Commercial Street (Route 140) with Norfolk Street is a 3-legged intersection controlled by a traffic signal. The eastbound Norfolk Street approach consists of two 12-foot lanes, a left-turn lane under the control of the traffic signal and right-turn channelized (free flow) lane which widens to 17 feet at the curve. This free flow right should be controlled by a yield sign, but one presently does not exist. These eastbound lanes are separated by a grass

covered triangle. The northbound Commercial Street approaches widen to three 12-foot lanes; 2 thru lanes and an exclusive left-turn lane. The southbound approach consists of two 12-foot lanes. The left lane is a thru lane which continues to the intersection. The right lane forks into two distinct lanes, one that continues to the intersection and one which forks to the right into a channelized (free flow) right-turn lane which widens to 20 feet at the curve. The southbound right lanes are separated from the thru lanes by a grass covered triangle. This intersection currently has no sidewalks and no pedestrian access. (See Figure 24 below.)

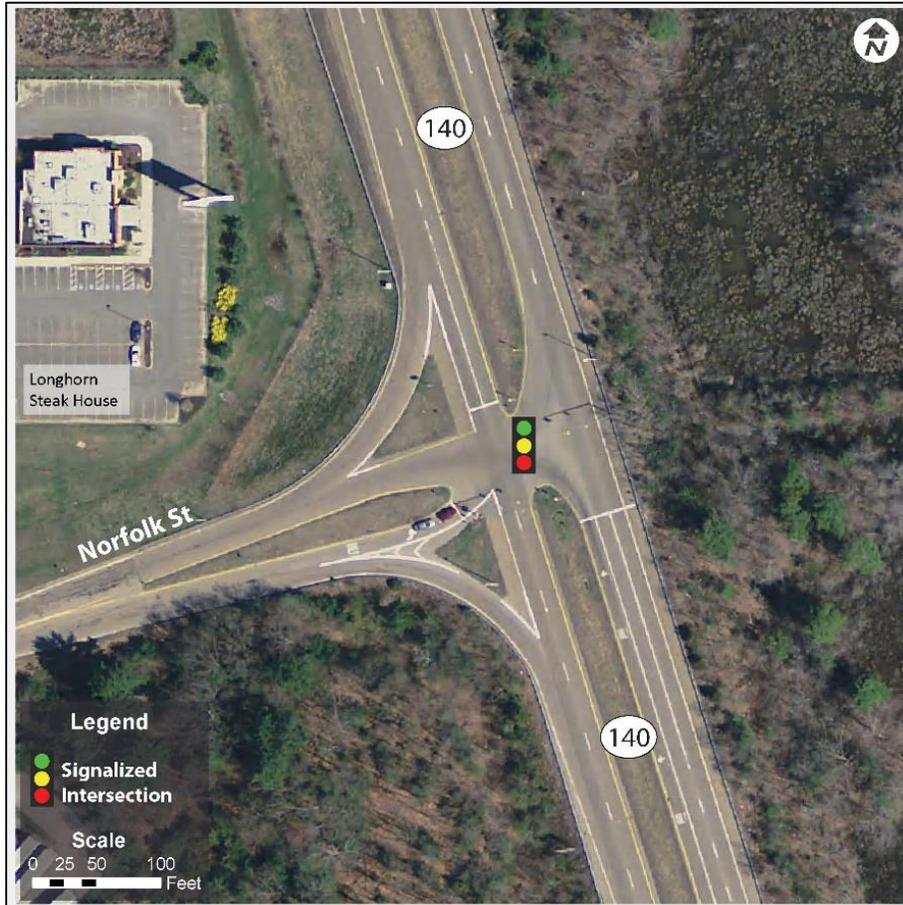


Figure 24 - Route 140 at Norfolk Street in Mansfield

Norfolk Street provides access to the shopping plaza that houses Home Depot, Shaw's Supermarket, Staples and Longhorn Steakhouse and to the southern end of the Cabot Business Park.

This intersection experiences 52 seconds of delay, operating at a LOS D. LOS is used to determine the efficiency of an intersection, grading it from A-F. LOS D indicates that traffic flow is worsening but still tolerable.

Over the 3-year period of 2013-2015 there were 13 crashes at this intersection. Of the total crashes, 8 (62%) resulted in property damage only, 4 (31%) involved an injury and 1 (8%) crash resulted in a fatality. Approximately half of the crashes occurred during daylight hours (46%) while a majority occurred during clear weather conditions (62%) and on dry surfaces (77%). A large percentage of the reported crashes involved a rear-end type crash (77%) with the remainder being either an angle type (8%), a single-vehicle crash (8%) or a side-swipe type crash (8%).

The crash rate was calculated at 0.46, lower than the regional average. The EPDO (crash severity) is 12.7 lower than the regional threshold, however, there was a fatal crash here in 2014.

Recommendations

By optimizing the existing signal phasing, the intersection at Norfolk Street will still operate at a LOS D, but the delay will only decrease by 5 seconds from 52 to 47. In 2040, the intersection is forecasted to operate at LOS E with motorists experiencing 73 seconds of delay. Optimization of the signal will decrease future delay by 10 seconds to 63.

West Street Intersection

The intersection of Commercial Street (Route 140) with West Street is a 3-legged intersection under traffic signal control. The eastbound West Street approach consists of two 12-foot lanes, a left-turn lane and channelized right-turn lane which widens to 20 feet at the curve. This right turn operates under the control of a yield sign. The eastbound lanes are separated by a grass covered triangle.

The northbound Commercial Street approaches widen to three 12-foot lanes; two thru lanes and an exclusive left-turn lane. The southbound approach consists of two 12-foot lanes. The left lane is a through lane which continues thru the intersection. The right lane separates into two distinct lanes, one that continues through the intersection and one that is a channelized right-turn lane which widens to 22 feet at the curve. These southbound right lanes are separated by a grass covered triangle. *(Please see Figure 25 on the following page.)*

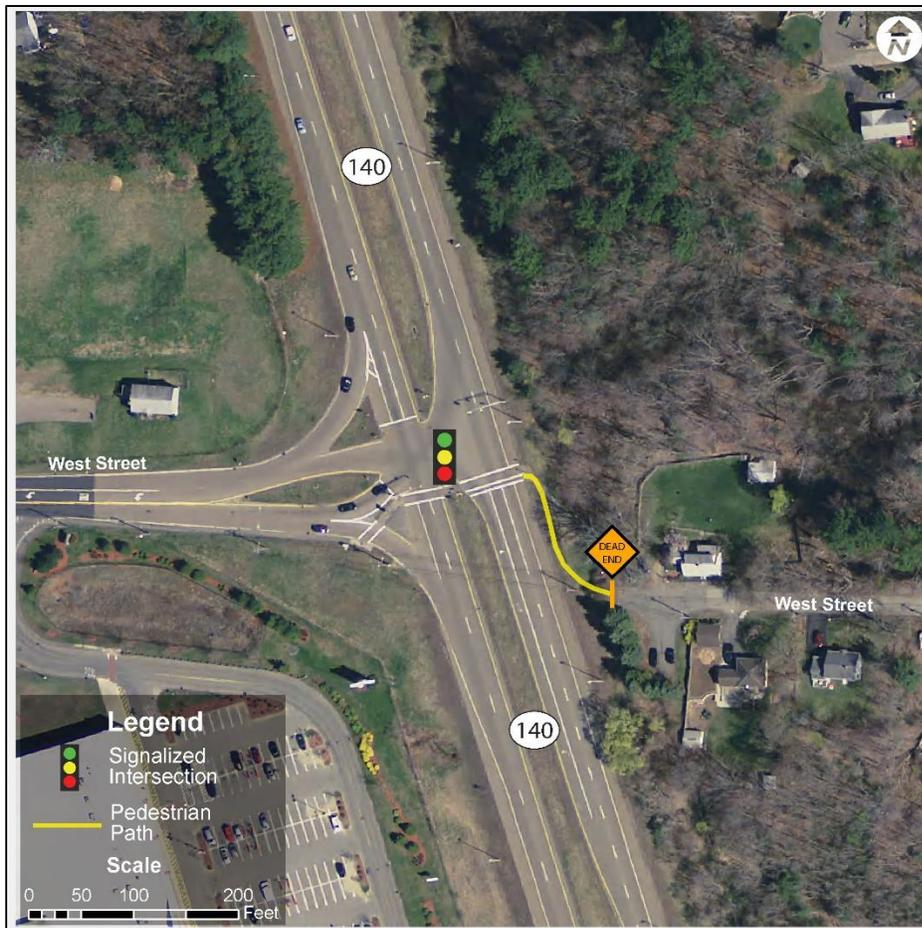


Figure 25 - Route 140 at West Street in Mansfield

This intersection provides one crosswalk, providing pedestrian accommodations for crossing in an east/west direction at the northbound Route 140 approach. The crosswalk connects a sidewalk on the south side of West Street at the shopping plaza to an informal unpaved path created by pedestrians from Commercial Street to the east end of West Street. The east end of West Street becomes a dead end at Commercial Street, providing no vehicular access to Commercial Street *as shown in Figure 25 above*. There are three pedestrian signal buttons located at the east end of the crosswalk, at the median, and at the southwest island. Unfortunately, the 20 seconds provided by each of these phases is inadequate to cross the entire length of the crosswalk.

West Street provides access to the shopping center that includes Home Depot, Shaw's Supermarket and other retail businesses, as well as to the Cabot Business Park.

This intersection experiences 20 seconds of delay, operating at a Level of Service (LOS) B. Level of Service (LOS) is used to determine the efficiency of an intersection, grading it from A-F. LOS A

through C is considered acceptable because it provides an adequate quality of service to motorists.

Over the 3-year period of 2013-2015 there were 18 crashes at this intersection. Of the total crashes, 14 (78%) resulted in property damage only while 4 (22%) involved an injury. The majority of crashes occurred during daylight hours (78%) with clear or cloudy weather conditions (56%) and on dry surfaces (67%). A large percentage of the reported incidents involved a rear-end type crash (56%) with the remainder being either an angle type (22%), a single-vehicle crash (17%) or a head-on type crash (6%). For more detail please see the Mansfield Road Safety Team Review, included as Appendix F.

The crash rate here is 0.67, below the average and the EPDO (crash severity) is 11.3, below the regional threshold of 15.

Recommendations

By optimizing the signal phasing the intersection at West Street will still operate at a LOS B as the delay will only decrease by 2 seconds from 20 to 18. In 2040 the intersection is forecasted to operate at LOS C with motorists experiencing 26 seconds of delay. Optimization of the signal will decrease future delay by 4 seconds to 22. The pedestrian signal timing is presently inadequate and should be upgraded to meet current standards as outlined by the Manual on Uniform Traffic Control Devices (MUTCD).

Chauncy Street (Route 106) Intersection

The intersection of Commercial Street (Route 140) with Chauncy Street (Route 106) is a 4-way intersection under traffic signal control. Both northbound and southbound Commercial Street approaches opens up to provide four 11-foot lanes at the intersection. They each have 2 thru lanes, an exclusive left turn lane and a channelized (free flow) right turn lane controlled by a yield sign. The channelized right lanes widen to 22 feet at the curve. The northbound exclusive left-turn lane, at approximately 175 feet, is able to accommodate 7-8 queued vehicles. The southbound exclusive left-turn lane, however, at approximately 600 feet in length, can accommodate approximately 24 queued vehicles. *(Please see Figure 26 on the following page.)*



Figure 26 -Route 140 at Chauncy Street (Route 106) in Mansfield

Chauncy Street (Route 106) provides access to the Cabot Business Park and the town of Plainville to the west. To the east, Chauncy Street provides access to the Mansfield MBTA train station (belonging to the Providence-Stoughton line), the Mansfield Public Library and the town of Easton.

Vehicles entering this intersection experience more than 120 seconds of delay, operating at a Level of Service (LOS) F. More than 120 seconds (2 minutes) of delay is beyond the acceptable limits of delay. LOS is used to determine the efficiency of an intersection, grading it from A-F. At LOS F, traffic flow is considered unacceptable.

Over the 3-year period of 2013-2015 there were 42 crashes at this intersection. Of the total crashes, 30 (71%) resulted in property damage only while 12 (29%) involved an injury. The majority of crashes occurred during daylight hours (71%) with clear weather conditions (81%)

and on dry surfaces (81%). A large percentage of the reported incidents involved a rear-end type crash (55%) with the remainder being either an angle type (31%), a single-vehicle crash (7%) or a side-swipe type crash (7%). *(Please see Figure 27 on next page.)*

The crash rate was calculated at 1.22, substantially higher than the regional average of 0.76. The EPDO (crash severity) is 30, well above the regional threshold of 15.

There were numerous public comments expressing concern over the traffic congestion, as well as vehicle crashes and red-light running. Motorists traveling on Route 140 southbound and turning left onto Chauncy Street regularly run the red light due to frustration caused by the delay and the length of the vehicle queues, especially between 4-7 pm. Also mentioned was the congestion experienced at the adjacent intersection of Chauncy Street at Copeland Drive which backs up to Chauncy at Route 140, adding to the congestion.

MassDOT recently conducted a Road Safety Audit (RSA) at this intersection in response to concerns expressed in the public outreach effort for this study. This intersection is presently included on the list of projects in our Transportation Improvement Program (TIP) for Federal Fiscal Year 2019 with improvements to the intersection that includes traffic signal timings and pavement marking upgrades.

Recommendations

Based on the analysis of the Chauncy Street intersection, SRPEDD offers the following recommendations for geometric modifications:

- the addition of a southbound left-turn lane;
- the extension of the westbound approach to 350 feet; and
- the extension of the southbound right-turn lane to 300 feet.

In addition, optimization of the signal timing will potentially improve the LOS to D with 49 seconds of delay per vehicle, a substantial improvement over current conditions.

Without any improvements the intersection will continue to operate at a LOS F with motorists experiencing more than 120 seconds of delay in 2040. Optimization of the signal system with the future projected traffic growth will improve the delay to 101 seconds of delay per vehicle. Implementation of the recommendations with optimization will improve the LOS to E with 72 seconds of delay per vehicle, a substantial improvement over a 'no-build' scenario.

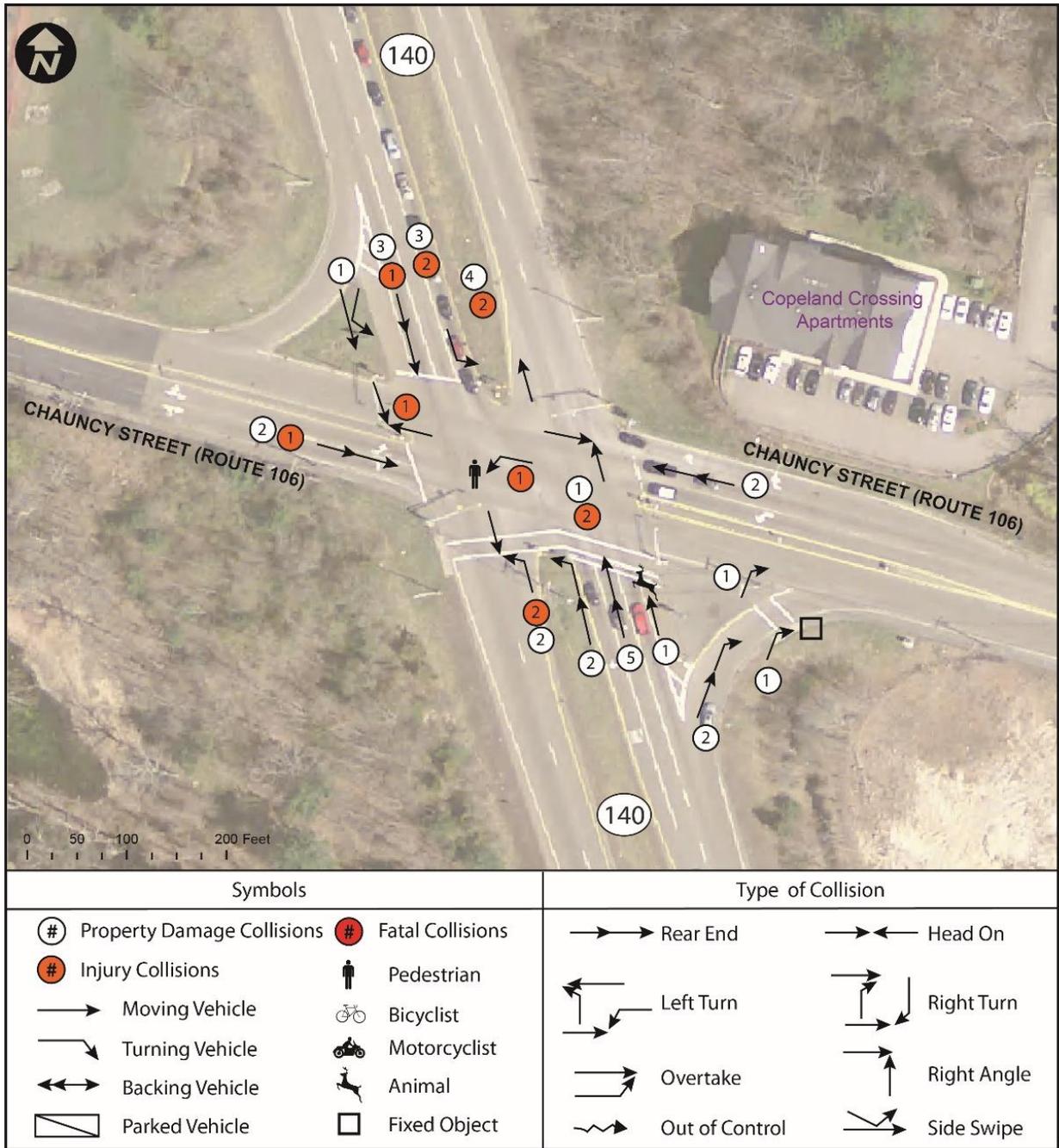


Figure 27 - Crash Diagram - Route 140 at Chauncy Street (Route 106) in Mansfield

The Route 140 Corridor in Foxborough

Existing Conditions

The Route 140 corridor (Commercial Street) in Foxborough begins at the Mansfield town line and continues north through a signalized intersection at Forbes Boulevard; through a signalized intersection at Fisher Street which provides access to the Comfort Inn; the interchange with Interstate 95; Walnut Street; the Foxborough Plaza which includes Ocean State Job Lot, Chic 2 Chic retail and a Dunkin Donuts; and Central Street just past the plaza on the east side. Route 140 then traverses a residential neighborhood which includes the Foxborough Regional Charter School and continues to the center of town. The limits of the study area end just north of the Charter School at Leonard Street. *(Please see Figure 28 on the following page.)*

The Route 140 corridor in Foxborough is a limited access highway with a grassy median from the town line of Mansfield until Walnut Street where it becomes a one lane road with a suburban residential character.

Automatic Traffic Recorders were placed at three locations in Foxborough along Route 140. Locations and Average Daily Traffic (ADT) were as follows:

- South of I-95 - 38,800 ADT
- North of I-95 - 25,400 ADT
- North of Walnut Street - 21,900 ADT

The 85th percentile speeds were recorded as follows:

- South of I-95 - 54 mph
- North of I-95 - 54 mph
- North of Walnut Street - 51 mph

The posted speed limit is 55 mph just north and south of the I-95 interchange. However, the posted speed limit varies by direction further north of the I-95 interchange, in the area of Walnut Street.

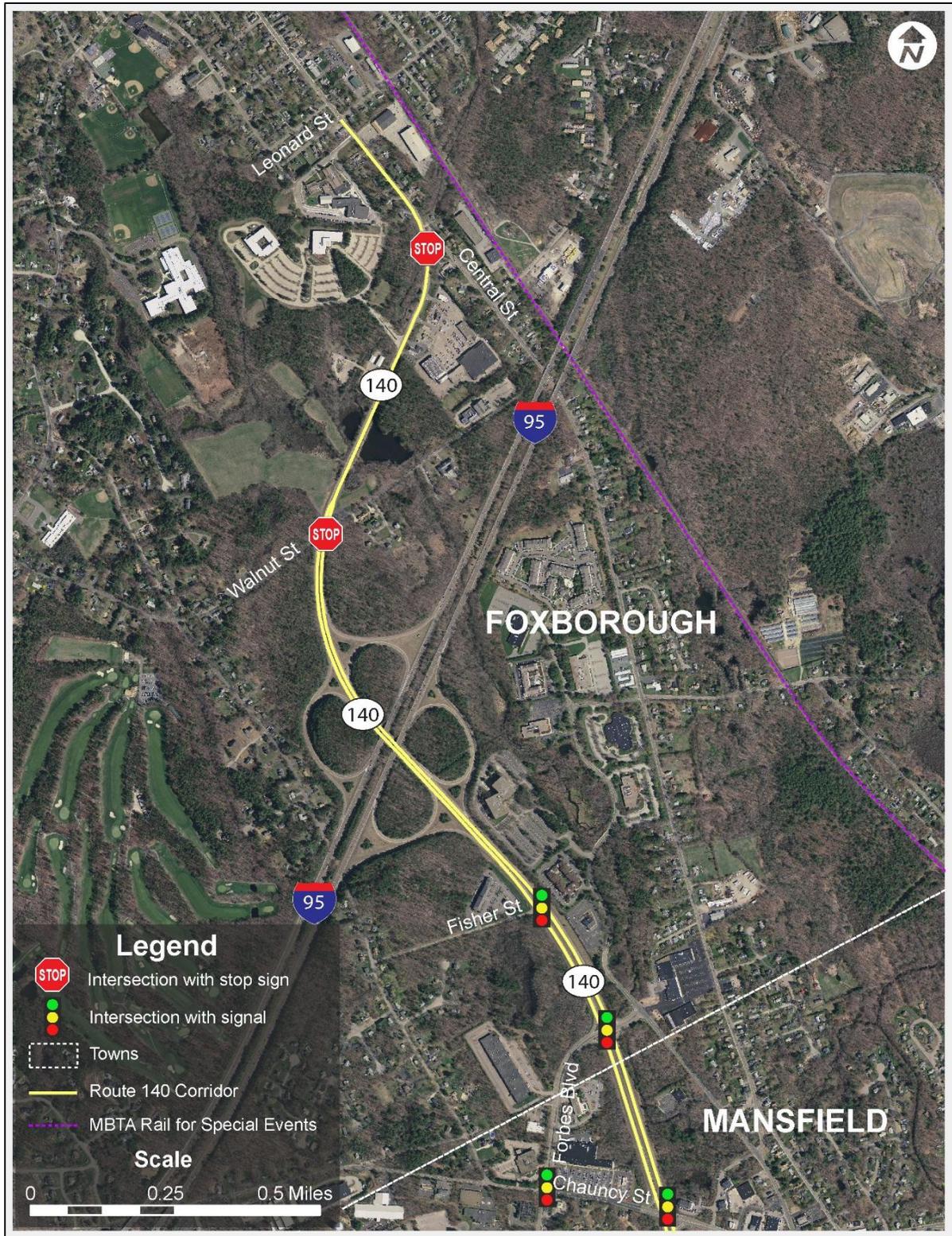


Figure 28 -Route 140 Study Area in Foxborough from the town line to FRCS

Motorists traveling in the southbound direction toward Walnut Street have the posted speed limit change from 40 mph to 55 mph prior to Walnut Street and the I-95 interchange. In the northbound direction, the posted speed limit changes from 55 mph, just beyond the I-95 interchange, to 40 mph, north of Walnut Street.

The 85th percentile speed averaged 51 mph for both directions. However, in the northbound direction, the 85th percentile speed was recorded at 49 mph north of Walnut Street, reflecting northbound motorists being forced to slow down rather quickly in a short distance. However, southbound motorists, with the 85th percentile at 52 mph, are well exceeding the posted speed limit of 40 mph here.

Heavy and light truck percentages were as follows:

- South of I-95– light trucks 1.4%, heavy trucks 2.1%
- North of I-95 – light trucks 0.35%, heavy trucks 0.9%.
- North of Walnut Street – light trucks 1.3%, heavy trucks 0.6%

Since anything over 2% for truck traffic is considered significant, based on this data, there is no significant truck traffic in the study area of the Route 140 corridor in Foxborough.

All of the traffic data collected, including the Average Daily Traffic, the 85th percentile speed and the percentage of trucks at each location counted is *displayed as Figure 29 on the following page*, which also shows the posted speed limits.

As part of SRPEDD's efforts to analyze the mobility and safety conditions along the Route 140 corridor, a Road Safety Team Review was held in each community. These meetings included a multidisciplinary team that reviewed crash data, discussed traffic volumes and speeds, and summarized bicycle and pedestrian facilities along the corridor.

The multidisciplinary team representing various stakeholders met on November 21, 2016 in the McGinty Room of the Foxborough Public Safety Building. The team discussed safety related observations and highlighted potential safety enhancements which are included in the following section. The Road Safety Team Review for the Foxborough portion of Route 140 can be found in Appendix G.

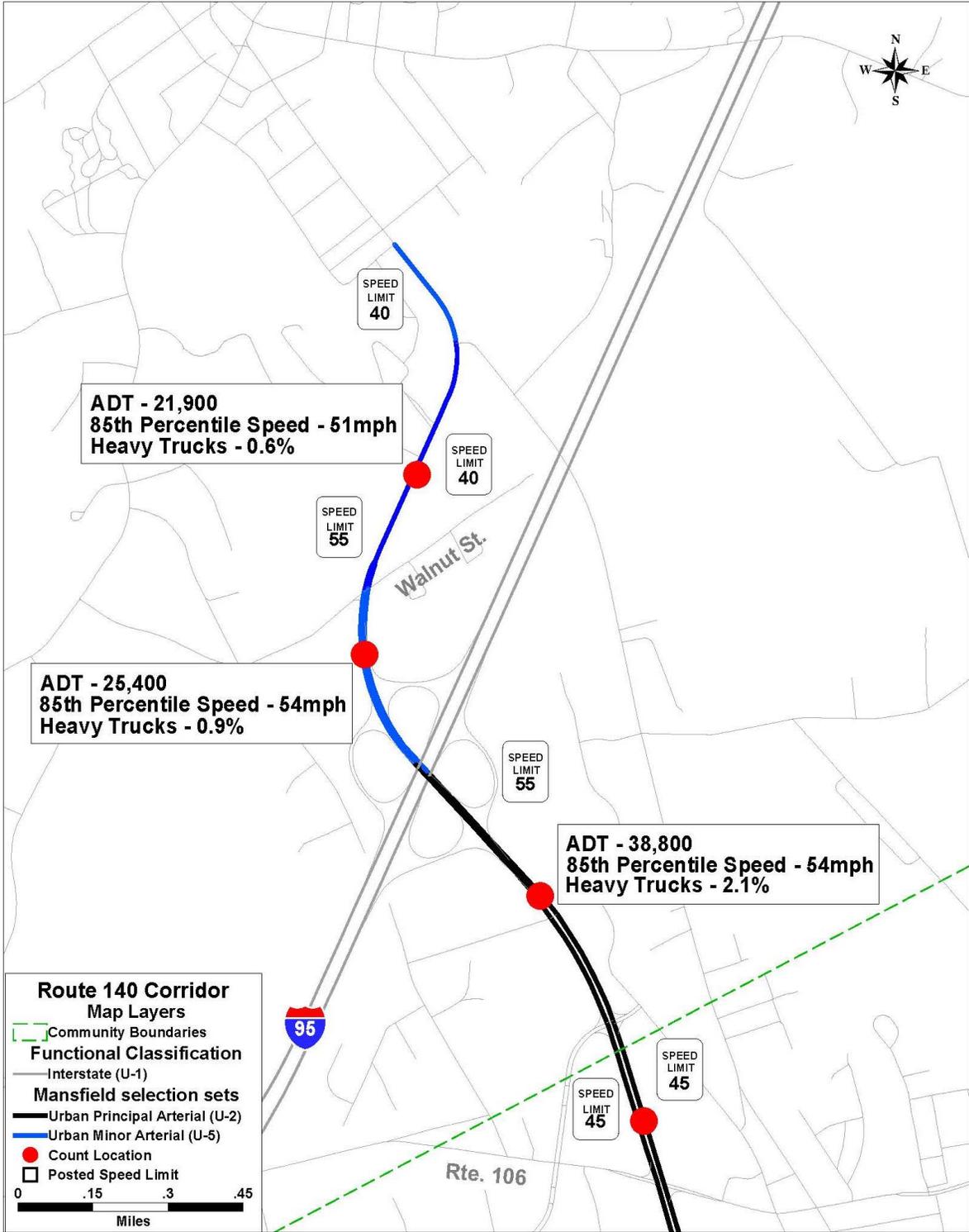


Figure 29 - Traffic Data on Route 140 in Foxborough

Interchanges and Intersections

Forbes Boulevard

The intersection of Route 140 (Commercial Street) with Forbes Boulevard is a 4-way intersection under the control of a traffic signal. The northbound Commercial Street approach consist of two 11-foot lanes which widen to 4 lanes at this intersection. These four lanes consist of two thru lanes, an exclusive left-turn lane and a channelized right-turn lane. The northbound channelized right lane is controlled by a yield sign but there was no yield sign present at the southbound channelized right lane onto Forbes Boulevard into the main entrance of the Cabot Business Park when field observations were made. *(Please see Figure 30 on the following page.)*

The southbound Commercial Street approach consist of two 11-foot lanes which widen to five lanes at this intersection. These five lanes consist of two thru lanes, an exclusive left-turn lane and a channelized (free flow) right-turn that is divided into two lanes by a faded solid line.

The eastbound approach consists of three lanes; an 11-foot exclusive left-turn lane, an 11-foot shared thru/left-turn lane and a channelized free flow right-turn that widens to 16 feet at the curve that is controlled by a yield sign. The westbound approach consists of three lanes; a 14-foot exclusive left-turn lane, a 12-foot thru lane and a channelized free flow right lane that widens to 22 feet at the curve controlled by a yield sign.

The Forbes Boulevard one-lane westbound approach widens to three lanes at the intersection. This includes one thru lane and an exclusive left-turn lane controlled by the traffic signal, and a channelized right-turn lane controlled by a yield sign. Forbes Boulevard, within the Cabot Business Park, consists of three lanes in either direction with the eastbound Forbes Boulevard approach to the intersection also at three lanes. These lanes consist of a thru lane and an exclusive left-turn lane controlled by a traffic signal, and a channelized right turn lane controlled by a yield sign.



Figure 30 - Route 140 at Forbes Boulevard in Foxborough

The Cabot Business Park, located in the town of Mansfield, is accessible from Forbes Boulevard in Foxborough, as well as from Norfolk Street, West Street and Chauncy Street in Mansfield, includes medical device and technology-related companies, as well as warehousing and distribution facilities. This includes the U.S. headquarters of Covidien which employs about 1,600 people, making it one of the area's largest employers.

Forbes Boulevard also provides access to the Red Roof Inn, a Super Stop & Shop, and the Cabot Business Park to the west, and Foxborough Boulevard and the Foxfield Plaza to the east.

This intersection experiences 60 seconds of delay, operating at a Level of Service (LOS) E. Level LOS) is used to determine the efficiency of an intersection, grading it from A-F. At LOS E and F, traffic flow is considered unacceptable.

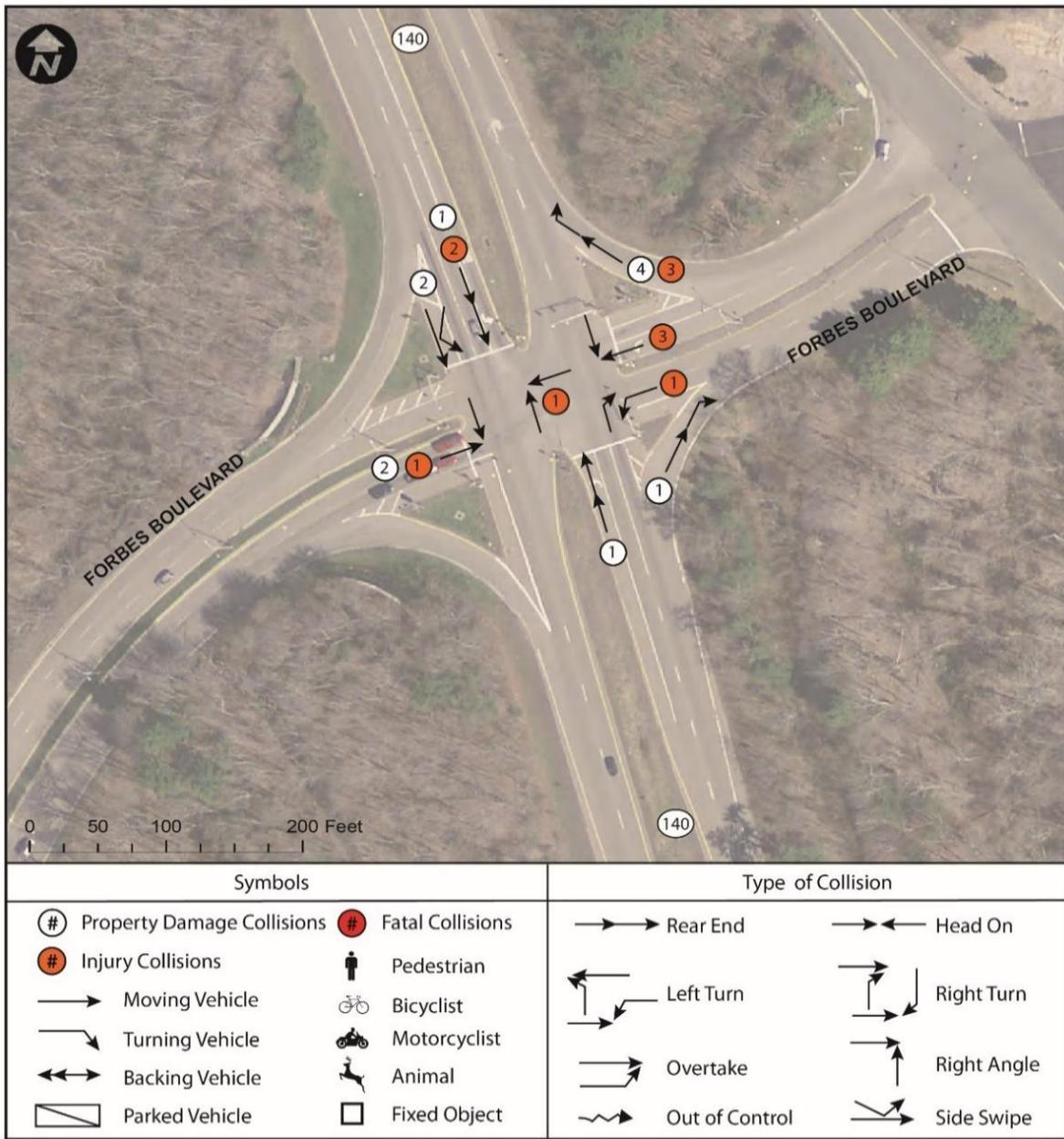


Figure 31 - Crash Diagram of Route 140 at Forbes Boulevard in Foxborough

Over the 3-year period of 2014-2016 there were 22 crashes at this intersection. The crash rate here is 0.78, only slightly higher than the regional average of 0.76. The EPDO (crash severity), however, is 29, well above the regional threshold of 15, indicating a high crash severity problem and significant safety issues here. *(Please see Figure 31 on the previous page.)*

Injury crashes are usually attributed to speeding and aggressive driving. The short east/west green phase may be a contributing factor to motorists running the red light. It was also noted that signal visibility may be an issue due to the lack of back plates on the signal heads.

Recommendations

Based on traffic growth projections to the year 2040, the intersection of Route 140 at Forbes Boulevard will worsen to LOS F with 96 seconds of delay per vehicle. Based on the traffic distribution through the intersection, an additional westbound right lane and an additional eastbound approach lane to provide two left-turn lanes and one thru lane is recommended. Implementation of these improvements will improve the operation to a LOS D with 49 seconds of delay, a substantial improvement. Traffic conditions at LOS D are considered tolerable.

Consideration should be given to an Intelligent Transportation System (ITS) warning sign to alert motorists, especially those exiting from I-95, of the approaching signal being red.

A roundabout is proposed east of the intersection at Forbes Boulevard and Foxborough Boulevard to assist with traffic mitigation for the Foxfield Plaza redevelopment project. This project includes plans for a 139-room hotel, 46,500 square feet of retail, a 3,200 square foot drive-thru bank, and 10,000 square feet of restaurant space. At this time, the roundabout project is on hold.

Fisher Street

The intersection of Route 140 (Commercial Street) with Fisher Street is a 3-way intersection controlled by a traffic signal and provides access to the Comfort Inn, the 99 Restaurant, the Red Roof Inn and Route 106 via South High Street on the west side of the roadway. The northbound approach consists of 2 thru lanes and an exclusive left-turn controlled by the traffic signal. The southbound approach provides two lanes, with the left lane used as a thru lane and the right lane used as a shared thru/right-turn lane. The Fisher Street eastbound approach provides one lane. There are no crosswalks or other pedestrian facilities at this intersection. *(Please see Figure 32 on the following page.)*



Figure 32 -Route 140 at Fisher Street in Foxborough

This intersection experiences 7 seconds of delay and operates at an LOS A. Traffic growth projections to the year 2040 indicates the intersection will operate at a LOS D with 39 seconds of delay per vehicle. LOS D indicates that traffic flow is worsening but still tolerable.

Over the 3-year period of 2014-2016 there were 17 crashes at this intersection with a crash rate of 0.62, below the regional average of 0.76. The EPDO (crash severity) is calculated at 11, well below the regional threshold of 15, indicating that this intersection does not have a significant safety issue.

Route 140 northbound leads directly to the Interstate 95 interchange. This full cloverleaf interchange provides both access and egress between Route 140 and Interstate 95. Vehicles that are exiting from I-95 northbound onto Route 140 southbound at a high speed have little time to stop for a red light or for a vehicle slowing to turn right onto Fisher Street.

Although the crash rate here is not significant, residents indicated through the public process that this intersection is very dangerous. During the final round of public meetings, it was stated that motorists on the Fisher approach regularly wait 3-5 seconds before proceeding on a green signal. Motorists allow this time because they are expecting at least one vehicle on Route 140 southbound to run the red light at Fisher Street due to excessive speed from vehicles exiting the I-95 interchange nearby.

Recommendations

Consideration should be given to extending the all-red clearance interval at this signal system, and additional signage, such as “Intersection Ahead” for vehicles exiting I-95 north of the intersection. Consideration should also be given to an Intelligent Transportation System (ITS) warning sign to alert motorists of the approaching signal being red.

Walnut Street

The intersection of Route 140 (Commercial Street) with Walnut Street is a short distance from the interchange with Interstate 95. A similar issue is present here, as with Fisher Street. Vehicles are exiting I-95 southbound onto Route 140 northbound at high speeds just a short distance from Walnut Street. The merging points are very close to these intersections and do not afford motorists sufficient distance to stop or slow down safely for turning vehicles at either Fisher Street or Walnut street. *(Please see Figure 33 on the following page.)*

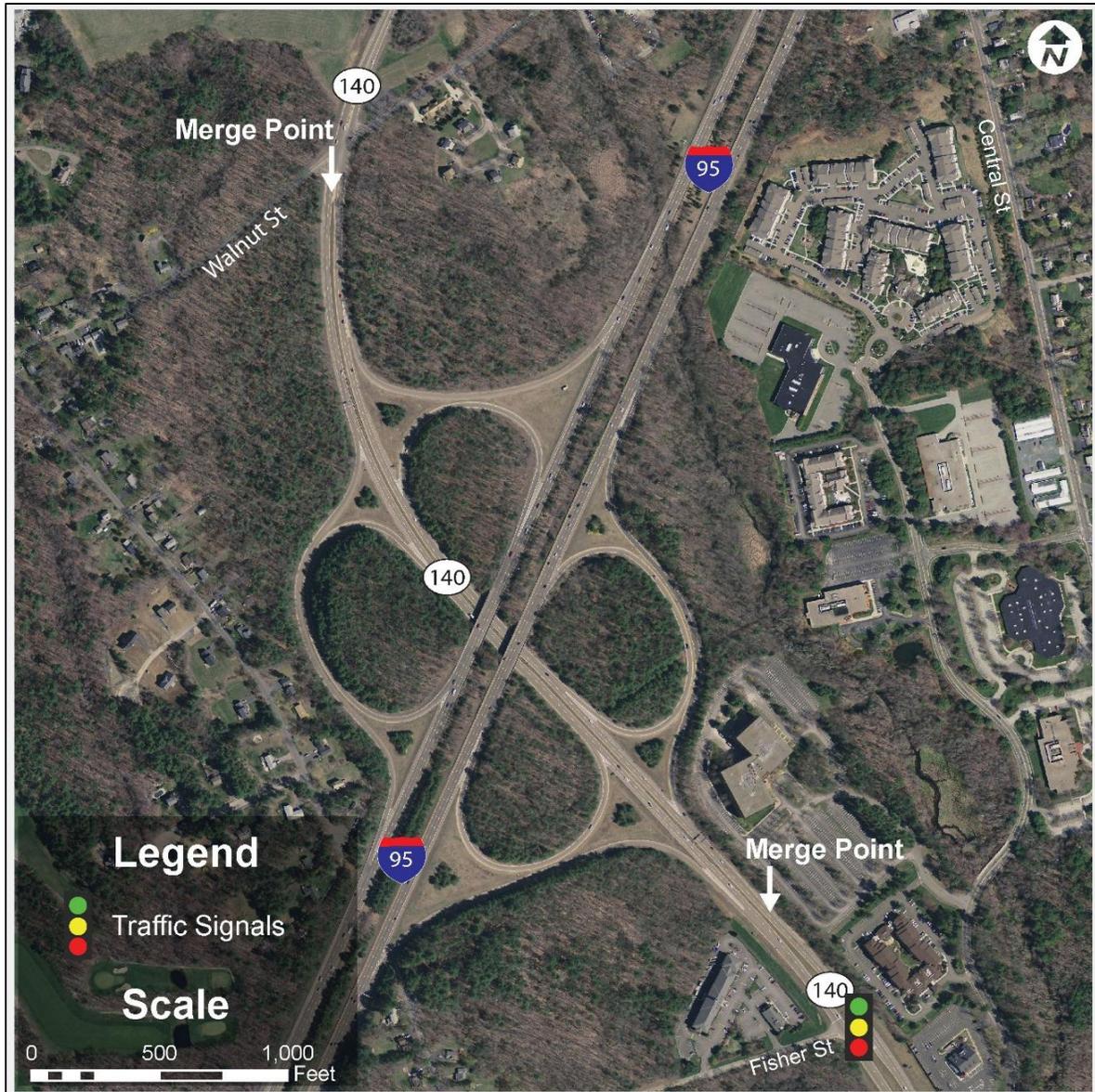


Figure 33- The I-95 Interchange at Route 140. Merge points are indicated near Walnut Street and Fisher Street in Foxborough.

The Walnut Street intersection is just beyond the merging point of vehicles exiting from I-95 South, making turns to and from Walnut Street especially difficult. Walnut Street provides access to a residential neighborhood to the west and to the Foxboro Cancer Center and Medical Group to the east. This facility is visited by approximately 80,000 patients annually, all of whom travel through this intersection to access the medical services including cancer treatments, physician's visits, laboratory and radiology testing. There is no other access to the medical facility and residences other than this intersection.



Figure 34-End of the paved roadway on Walnut Street.

Walnut Street is a dead-end road east of the medical facilities. However, a narrow dirt road, used by locals as a cut-through, continues for a short distance through a residential area and directly onto Central Street. (See Figure 34 above & Figure 35 below.)

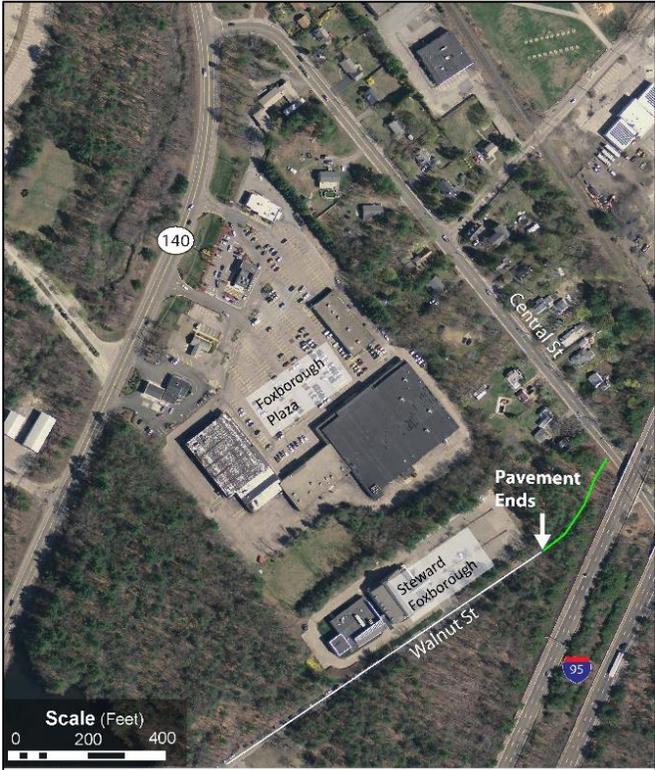


Figure 35 - End of Walnut Street just short of Central Street in Foxborough

Site visits and observations noted that the Walnut Street pavement was severely deteriorated, with potholes and pieces of dislodged pavement. There are no visible pavement markings and there is an extremely faded 'STOP' marking painted onto the roadway but without the accompanying Stop Sign. There were obvious signs of a crash as one of the street signs was apparently run over and was still lying on the ground. (See Figure 36 below.)

Field visits noted that left turns from Walnut Street onto Route 140 are a difficult maneuver, especially with high-speed northbound vehicles from the I-95 off-ramp. The posted speed limit on Route 140 at Walnut Street is 40 mph in the southbound direction but 55 mph in the northbound direction.

This intersection was one of the most frequently mentioned safety concerns during the public outreach process. Several incidences of observed crashes were reported by the public that may or may not be reflected in the crash data.



Figure 36 - At Walnut Street in Foxborough looking south

Over the 3-year period of 2014-2016 there were 16 reported crashes at this intersection with 19% of the crashes resulting in injury and the remainder resulting in property damage only. The calculated Equivalent Property Damage Only (EPDO) (crash severity) is 10, well below the regional threshold of 15.

Angle-type crashes, most likely due to the difficult geometry and high speeds accounted for 75% (12) of crashes at this location. Although the data does not indicate a safety issue here, this

intersection is one of the biggest safety concerns for people who live and/or drive in the area. Side-swipe type crashes accounted for 19% (3 crashes) at the intersection. The majority of crashes at this location occurred between 10am and 4pm.

The intersection, controlled by a stop sign on Walnut Street, currently operates at a LOS C with 25 seconds of delay per vehicle. Projected traffic growth indicates the intersection will operate at a LOS D with 31 seconds of delay in 2040. LOS D indicates that traffic flow is worsening but still tolerable.

Recommendations

A signal warrants analysis was conducted for the intersection which analyzes traffic conditions, pedestrian characteristics, and physical conditions to determine whether installation of a traffic control signal is justified. The analysis consists of nine warrants with the results that five warrants were met, including the warrants for 8-hour volume, 4-hour volume, peak hour volume, crash experience and the roadway network. This is an indication that this intersection is a candidate for a signal.

Implementation of a signal would improve the existing LOS from a B to an LOS A with 5 seconds of delay per vehicle but would improve safety by protecting vehicles making turns onto Route 140. The addition of future traffic growth will not worsen the LOS, as the delay will increase slightly to 7 seconds of delay per vehicle with signalization in 2040.

Included with any design of a signal system should be an advanced warning signs (Signal Ahead) on Route 140 due to the layout of the roadway.

Foxborough (Ocean State Job Lot) Plaza

Further north on Route 140 is Foxborough Plaza, a large retail plaza that includes an Ocean State Job Lot, a Shell Gas Station, Honey Dew Donuts, Chic 2 Chic clothing, Papa Gino's, Dollar Store, Dunkin Donuts and other small businesses. There are a total of four (4) driveway accesses to the plaza. There are two driveways at the gas station, a main driveway access at the center of the plaza, with an additional driveway access at Papa Gino's, all which allow cross access to the other businesses in the plaza. Central Street is located a short distance north of the plaza but there is no access to the plaza from Central Street. A sharp curve in the road on Route 140 along the front of the plaza to Central Street, coupled with the speed of traffic, results in sight distance issues for vehicles attempting to turn either right or left when exiting from the plaza. *(Please see figure 37 on the following page.)*

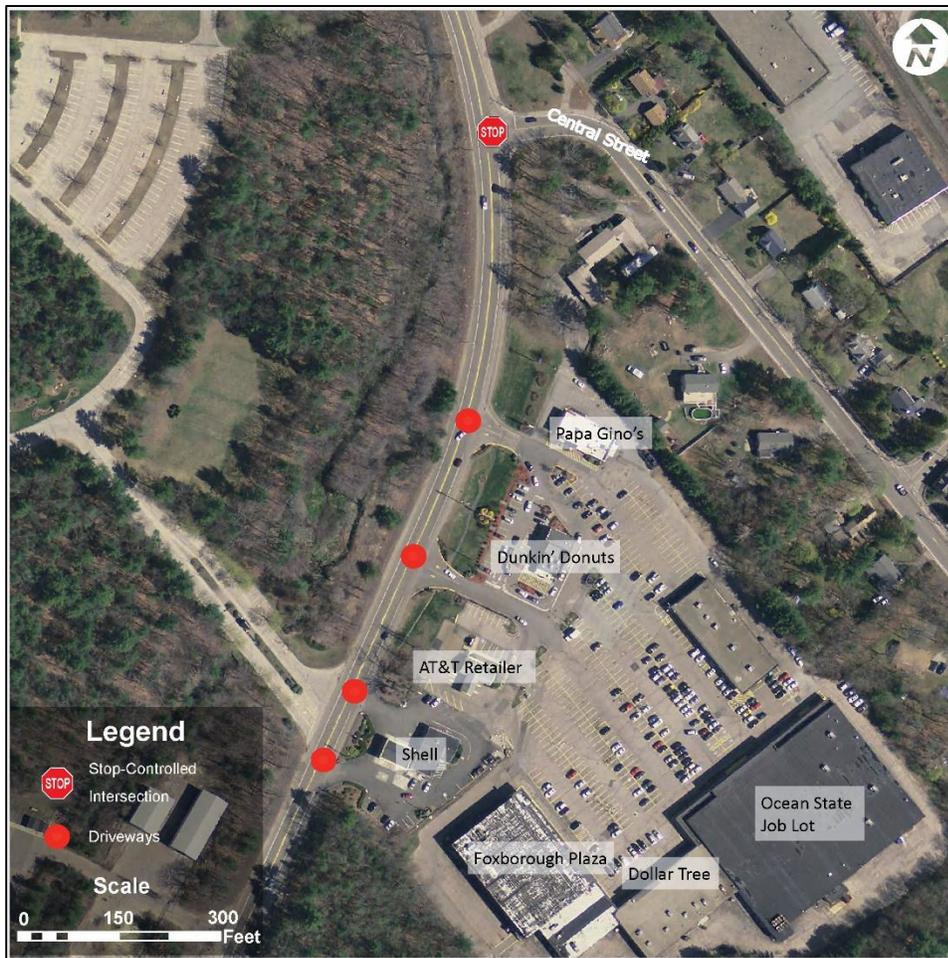


Figure 37 - Foxborough (Ocean State Job Lot) Plaza in Foxborough

Located directly across from the two driveway accesses to the Shell Gas Station is the entrance to the Schneider Electric office park complex which forms a four-legged intersection with Route 140. The northbound and southbound Route 140 approaches operate freely and the eastbound Schneider Electric approach is stop controlled.

Over the 3-year period of 2014-2016 there were 30 reported crashes at this intersection. with 10% of the crashes resulting in injury and the rest resulting in property damage only.

Angle-type crashes accounted for 57% (17) of the crashes associated with access to the plaza. Rear-end type crashes accounted for 27% (8 crashes) at the intersection and side-swipe crashes accounted for 10% (3) of the crashes. Crash data for this location indicates that the majority of rear-end collisions were related to vehicles waiting to turn into the plaza and the rear vehicle not observing the stopped vehicle in time or confusion as to where the car was turning. The side-swipe crashes were attributed to drivers attempting to avoid left-turning vehicles into the plaza.

Recommendations

With 4 driveways providing access to the plaza, this leads to confusion over which driveway to use and where cars are actually turning. There are also sight distance issues related to the curvature of the road and obstructions along the side of the road that make exiting the plaza difficult. The wide cross-section of the roadway at this location lends itself to higher speeds and evasive driver movements.

Reducing the width of the travel lanes and adding infrastructure such as bicycle lanes will help to calm traffic. Consideration should also be given to investigating whether driveways can be combined or reconfigured at the plaza to reduce the number of conflict points and if obstructions to sight distance can be removed or minimized. Wayfinding signage should also be considered to allow for better guidance in and out of the plaza.

Central Street

The intersection of Route 140 at Central Street is a three-legged unsignalized intersection with Central Street located on the eastside of Route 140. The segment of Route 140 north of Central Street through Foxborough is mostly residential with the study area ending at Leonard Street, just past the Foxborough Regional Charter School (FRCS). Central Street provides access to a large residential area, including apartment complexes. *(See Figure 37 on the previous page.)*

The Central Street approach to Route 140 is controlled by a stop sign. Central Street is a two-lane undivided roadway with one general purpose lane in each direction. The Central Street one-lane approach widens enough to be utilized as two lanes by motorists for a left turn and a right turn onto Route 140. At the Central Street intersection, Route 140's designation changes from Commercial Street to Central Street.

The sharp curve and excess speeds which causes difficulty in safely exiting the Foxborough Plaza also makes it difficult to safely turn left from Central Street. During site visits, queues at the stop sign on Central Street numbered up to 15 vehicles waiting to turn onto Route 140. This intersection experiences extensive operational and safety issues.

Between 2014-2016 there were 22 total crashes at the intersection, with 50% of the crashes occurring during the afternoon peak period from 4 p.m. to 7 p.m. Six (27%) of the crashes were injury related. The crash rate here is 0.98, higher than the Statewide and District 5 unsignalized intersection average crash rates of 0.58. The calculated Equivalent Property Damage Only (EPDO) (crash severity) is 16, slightly above the regional threshold of 15. Both of these data sets indicate a safety issue at this intersection.

Angle-type crashes accounted for 68% (15) of the total crashes and can be attributed to the difficulty of exiting Central Street. Nine of the angle crashes were related to drivers attempting left turns out of Central Street and being struck by a northbound vehicle on Route 140. Five (23%) of the crashes were rear-end type crashes, the majority of which occurred on Route 140. Crash data indicates that the rear-end crashes were mostly related to drivers attempting to avoid turning vehicles. There was one bicycle crash at this intersection which involved a driver failing to yield right-of-way to a cyclist as they were turning.

Under stop control the intersection currently operates at a LOS D with 27 seconds of delay. It is projected to operate at a LOS E with 47 seconds of delay in 2040 with projected traffic growth. LOS D indicates that traffic flow is worsening, but still tolerable. At LOS E and F, traffic flow is considered unacceptable.

Recommendations

A signal warrants was conducted for the Central Street intersection which analyzes traffic conditions, pedestrian characteristics, and physical conditions to determine whether installation of a traffic control signal is justified. The results indicated that this intersection is a candidate for a signal. If a signal were installed under current traffic volumes the intersection would improve from an LOS D to an LOS C with 21 seconds of delay per vehicle. It would also make turning onto Route 140 easier and safer.

By 2040 the intersection will continue to operate at a LOS C with 31 seconds of delay per vehicle based on projected traffic patterns. LOS A through C is considered acceptable because it provides an adequate quality of service to motorists.

Included with any design of a signal system should be an advanced warning sign (Signal Ahead) on the approaches of Route 140 due to the layout of the roadway.

As an interim improvement, consideration could be given to install pavement markings the roadway to allow for a free-flow right turn from Central Street.

The Foxborough Regional Charter School (FRCS)

The Foxborough Regional Charter School (FRCS) is located on the west side of Central Street (Route 140). FRCS is a kindergarten thru Grade 12 school, accepting priority students from the region including Attleboro, Avon, Brockton, Canton, Easton, Foxborough, Mansfield, Medfield, Medway, Millis, Norfolk, North Attleboro, Norton, Norwood, Plainville, Sharon, Stoughton, Walpole, West Bridgewater, and Wrentham, but it is open to all Massachusetts residents. There are over 1,500 students presently enrolled at FRCS, with approximately 150 faculty and support staff. (Please see Figure 38 below.)



Figure 38- the Foxborough Regional Charter School

When this study began, there was only one access and egress point for the school. In the morning, students are dropped off between 7:00 AM and 7:30 AM, when the school day begins. Dismissal from school is at 3:30 PM with an extended day program which runs from 3:30 PM to 6:00 PM for students in Kindergarten through 8th grade. Some students are transported by school buses, but there is a substantial fee for that service. School bus transportation ranges from \$1,055 to \$1,900 per family, based on the number of students. This high cost forces families to drive their children to school in order to avoid these fees.

The number of students being driven to FRCS coupled with the single access and egress point created a daily traffic congestion issue. Traffic congestion is not as severe in the afternoon due to the staggered student dismissal and the extended day program.

The morning traffic congestion forces motorists to seek alternate routes around this bottleneck, including use of the Central Street Business Park, located opposite from the FRCS entrance, as a cut through to avoid the traffic congestion at the Charter School.

Since the commencement of this study, the school has expanded and added a new elementary school building and a secondary access (Fall of 2017). This is located adjacent to the existing campus with the secondary access located at 33 Commercial Street. Since the beginning of the school year the Foxborough Police Department has voiced concerns with the traffic flow into the Charter School at the new secondary Commercial Street entrance. Motorists driving along Route 140 are delayed by left-turning vehicles attempting to enter the new school entrance, with many motorists using the break down lane to pass the left-turning vehicles on the right.

A meeting was held at the Foxborough Public Safety building on November 21, 2017 with town officials, representatives from the school, MassDOT and SRPEDD to discuss alternatives to assist with these issues. Since that time, a project has been initiated to realign the Route 140 northbound approach to the secondary driveway (33 Commercial Street) providing a left-turn lane. The school and town officials are coordinating this effort with MassDOT.



Figure 39- School Zone Signs Near FRCS

SRPEDD recommends that traffic conditions continue to be monitored once the realignment is implemented to determine the effectiveness of this change to traffic flow.

Posted speed limits on Route 140 in Foxborough vary greatly. The northbound and southbound approaches to the I-95 interchange are 55 mph. The posted speed limit drops to 40 mph just beyond Walnut Street northbound until almost to the FRCS entrance. *(See Figure 29 displaying the posted speeds on page 54.)* The posted speed limit then drops to 30 mph at the entrance to the FRCS. This area has been recently designated as a school zone with 20 mph posted speeds. *(Please see Figure 39 on the previous page.)*

Land Use and Development

Generally, the existing land uses along the Route 140 corridor in all three communities are primarily residential and commercial with pockets of industrial, recreational, and institutional uses. The following sections briefly describe the known existing and future land uses in each community and highlight some of the larger trip generators.

To project future residential and commercial growth SRPEDD used a software analysis model called CommunityViz, local knowledge, and a wide variety of current information. The Community Viz model contains data such as parcels, zoning, numerous GIS layers such as wetlands, habitats, flood zones, and civic amenities, as well as projection totals for dwelling units, retail jobs, and non-retail jobs.

The model estimated existing development and created a build out analysis which assumed growth on every buildable parcel. The results were assessed and adjusted to determine realistic development and to estimate how likely (or unlikely) future development might be.

A key step in the land use modeling included assessing the "suitability" of each new potential building (from the build-out). Using a wide variety of information, such as the distance to the nearest school or interchange, if the building was served with sewer, or the type of underlying soil characteristics, SRPEDD planners developed estimates of how likely (or unlikely) it would be that potential building to be constructed. Ultimately, each potential building received a score that determined its overall "suitability" for both industrial and non-industrial demand. A more detailed explanation of the analysis and maps showing the Industrial and Non-Industrial Suitability (displayed on the parcel for better visibility) for all three communities along the Route 140 corridor can be found in Appendix I.

This approach provided a different perspective on projections for industrial, office, retail, and service jobs as well as single family, multi-family, and mixed-use dwelling units.

Norton

The southern section of the Route 140 corridor in Norton (Route 123 to the Norton Reservoir) is predominately single-family residential with some areas of institutional use (Wheaton College). The southern section also includes small areas of commercial uses, mainly concentrated in the area of the reservoir. Those commercial uses include small auto repair shops, convenience/liquor stores, a landscape supply store, and several eateries. The amount of commercial uses steadily increases in the northern section of the Route 140 corridor in Norton (Norton Reservoir to the Mansfield Town Line) with areas like the Great Woods Marketplace (Roche Brothers Supermarket, Dunkin Donuts and McDonalds), TPC Boston Golf, Cumberland Farms, and the Lakeview Plaza. There are large industrial uses located in this section of Route 140; the Autopart International distribution facility and the newly constructed New England Ice Cream distribution facility. Residential uses in this section include two smaller mobile home developments (approximately 70 units), a 116-unit 55+ community (Great Brook Condominiums), and an assisted living facility (Wingate/Epoch at Norton) located directly across from the Great Woods Marketplace plaza; several multi-family structures near Arnold Palmer Boulevard; and a 123-unit mobile home development (Norton Estates) located at the Mansfield Town Line.

The Norton Town Planner indicated that the New England Ice Cream distribution facility recently received an occupancy permit and has plans for expansion in the near future. Otherwise, there are no other planned developments along the Route 140 corridor in Norton. However, the Park at Great Woods still includes the potential for approximately 900,000 square feet of office space located off of Arnold Palmer Boulevard. The owners of the site continue to actively market the property; however, no concrete projects have come to fruition. Route 140 in Norton will not experience any additional projected travel trips due to development. *(Please see Figure 40 on the following page.)*

In 2017, Spring Town Meeting voted in favor of a zoning change to 33 parcels along Route 140 in the area of the Norton Reservoir. This change, in effect since May 8, modifies the existing zoning (primarily commercial, one parcel of residential 40B) to a village commercial district. This would allow greater density and mixed uses along the corridor.

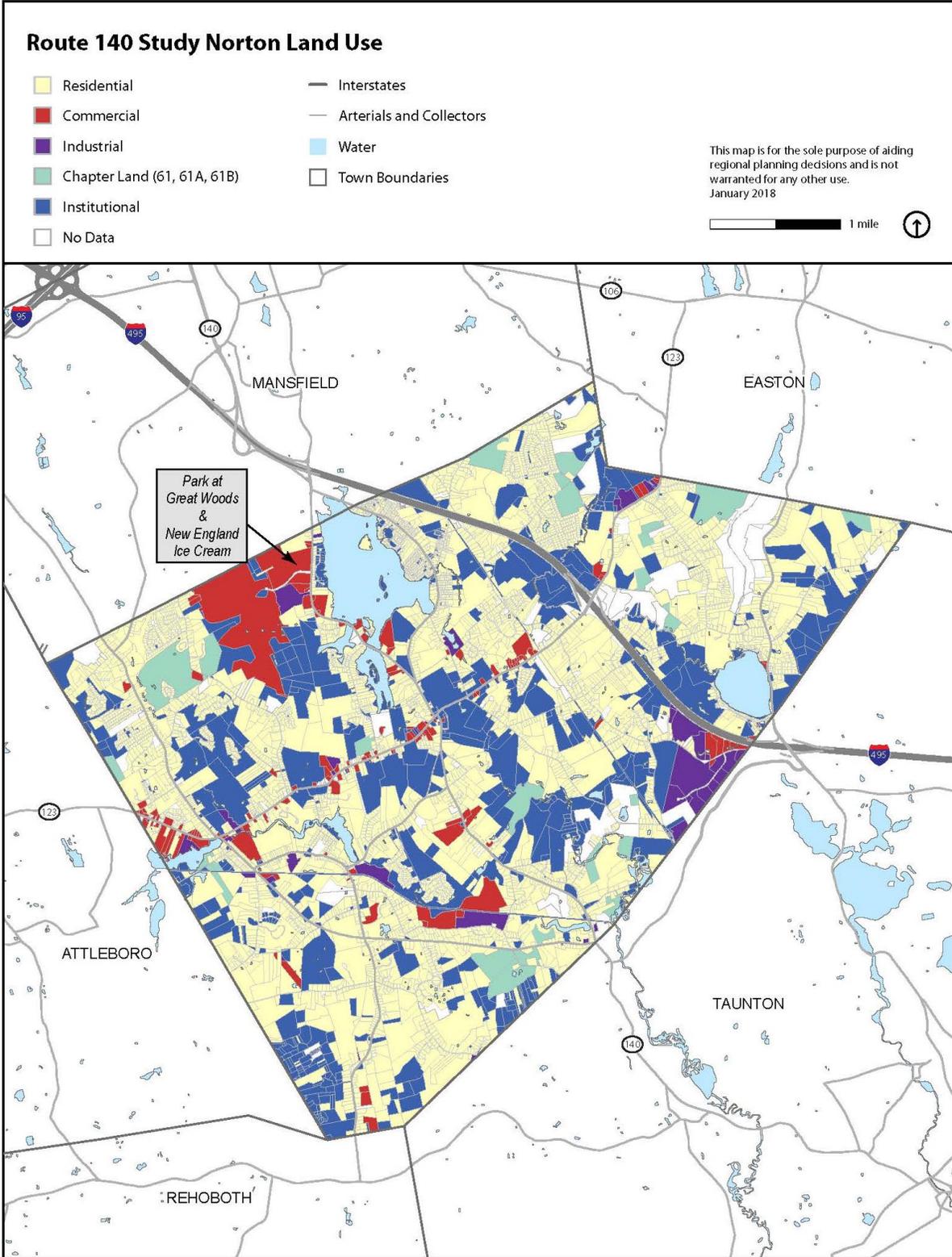


Figure 40 - Norton Land Use

Mansfield

Commercial uses are the predominant land use in the southern section of the Route 140 corridor in Mansfield (Norton Town Line to I-495). The commercial sites include the Xfinity Center, the SMG Great Woods Family Medicine practice, and the Miami Systems Corporation. This sections also includes the Great Woods Conservation Area, an area of protected conservation land with over 3.5 miles of hiking trails. The northern section of Route 140 (I-495 to the Foxborough Town Line) contains a mix of commercial, industrial, and residential uses. The limited access divided highway designated as Commercial Street does not provide any direct access to adjacent properties. The majority of the residential uses are present on the east side of the divided highway while the commercial and industrial uses are generally located on the west side of Route 140.

Commercial uses from School Street include Mansfield Crossing and other shopping to the west, and connects to West Street which leads to the Mansfield Town Common and the center of town to the east. Mansfield Crossing alone includes over 30 retail outlets and several restaurants. Additional commercial uses from West Street and Norfolk Street includes Erin's Center shopping plaza that houses Home Depot, Shaw's Supermarket, Staples and Longhorn Steakhouse and the southern end of the Cabot Business Park.

Chauncy Street (Route 106) provides access to developments on Route 106 on both sides of Route 140 (Stop & Shop, Advance Auto Parts, a cold storage facility, and a dental practice), access to the Cabot Business Park and the town of Plainville to the west, and access to the Mansfield MBTA train station belonging to the Providence-Stoughton line, the Mansfield Public Library and the town of Easton to the east.

The Cabot Business Park is approximately 850-acres in size, is located on the west side of Route 140 and is the largest industrial use along Route 140 in Mansfield. It is accessible from Norfolk Street, West Street and Chauncy Street in Mansfield, and includes a number of medical device and technology-related companies, as well as warehousing and distribution facilities. This includes the U.S. headquarters of Covidien, one of the area's largest employers, employing about 1,600 people.

The Mansfield Town Planner indicated that in addition to the most recent developments (Advance Auto Parts, cold storage facility, and dental practice) on Route 106 east of Route 140, there is also a new building in the Cabot Business Park (76,000 square feet), and a 27-lot residential subdivision on Willow Street. There were no other planned developments along the Route 140 corridor in Mansfield. There have been discussions of a 100-room hotel with approximately 35,000 square feet of retail space to be located across from the Xfinity Center;

however, no formal plans have been submitted. Route 140 in Mansfield is projected to have 1100 additional travel trips due to this recent development. *(Please see Figure 41 below.)*

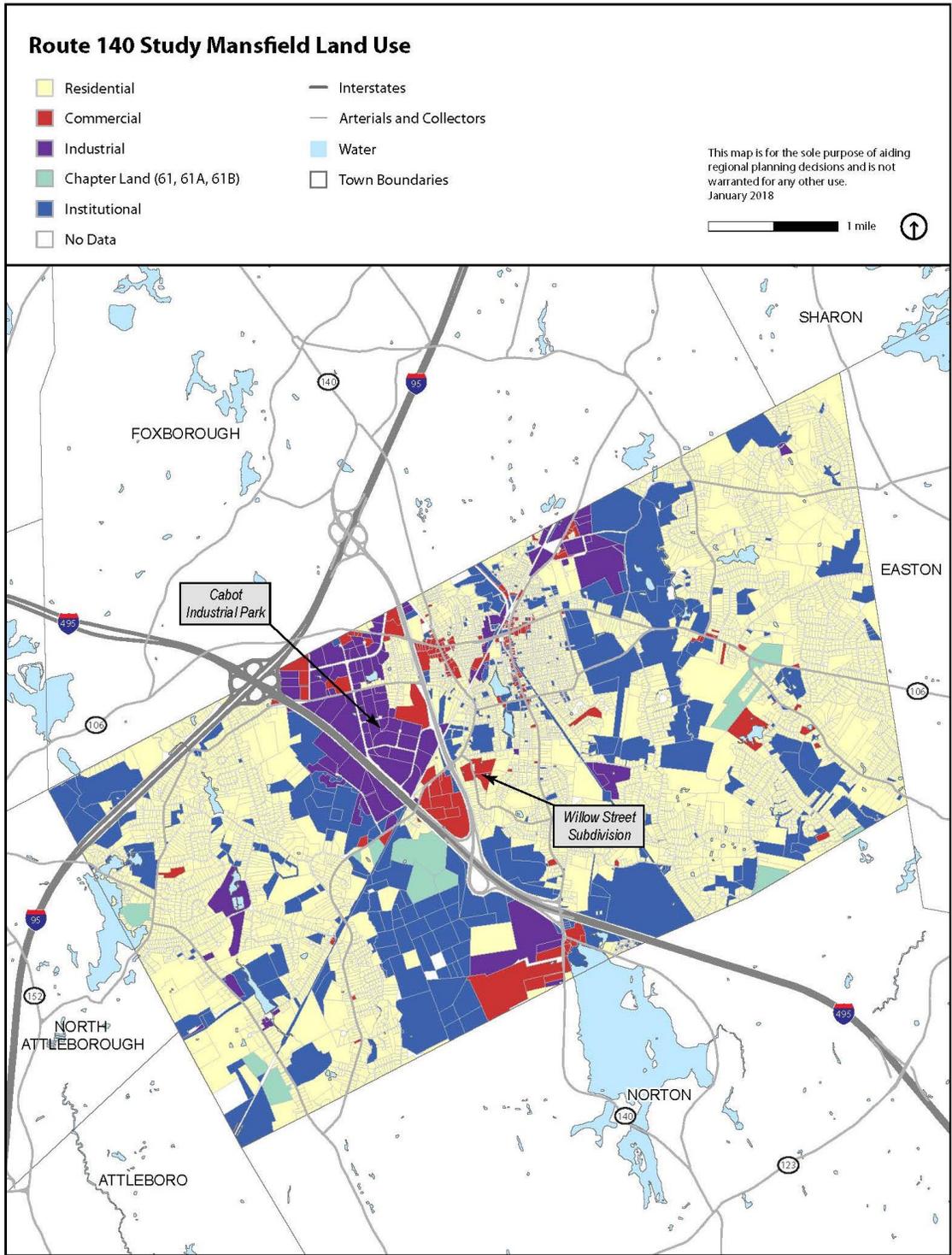


Figure 41 - Mansfield Land Use

Foxborough

In general, the land uses along the Route 140 corridor in Foxborough include a mix of commercial, residential, and institutional uses. The southern section of the corridor (Mansfield Town Line to I-95) is almost entirely commercial use. Forbes Boulevard provides access to sites such as the Foxfield Plaza, Jake n Joe's Sports Grille, the Courtyard Boston, the Red Roof Inn and a Super Stop & Shop. Fisher Street provides access to the Comfort Inn and the 99 restaurant. The residential uses in that section of the corridor are generally single-family structures and are located behind the commercial uses which line Route 140.

The northern section of the corridor (I-95 to the Foxborough Regional Charter School) includes commercial, institutional, and residential uses. The commercial sites include a large office park and Foxborough Plaza (Ocean State Job Lot, Chic 2 Chic, Dunkin' Donuts, Papa Gino's, etc.) while the institutional use is the Foxborough Regional Charter School. The residential uses are single-family units which line Route 140 from the intersection of Central Street to the end of the study area. Walnut street provides access to a residential neighborhood to the west and to the Foxboro Cancer Center and Medical Group to the east. This facility is estimated to see close to 80,000 patients annually. Central Street provides access to a large residential area, including apartment complexes.

The Foxborough Town Planner indicated that there are three development proposals (Foxfield Plaza, Domain Foxborough, Housing Authority Units) on Route 140 in Foxborough. The Foxfield Plaza (located off of Forbes Boulevard and currently under construction) redevelopment plan includes a 139-room hotel, 46,500 square feet of retail, a 3,200 square foot drive-thru bank, and 10,000 square feet of restaurant space. Meanwhile, the Domain Foxborough project is a 248-unit residential community located off of Fisher Street and the Housing Authority project is a 60-unit senior housing development located on Walnut Street. Route 140 in Foxborough is projected to have 6038 additional travel trips due to the above mentioned developments. *(Please see Figure 42 on the following page.)*

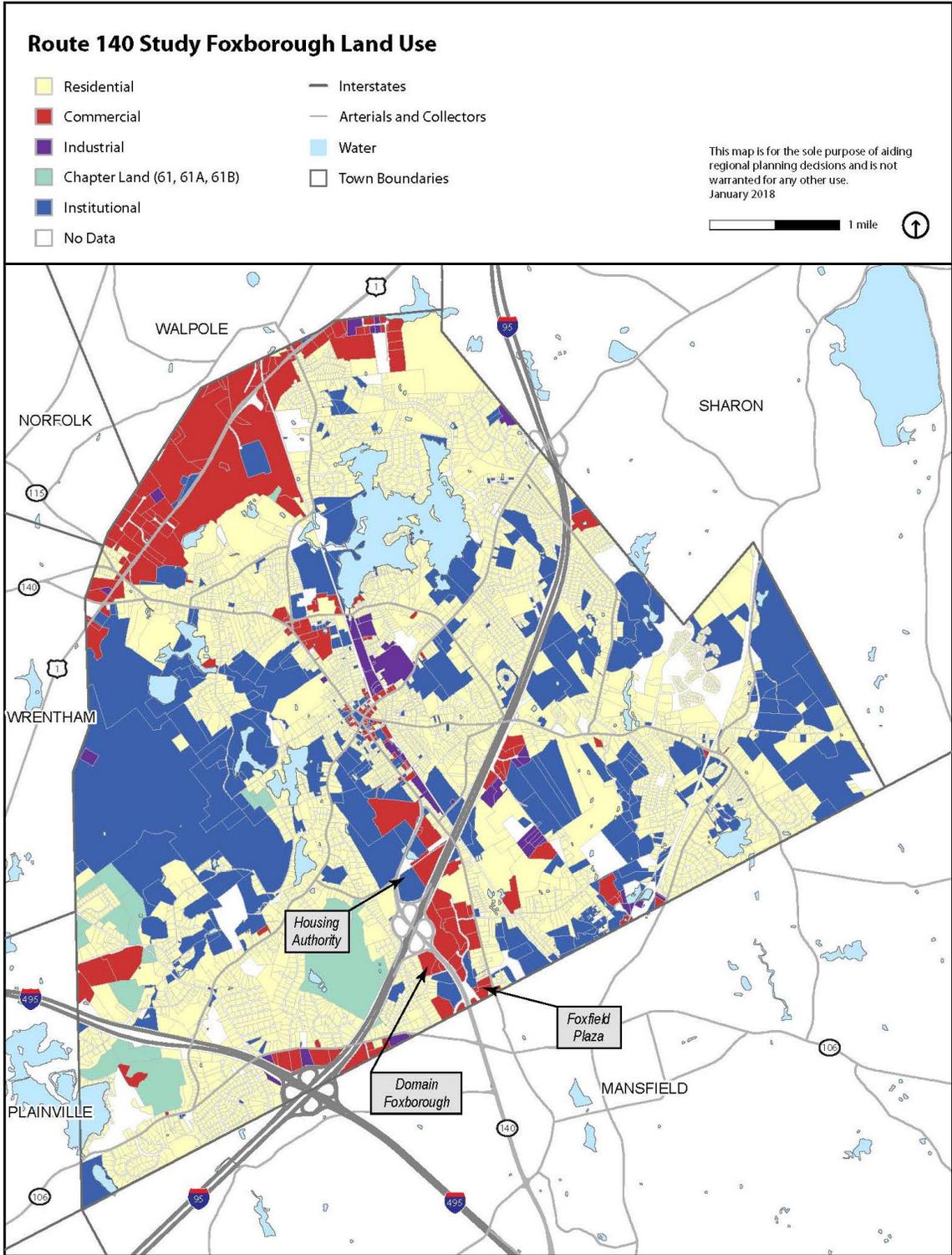


Figure 42 - Foxborough Land Use

The South Coast Rail Corridor Plan & Priority Areas

The South Coast Rail Corridor planning process included the identification of Priority Development Areas (PDAs) and Priority Protection Areas (PPAs) by each participating community, including Norton, Mansfield and Foxborough. Three Regional Planning Agencies, Southeastern Regional Planning and Economic Development District (SRPEDD), Metropolitan Area Planning Council (MAPC) and Old Colony Planning Council (OCPC), were charged with evaluating these sites to identify a set of regionally significant opportunities for development and preservation. Partnering state agencies used this information to make their selection of state priority areas for investment. Therefore, there are local, regional, and state priorities for development, and local, regional, and state priorities for preservation. *(Please see Figure 43 on the following page.)*

The locally designated Priority Development Areas (PDAs) that impact traffic on Route 140 are as follows:

In Norton, the PDAs designated by the community are the Tournament Players Club Business Center off of Arnold Palmer Boulevard, the Village Center and Wheaton College.

In Mansfield, the PDAs designated by the community are the Airport Development District associated with the Mansfield Airport, the Cabot Business Park and the Xfinity Center for the Performing Arts.

In Foxborough, the PDAs designated by the community are the Route 140 Growth Node which is an extension of the Mansfield Cabot & Forbes industrial park which includes Foxborough Boulevard and ends along Central Street. The second PDA is Walnut Street including a parcel purchased by the Town's housing authority as a 60-unit senior housing project.

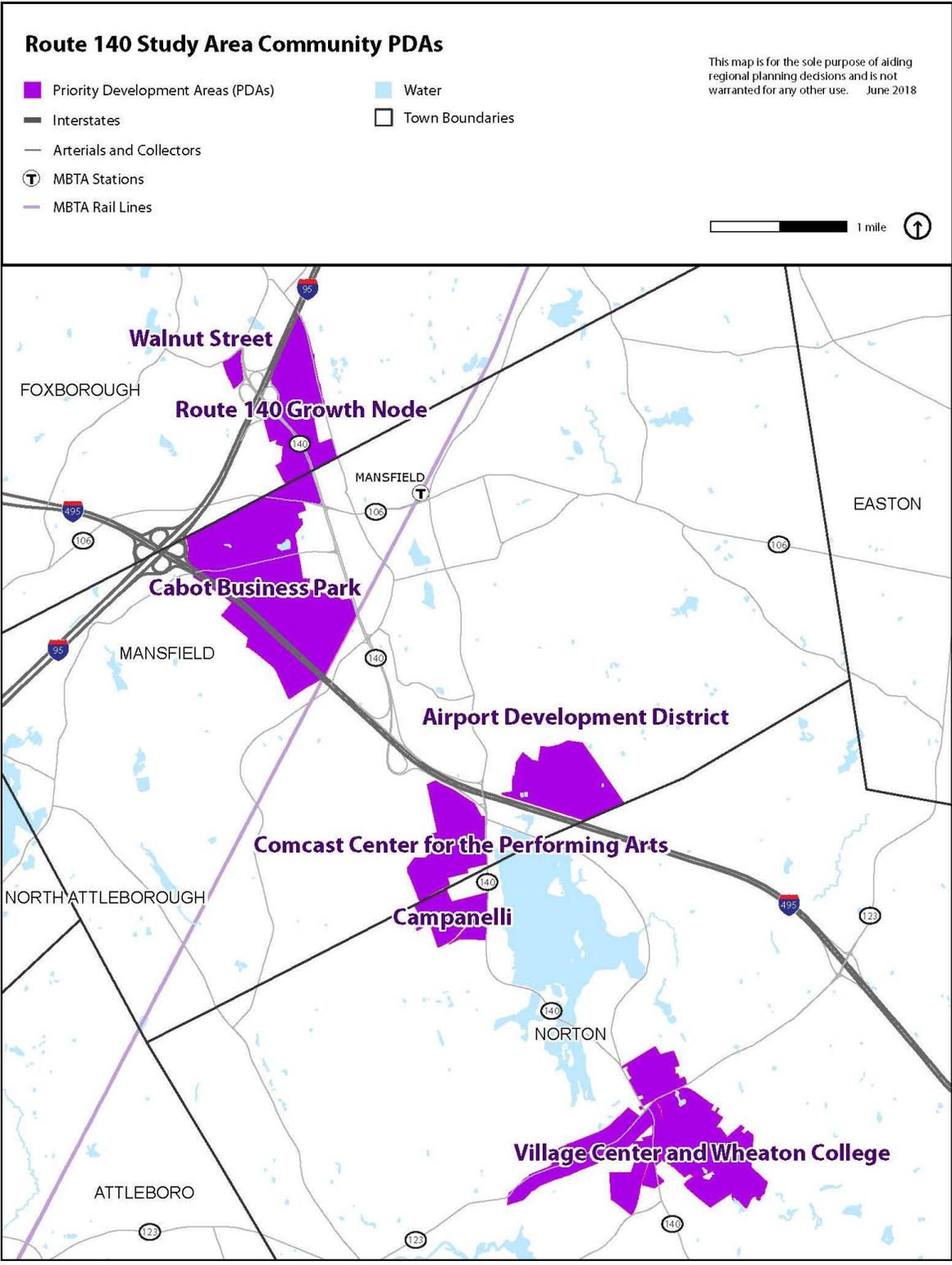


Figure 43 - Priority Development Areas in the Route 140 Study Area

Safety and Access Management

Access Management is a set of techniques that State and local governments use to control access to highways, major arterials, and other roadways. The benefits of access management include improved movement of traffic, reduced crashes, and fewer vehicle conflicts.

Access Management is the regulation of interchanges, intersections, driveways and median openings (curb cuts) to a roadway, enabling access to land uses while maintaining roadway safety and mobility.

Municipalities, planners and permitting agencies do not always consider the full effects of introducing driveways or access points to a corridor. It is often perceived that access management techniques such as closing median breaks, consolidating or limiting the number of access points will cause economic damage. The truth is that carefully planned development can coexist with good access management and promote safe and efficient transportation for the general public.

A national study in the late 1990s looked at nearly 40,000 crashes and data from previous studies to determine the crash rate associated with adding access points to major roads. It found that an increase from 10 to 20 access points per mile on major arterial roads increases the crash rate by about 30%. The crash rate continues to rise as more access is permitted. This is why studies consistently show that well-managed arterials are often 40 to 50 percent safer than poorly managed routes¹.

Along the Route 140 corridor, business driveways create numerous intersections, all with their own conflict points that increase the potential for vehicle crashes. Compounding this problem is the geometry of the roadway, with narrow lanes, little to no shoulders and traffic traveling at high speeds along the Route 140 corridor. The following is a summary of Access Management issues, previously mentioned, along the Route 140 study area.

The Great Woods Plaza in Norton has two separate entrances. The main (northern) entrance is wide and is separated by a grassy median. There is an uncontrolled channelized left-turning turning lane in the southern direction to allow left turns into the main access entrance. Directly across from this main entrance is the entrance to Wingate (Epoch), an assisted living facility with over 100 resident units. There is an additional smaller entrance at the southern end of the plaza, near the Dunkin Donuts and utilized by its patrons. Unfortunately, this southern entrance is located on a sharp curve, making it difficult to exit from this driveway due to a lack of adequate

¹ Preston, H., et al. *Statistical Relationship between Vehicular Crashes and Highway Access*, Minnesota Department of Transportation, Report MN-RC-1998-27, August 1998.

sight distance. Directly across from this southern driveway is the entrance to South Easton Savings Bank.

The area from Arnold Palmer Boulevard in Norton to the town line in Mansfield is awash with driveways to businesses on a straightaway with a high volume of traffic at excessive speeds. Within the 600-foot section of Route 140 there are single driveways to Mini Golf, New England Ice Cream, Norton Estates, Norton Kayak, Great Woods Art Glass, two driveways each at Cumberland Farms, Alberto's/Lake View Plaza and the plaza at 253 Mansfield Avenue, and five private residence driveways for a total of 17 access points within this short distance. There is also a row of private residence driveways that continue south of here. There were 22 crashes in this general area from 2013-2015, with 15 of these crashes concentrated in this 600-foot section.

The Foxborough Plaza (Ocean State Job Lot) in Foxborough has four separate driveway accesses from Route 140. There are two driveway accesses at the gas station (southern end), a main driveway access at the center of the plaza, with an additional driveway access at Papa Gino's (northern), all which allow cross access to the other businesses in the plaza. There is no access to the Foxborough Plaza from Central Street.

Bicycle and Pedestrian Accommodations

Overall, the corridor has limited to no bicycle and pedestrian accommodations. Sidewalks along the corridor are minimal and offer no continuity. The corridor lacks a consistent width for properly striped shoulders to accommodate bicyclists. Many parts of the study area offer no shoulder, causing pedestrians and bicyclists to walk and ride directly within the roadway. This is dangerous during mild weather but becomes a greater danger during the winter months with plowed mounds of snow creating additional obstacles and sight barriers while forcing pedestrians to walk in the roadway.

Transit Service

Within the study area, the Greater Attleboro-Taunton Regional Transit Authority (GATRA) operates a fixed-route service along Route 140 in Norton and Mansfield that starts at the U.S. Post Office in Norton/Wheaton College area with stops at the Great Woods Marketplace (Roche Brothers) and Mansfield Crossing and ends at the Mansfield MBTA station.

The bus stop near the U.S. Post Office in Norton presently contributes to the congestion at the signalized intersection of Route 140 @ Route 123 due to the lack of shoulder and/or a bus turnout for a public transit stop. When stopped to pick up or drop off passengers, the bus blocks traffic, creating further congestion and driver frustration.

GATRA provides Dial-A-Ride service (curb-to-curb transportation for passengers that cannot use fixed route transit due to disability or are age 60 and above) for Norton residents within the town of Norton, and provides the same service to Mansfield residents within the town of Mansfield. In Mansfield, GATRA also provides the Mansfield T Connector, a demand response commuter subscription service from home to the Mansfield MBTA rail station for Mansfield residents.

For Foxborough residents, GATRA provides Commuter Shuttle service for town residents from the commuter parking lot, located at 41 County Street, to the Mansfield MBTA rail station.

GATRA also provides a regional Dial-A-Ride service that serves the four communities of Wrentham, Franklin, Norfolk and Foxborough for seniors and persons with disabilities. The Foxborough Council on Aging provides additional transit service for seniors.

There are presently no formal transit accommodations including bus shelters, turnouts, etc. in the study area. There were two locations that have been identified as possible locations for transit accommodations. Both are located in Norton. The first is the mobile home development located south of the Roche Brothers Plaza and the second location is at the New England Ice Cream distribution facility just south of the Mansfield town line.

In order to address common concerns related to safety and the lack of multimodal accommodations throughout the corridor it is recommended that the cross section of the Route 140 corridor have a consistent layout with multi-modal accommodations. In other words, consistent travel lanes, bicycle lanes and sidewalks. Also, to accommodate transit, bus turn-outs need to be included in the design where deemed appropriate.

Any improvements on the Route 140 Corridor are the responsibility of MassDOT, as is the decision to proceed with a project. However, communities may prioritize necessary improvements as a wish list of separate projects and may initiate and expedite the process by contributing toward the initial cost of design. These efforts must be coordinated with MassDOT.

Improvements along the corridor are eligible for construction funds through the Transportation Improvement Program (TIP). Funding for such projects would be 80% from the Federal Highway Administration (FHWA) and 20% from MassDOT, provided that the project meets state, federal, and local design requirements. As always, SRPEDD staff is willing and available to assist communities in these efforts.