

ATTACHMENT 6

Traffic Impact and Access Study

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TRAFFIC IMPACT ACCESS STUDY

Logan Express Parking Garage Framingham, Massachusetts

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ES - EXECUTIVE SUMMARY

The following Traffic Impact and Access study evaluates the traffic implications associated with the expansion MassPort's (MPA) existing Logan Express parking facilities located adjacent to Shoppers World in Framingham. The existing Logan Express consists of three surface lots of which the largest main facility provides 374 parking spaces and is open year round. An additional 500 surface parking spaces are located nearby and are utilized only in times of peak demands. Logan Express provides scheduled bus service between and the main Framingham facility and Logan International Airport (Logan) in Boston. The goal of the Logan Express system (which includes four locations) is to offer passengers and employees an alternative to driving to and parking at Logan.

In response to the high utilization of the Framingham Logan Express the MPA is poised to upgrade both the quantity and quality of parking in Framingham by consolidating all 874 surface parking spaces into a garage with the potential to support 1500 parking spaces on the site of the current main facility.

As documented in the following study, with the proposed 1500 space garage in operation there will be no meaningful changes to area traffic operations. This lack of impacts results in large part from the distribution patterns of drivers utilizing the Logan Express facility. The busiest times at the existing Framingham facility is between 7:00 and 8:00 on a typical weekday morning and 4:00 and 5:00 during a typical weekday afternoon. These times do not coincide with the weekday peak hours for traffic on area roadways which occur between 7:45 and 8:45 in the morning and 5:00 to 6:00 in the afternoon. Thus, when most drivers enter and exit Logan Express they encounter lower traffic volumes on area streets and when area roadways are at their busiest, Logan Express generates a lower number of trips. Consequently, the proposed garage would increase the transportation and air quality benefits the Logan Express system was designed to attain without impacting area travel efficiency.

As the proposed location for the new garage is on the site of the main existing Logan Express parking lot, MPA proposes to temporarily relocate day-to-day Logan Express parking and bus service during construction from Framingham to an underutilized office park. Located in Natick, the temporary site is within 1.4 miles of the existing Framingham site and is accessed from Speen Street. There are two unused surface parking lots containing 500 spaces at the Natick site. This total exceeds the total spaces available at the main Logan Express parking lot in Framingham. Overflow parking spaces will remain available in Framingham to meet peak demands. As with the existing Framingham site, Logan Express operations at this temporary site would not result in unacceptable traffic operations. The length that the site would be utilized is approximately 12 months, which is the time needed to construct the proposed Logan Express garage in Framingham. Following construction, all Logan Express operations would return to the new Framingham Logan Express facility.

I. INTRODUCTION

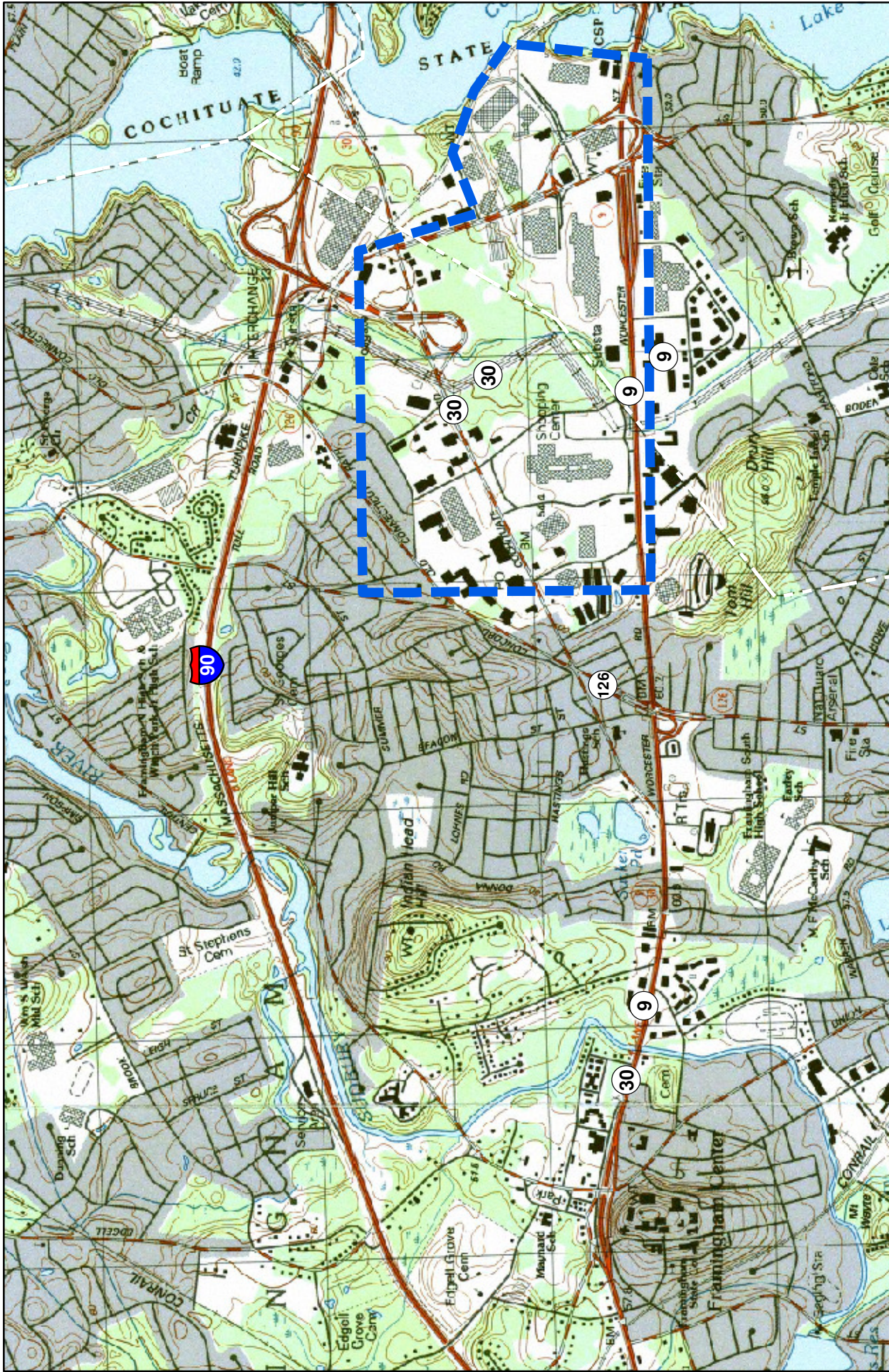
The Massachusetts Port Authority (Massport) is proposing improvements to the existing Logan Express parking facility in the Town of Framingham located in close proximity to the Massachusetts Turnpike (I-90) at the corner of Burr Street and Shoppers World Drive (Figure 1). Massport secured approvals for improvements to this facility in early 2001. Following the events of September 11, 2001, however, the proposed improvements were never constructed. Over the past several years, as passenger levels at Boston-Logan International Airport have returned to pre-2001 levels and beyond, ridership at Massport's Framingham Logan Express facility have similarly recovered. Between 2012 and 2013, the average daily parking demand for this location increased by 12%.

To meet this existing and projected demand, Massport is proposing to increase the parking capacity and consolidate four existing surface parking lots with a phased 5-level garage (grade plus four parking decks) to support up to 1,500 cars at this facility. Construction of a single garage with an integrated replacement terminal building will add to Massport's High Occupancy Vehicle (HOV) capacity for passengers and employees enhance customer service and alleviate the inefficiencies experienced today in serving the three separate overflow parking lots which today comprise the Framingham Logan Express facility (Figure 2).

Purpose and Need

The purpose of this project is to expand reliable and convenient access for HOV service to Boston Logan International Airport Logan for passengers and employees in the MetroWest/Framingham area. Currently, the Framingham Logan Express facility can accommodate up to approximately 875 vehicles, though existing demand can exceed that capacity during Logan's seasonal peak travelling periods.

Over the past several years, on-airport parking demand at Logan Airport has routinely exceeded capacity. In response, Massport has heavily promoted the use of the four Logan Express sites. In addition to more frequent service at the most heavily used locations and reduced parking rates at all locations, these seasonal promotions have included fare reductions. As a result, particularly at the Framingham location, parking demand now exceeds capacity at the primary lot more than 90% of the time. As described below, use of the adjacent overflow lots require additional bus stops and even these locations are now periodically unable to meet demand. As Logan continues to grow to meet forecast regional demand, the need for enhanced HOV services will

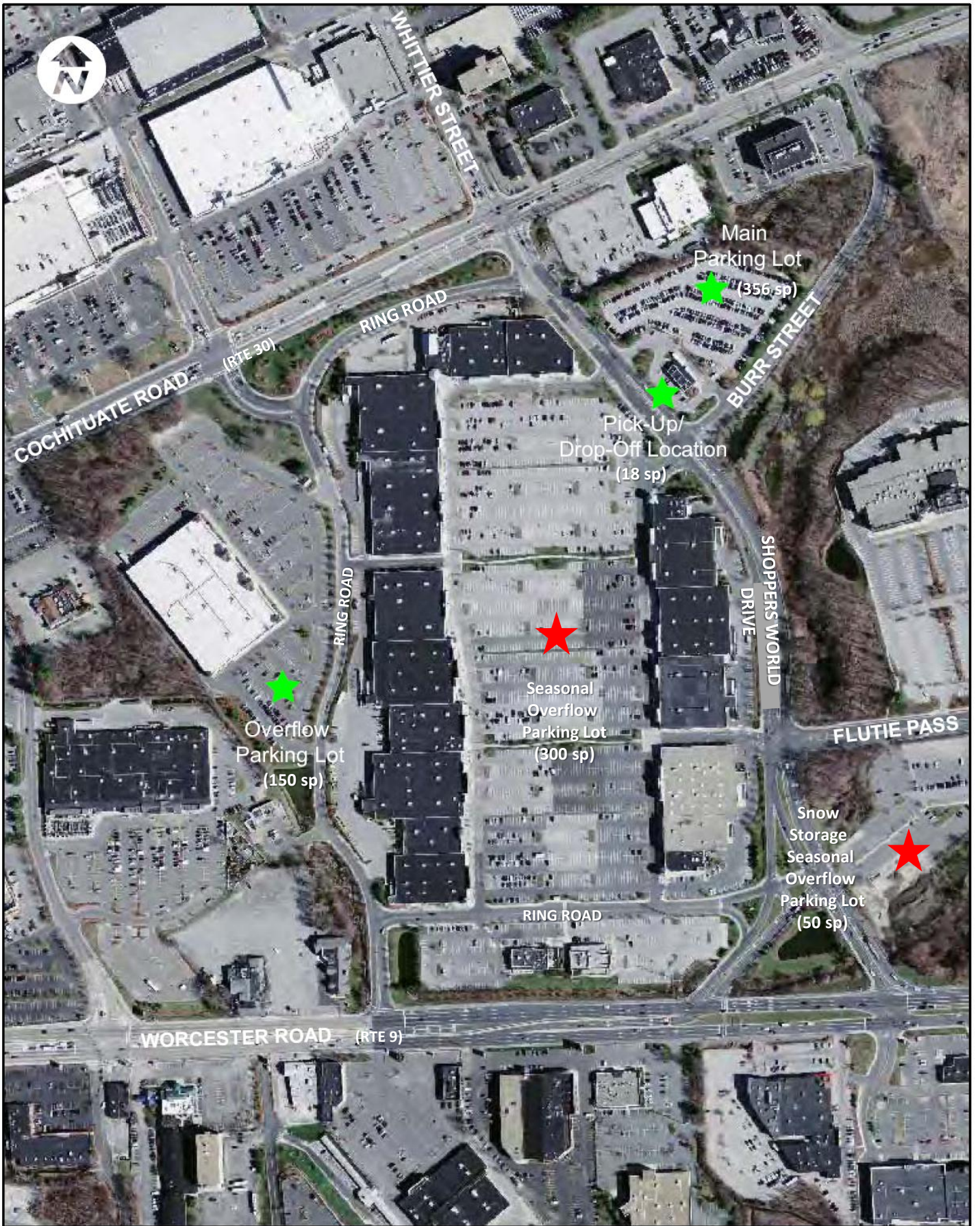


Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs



Figure 1 - Study Area Locus Map

Logan Express - Framingham
January 2, 2014



- ★ License Plate Survey Location
- ★ Additional Overflow Lot



Figure 2
Framingham Logan Express
Parking System

become more critical. Phased construction of a new garage at the existing Framingham Logan Express site allows Massport to help meet the growing regional HOV demand.

Existing Framingham Logan Express Terminal and Parking System

At the present time, the main Framingham Logan Express (FLEX) terminal building is served by 374 at grade Massport-owned parking spaces developed for this purpose in 1996. Of Massport's owned parking supply, 356 are long-term parking spaces with 6 handicapped accessible spaces, and 18 are short-term drop-off/pick-up spaces, 4 of which are handicapped accessible. Additionally, three taxi spaces are provided. Up to four buses can stage simultaneously in two lanes with two buses each adjacent to the east side of the FLEX terminal with a third lane available for bypass. Buses flow in a clockwise direction, turning right or left from Shoppers World Drive, stopping and discharging/embarking passengers and turning right or left out onto the Burr Street.

Because demands for short and long term parking at main FLEX facility exceeded the number of available spaces more than 90% of the time, Massport leases a total of 500 spaces at three overflow parking lots. The three overflow lots are located within a quarter mile walking distance of the existing FLEX terminal.

The primary overflow lot has 150 leased spaces south of Kohl's Department Store features a bus stop on the FLEX route and is clearly demarcated by signs for its users with Massport logos and parking fee rates. According to Massport data, coupled with the main FLEX lot, the two facilities have a capacity of 524 spaces. This is sufficient to serve peak FLEX parking demands 92.5% of the time during the mid-February to mid-October eight month period in 2013. During the days when parking demands exceeded the capacity of the two lots, overflow demands exceeded a hundred vehicles only six days, during April 2013, or 2.5% of the time.



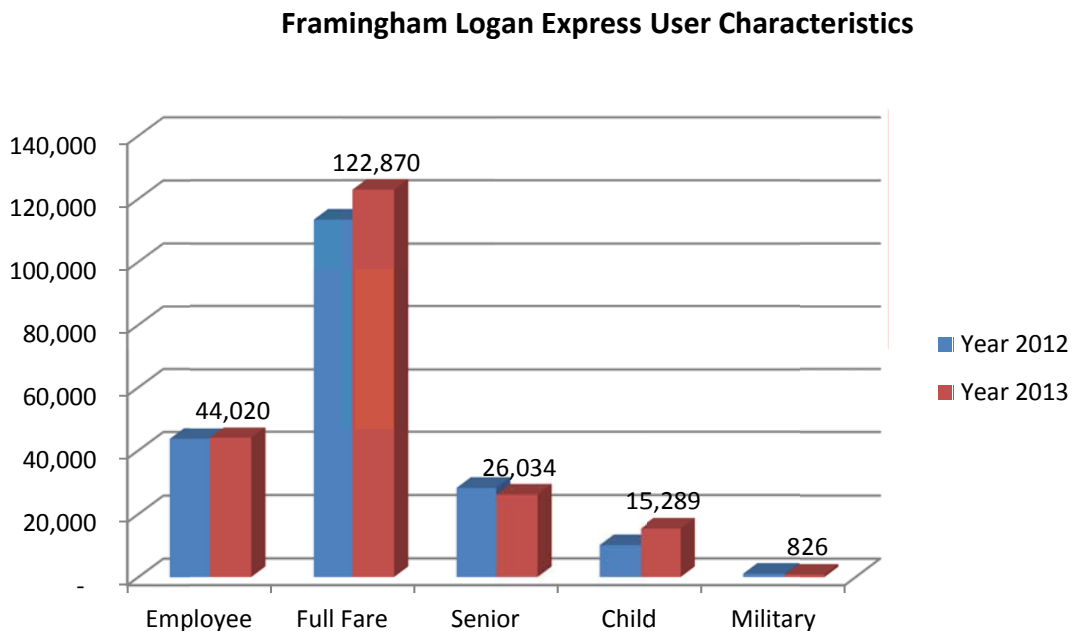
The larger of the remaining two leased parking lots is an unmarked 300 space Shopper World interior lot nearly central to the primary Shopper's World surface parking area. Unavailable to Massport users during the peak shopping season between

Thanksgiving and Christmas, these spaces are purposely located in the center of the large surface parking area away from the most convenient spaces closest to Shoppers World retail businesses.

Additionally, 50 spaces are leased at the AMC overflow lot adjacent to the Massachusetts Department of Transportation (MassDOT) lot just off Route 9. The unmarked 50-space lot is available except when snow storage is required and was unoccupied during a recent mid-day observation on Friday October 18, 2013. Historical data indicates that storage of the long term parking demands at either of these two lots is relatively rare.

Framingham Logan Express User Characteristics

Massport data indicates that from a comparable 8-month period from mid-February through mid-October for 2012 and 2013, trends for users of FLEX are as follows:

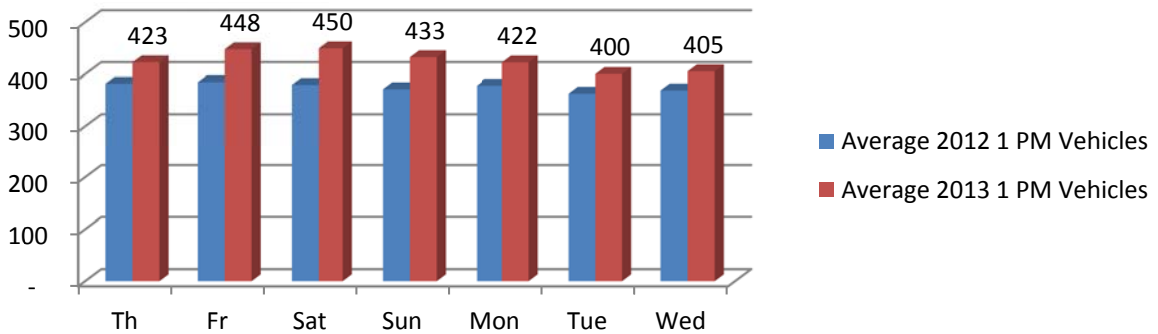


Massport data indicates that paid and non-paid FLEX users grew by 6.4% during the comparable 8 month period – from an aggregate of 196,542 users in 2012 to 209,039 users in 2013.

On a daily basis, long term users of FLEX services tend to carpool to the site. Based on Massport’s FLEX data, during mid-February through mid-October 2013, there are a total of average of 870 FLEX paid and non-paid riders versus an average peak 1 PM parking demand of 428 vehicles – or slightly more than 2 riders per peak space occupied.

Distribution of parking demand trends by day of the week between the same 2013 eight month period is illustrated on the next page. As can be seen, Friday and Saturday are typically the peak days for FLE parking demands and typical day of week parking demands grew by more than 12% between 2012 and 2013.

Trends in Framingham Logan Express Combined Parked Vehicles Measured at 1 PM 2012-2013 by Day of the Week



With the exception of staff assigned to park at the Kohl’s lot, all non-staff overflow lot users must obtain parking tickets at the main FLEX terminal prior to parking. Only the Kohl’s lot is a designated stop on the FLEX bus route.

While the two less publicized FLEX overflow lots are located within a five to ten-minute walk of the existing Framingham Logan Express building, the walk would be inconvenient for persons carrying luggage or with disabilities. When used, both the Shoppers World and AMC overflow lots are used as a valet park operation or served by courtesy vans that shuttle between the remote lot and Logan Express Terminal. The use of a valet operation or van pick-up is an operational decision based on passenger loads.

From the 1 PM daily parking surveys of the FLEX parking facilities grew 12.6% for the same 8 month period of mid-February to mid-October from 2012 to 2013. As long term parking demands for Logan Airport increase, it is anticipated that the need for convenient one-stop park/fly from the FLEX site will also increase.

Study Methodology

This study evaluates the impacts that the proposed expansion and consolidation of the FLEX parking supply will have on traffic volumes and traffic and FLEX bus operations in the site vicinity under construction period and post-construction period conditions. Analyses were conducted in accordance with MassDOT’s Traffic Analysis Guidelines.

To address potential traffic impacts of consolidating the FLEX parking supply, an extensive data collection effort was undertaken. FST coordinated with Massport staff to identify changes in the project area and project goals. New intersection traffic turning movement counts and automatic traffic recorder counts were performed in Framingham and Natick, the two communities directly affected by the FLEX service changes during and post construction. A sample license survey was conducted of long term and short term users of FLEX main and Kohl's lots. This data, within the context of existing driveway turning movements at the main terminal was used to identify likely routes of travel for future garage users and temporary lot users during construction. Existing peak hour trip generation/distribution was estimated based on the new counts and FLEX data supplied by Massport and the anticipated growth in usage between 2013 and 2020.

In addition to traffic related data, historical crash trends in the study area were identified for the most recent available three-year period of 2009-2011 and crash analyses were conducted using MassDOT crash rate calculation procedures.

Central Transportation Planning Staff provided a future background traffic growth rate in the study area based on its regional traffic model. Traffic estimates from several future development projects permitted/approved but not yet occupied in Framingham and Natick were obtained and added onto the background traffic growth projections provided by CTPS to compile future year analysis projections to represent year 2020 Build and No-Build conditions.

Projections were made of traffic conditions during construction, when the main FLEX site will be relocated temporarily to the former Boston Scientific site off Prime Parkway in the Town of Natick. For analysis purposes, a year 2015 construction period analysis was undertaken and traffic operations were assessed at ten study area intersections most affected during construction. The former Boston Scientific site, with a 500 car capacity, will temporarily house FLEX activities. The site has the ability to accommodate nearly a third more vehicles than the existing 374-space main FLEX lot that will be unavailable while the new multi-modal facility and garage are under construction. It also has only 20 fewer spaces than the combined FLEX main and Kohl's lots.

Construction period projections assume the other three leased overflow parking lots will remain in use at least until the garage is opened at the existing site. Therefore, during construction, the FLEX parking capacity, inclusive of its three overflow lots totaling 500 spaces will increase from its existing 874 spaces capacity to a temporary 1000-space capacity, inclusive of all overflow lot leased areas.

Finally, projections were made of year 2020 traffic volumes and operating conditions with and without the expansion and consolidation of the FLEX parking supply to a $\pm 1,500$ car space capacity for short and long term users with enhanced bus flow accommodations at a reconfigured terminal incorporated on the site.

II. EXISTING CIRCULATION (2013)

To assess existing circulation at the FLEX site, a study area was established. Within the study area, existing site data was reviewed and where data gaps were found, new information was obtained. The purpose of the supplemental data collection effort was to:

- Obtain traffic analysis information for a consistent period of time;
- Identify the current distribution of vehicular travel to and from the FLEX site and its long term parking areas;
- Provide a basis for analyzing construction-period traffic impacts during the 1.5 year period when garage construction will temporarily remove the existing facility and parking area from use.
- Provide a basis for projecting future trip-making associated with the FLEX site when the garage is constructed and fully occupied; and
- Identify locations where future traffic operations could be adversely affected and whether the level of impact associated with traffic from the FLEX site can be considered as 'significant' at each of the locations evaluated.

Study Area

Refer to Figure 3 for an illustration of the study area and intersections evaluated as well as a summary of existing count locations. For traffic analysis purposes, the study area for the FLEX site was defined as:

- Cochituate Road (Route 30) between the Shoppers World Way to the west and Speen Street to the east forms the approximate northerly boundary.
- Speen Street between Cochituate Road (Route 30) and Superior Drive forms the easterly boundary. Superior Drive between the Speen Street interchange will experience most of the FLEX traffic during the 2014 year period while the garage is under construction at the main site.
- Ring Road and Shoppers World Way at Cochituate Road (Route 30) and Worcester Road (Route 9) form the westerly boundary.
- Worcester Road (Route 9) between the Ring Road and Shoppers World Drive forms the southerly boundary.

Data Collection

Several types of data collection were undertaken. A physical inventory of traffic operational field conditions was conducted on September 26, 2013. Existing traffic signal data was compiled for signalized intersections within the Town of Framingham and for signalized intersections within the Town of Natick located in the vicinity of the former Boston Scientific site, assumed to be the temporary Logan Express terminal and primary parking supply.

Several types of traffic volume counts were performed. Automatic and weekday AM/PM peak period manual turning movement, vehicle classification, and pedestrian/bicycle counts were obtained between 7-9 AM and 4-6 PM on a typical weekday. Refer back to Figure 3 for a summary of the manual and automatic traffic count locations.

Concurrently, an origin/destination survey of existing long term parkers and drop-off/pick-up FLEX users was performed to determine the distribution pattern of FLEX short and long term users. Historical crash information was also obtained reviewed for the most recently available three-year period.

FST contacted Framingham and Natick planning officials to identify future developments that may affect traffic operations at intersections in the FLEX traffic study area. While CTPS background traffic growth rates from its regional traffic model include an estimate of all development in the area, the traffic from development sites was added to provide a conservative (high side) analysis of traffic in the study area.

A summary of programmed roadway infrastructure improvements was also obtained and reviewed.

Physical Inventory

A physical inventory of FLEX parking system and key intersections and streets included in the study area was undertaken.

Framingham Logan Express Access

The primary FLEX site is conveniently located close to three regionally significant east-west corridors – the Massachusetts Turnpike (Interstate 90), Cochituate Road (State Route 30), and Worcester Road (State Route 9). It is located just east and adjacent to the Shoppers World retail commercial area far from sensitive residential areas in the northeast quadrant of the intersection of Shoppers World Drive at Burr Street. Two driveways provide existing access to the site. An entrance/non-bus exit is provided via a four-legged unsignalized intersection on Shoppers World Drive approximately 300 feet north of its

signalized intersection with Burr Street. The FLEX driveway on Shoppers World Drive is approximately 26 feet wide and accommodates two-way traffic. Shoppers World Drive is median divided and has two travel lanes in each direction. Southbound on Shoppers World Drive, a median break with a left-turn access lane approximately 70 feet in length serves as the bus entrance to the site. The driveway allows rights and lefts in and out for non-bus traffic.

The site's exit-only 24-foot wide driveway is located approximately 130 feet east of Shoppers World Drive on Burr Street. Separate lanes for right- and left-turn exit movements are provided.

The leased 150-space lot south of Kohl's Department Store is the only clearly-signed overflow lot for FLEX and serves all demands except approximately 8% of the time. This lot is accessed via two stop controlled driveways, north and south driveway off the two-lane Ring Road and is served directly by the FLEX buses. Automobile users of the 300-space Shoppers World leased spaces can access them via any of the many driveways along Ring Road and Shoppers World Drive. Access to the AMC overflow lot is provided via Flutie Pass. Both the 300-space Shoppers World overflow lot and the 50-space AMC snow storage lot are served by courtesy vans or taxis as needed and are not on the regular FLEX bus route.

Peter Pan Bus Lines is currently the only service carrier providing regularly scheduled service between Boston and Framingham unrelated to Logan Airport. Only seven outbound and eight inbound bus trips are offered by Peter Pan Bus Lines each day to downtown Boston.

Bus traffic enters the FLEX site via Shoppers World Drive and exits exclusively via the Burr Street driveway. However, the existing traffic pattern allows drop-off/pick-up automobile traffic to exit the site via either the driveway on the Shoppers World Drive or the Burr Street Extension driveway exit. FLEX buses enter via the southbound left-turn lane on Shoppers World Drive and exit via a right movement onto Burr Street Extension to travel to the Kohl's overflow lot. Non-FLEX buses make a left-turn out onto Burr Street Extension toward Cochituate Road.

Following is a description of the corridors within the study area corridors (refer back to Figure 3):

Cochituate Road (State Route 30)

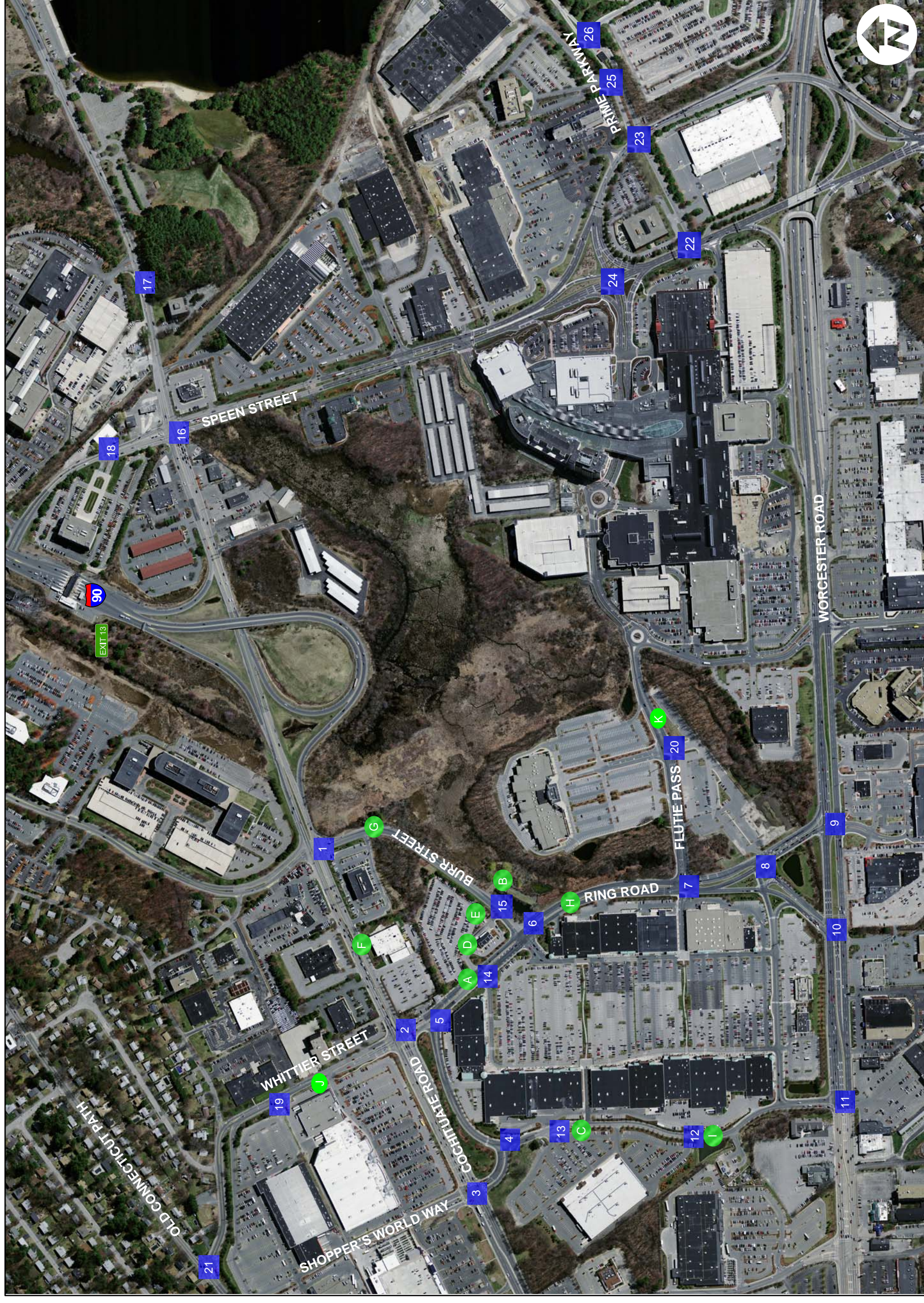
Cochituate Road is a generally northeast-southwest-oriented arterial that traverses several eastern Massachusetts communities. While a state-numbered route, Cochituate Road is controlled by the Town of Framingham. Its posted speed limit is 30 miles per hour. Through the study area, Cochituate Road is median divided, has two through lanes in each direction, and is bounded mainly by commercial land uses. At critical signalized intersections, Cochituate Road has been widened to provide left and right turning lanes. Within the study area, its four intersections with Speen Street, Burr Street, Whittier Street/Shoppers World Drive, Shoppers World Way /Ring Road are traffic signal-controlled and all located in the Town of Framingham.

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Figure 3 Traffic Count Locations Framingham

- Turning Movement Counts (TMC)**
1. Burr Street at Cochituate Road/Route 30
 2. Whittier Street and Ring Road at Cochituate Road/Route 30
 3. Shopper's World Way and Ring Road at Cochituate Road/Route 30
 4. Ring Road at Ring Road (west)
 5. Ring Road at Ring Road (east)
 6. Burr Street at Ring Road
 7. Ring Road at Flutie Pass
 8. Ring Road at Ring Road (southeast)
 9. Worcester Road/Route 9 at Ring Road (east)
 10. Worcester Road/Route 9 at Ring Road (central)
 11. Worcester Road/Route 9 at Ring Road (west)
 12. Ring Road at Kohl's southern Driveway
 13. Ring Road at Kohl's northern Driveway
 14. Ring Road at Logan Express Driveway and Shopper's World Driveway
 15. Burr Street at Logan Express Driveway
 16. Speen Street at Cochituate Road (Route 30)
 17. Route 30 at TJX Driveway
 18. Speen Street at TJX Driveway
 19. Whittier Street at Colonial Shopping Center Overflow Lot
 20. Flutie Pass at Overflow Lot
 21. Whittier Street at Old Connecticut Path
 22. Speen and Worcester Street (east)
 23. Speen and Worcester Street (west)
 24. Speen Street at Natick Mall Road
 25. Prime Parkway and Northern Parking Lot
 26. Prime Parkway and Southern Parking Lot

- Automatic Traffic Recorder (ATR)**
- A. Logan Express entrance/exit on to Ring Road
 - B. Logan Express entrance/exit on to Burr Street
 - C. Logan Express overflow lot
 - D & E. Logan Express entrance/exit (pick-up/drop-off) to 356 space long-term parking lot
 - F. Cochituate Road (Route 30)
 - G. Burr Street
 - H. Ring Road
 - I. Ring Road at the Kohl's southern Driveway
 - J. Whittier Street
 - K. Flutie Pass



LEGEND # Turning Movement Counts (TMC) X Automatic Traffic Recorder (ATR)

From east to west:

At Speen Street, westbound Cochituate Road approach has three lanes including a two through lanes and exclusive left turn lane. The southbound Speen Street approach to the intersection has four lanes striped to provide an exclusive left-turn lane, two through lanes and an exclusive right turn lane. The eastbound Cochituate Road approach has four lanes including an exclusive left- and right turn lanes with two through lanes. The northbound Speen Street approach has four lanes including a double left turn lane, a through lane, and a shared through/right lane.

At Burr Street, the westbound Cochituate Road approach has three lanes including a right-turn only lane and two through lanes. Westbound left turns are not permitted from Cochituate Road to the Burr Street. The southbound Burr Street approach to the intersection has two lanes striped to provide an exclusive left-turn lane and a general purpose shared lane. The eastbound Cochituate Road approach has three lanes including an exclusive left-turn lane, a through lane, and a shared through/right lane. The northbound Burr Street approach has two lanes including a shared through/left-turn lane and a channelized exclusive right-turn lane.

At Whittier Street and Shoppers World Drive, the westbound Cochituate Road approach flares out to provide three lanes including an exclusive left-turn lane, a through lane, and a shared through/right lane. The existing southbound driveway from Whittier Street includes an exclusive left-turn lane, a shared through/left lane, and a shared through right lane. The eastbound Cochituate Road approach provides an exclusive left-turn lane, two through lanes and two exclusive right-turn lanes separated from the through movements by a channelization island. The northbound Shoppers World Drive approach is median-divided and provides two approach lanes, an exclusive right-turn lane and a through lane. While northbound left turns are not allowed, motorists were observed as making this maneuver during the AM and PM peak hours.

At Shoppers World Way and Ring Road, the westbound Cochituate Road approach flares out to provide an exclusive left-turn lane, two through lanes and an exclusive right-turn lane. The southbound Shoppers World Way approach provides three approach lanes including an exclusive left-turn lane, a shared left/through lane, and an exclusive right-turn only lane separated by a channelization island. The eastbound Cochituate Road approach is a mirror image of the westbound approach as it also provides exclusive left and right-turn lanes and two through lanes. The northbound approach has three lanes including two exclusive left-turn lanes and a shared through/right lane, and is median divided.

Worcester Road (State Route 9)

Worcester Road (State Route 9) is a generally east-west oriented arterial. Like Cochituate Road, it traverses several Massachusetts communities. Unlike Cochituate Road,

Worcester Road is under the jurisdiction of the MassDOT.

Through the study area, Worcester Road is median divided, typically provides three through lanes in each direction, and has commercial land uses adjacent to it. Its posted speed limit is 40 miles per hour through the study area. Worcester Road has been widened at critical intersections to provide auxiliary lanes for heavy turning movements. Worcester Road also forms the southern boundary of a large commercial area in Framingham and Natick known as the 'Golden Triangle.' The other two boundaries of the Golden Triangle are Speen Street to the east and Cochituate Road/Concord Street/Old Connecticut Path to the north and west. Within the study area, Worcester Road has signalized intersections at Shoppers World Drive, the Ring Road West Couplet, and the Ring Road.

Again, from east to west:

At its intersection with Shoppers World Drive, the westbound Worcester Road approach provides five lanes including an exclusive right-turn lane, three through lanes, and an exclusive left-turn lane. The southbound Shoppers World Drive approach intersects Worcester Road at a skew to the west to foster left turn movements out of Shoppers World heading eastbound on Worcester Road. The southbound Shoppers World Drive approach is median divided and provides an exclusive left-turn lane and a shared through left-turn lane. The eastbound Worcester Road approach has three lanes including two through lanes and a shared through/right lane towards the Loew's Cinema driveway. Eastbound left turns are not permitted and are geometrically constrained, as they are provided at the West Couplet intersection just upstream of this intersection. The northbound approach of the Loew's Cinema driveway has two lanes, including exclusive left- and right-turn lanes.

The Ring Road West Couplet intersects Worcester Road at an acute angle to foster right-turn lane movements westbound to Worcester Road and eastbound left-turn lane movements from Worcester Road to the Ring Road West Couplet and Shoppers World. The westbound Worcester Road approach has three through lanes. The southbound Ring Road West Couplet has two right-turn lanes only. Eastbound Worcester Road has a double left-turn lane and three through lanes. The signal operation permits pedestrian crossings of Worcester Road immediately to the east of the intersection and the Ring Road West Couplet.

At its intersection with the Ring Road and a private driveway to the south serving commercial developments, the westbound Worcester Road approach provides three through lanes, a double left-turn lane, and an exclusive right-turn lane. The southbound Shoppers World West Driveway approach is median divided and restricted to right turns out only in one signal-controlled right-turn lane. The eastbound Worcester Road approach has a double left-turn lane, two through lanes, and a shared through/right-turn lane. The northbound approach from a private commercial drive is also median-divided and includes a driveway wide enough for two lanes but is unmarked.

Shoppers World Drive

Shoppers World Drive provides a north-south connection between Worcester and Cochituate Roads, or State Routes 9 and 30. It has two through lanes in each direction, is median-divided and provides direct access to the FLEX facility and several Shoppers World adjacent land uses. Shoppers World Drive is privately-owned and maintained by Shoppers World. Its speed limit is 30 miles per hour.

Within the study area, Shoppers World Drive has five signalized intersections, two of which intersect public roads (Cochituate and Worcester roads) and were described previously. The other three signalized intersections are with private roads on the Shoppers World site -- i.e., the Burr Street, Flutie Pass, and the West Couplet Ring Road/Shoppers World Drive split. Auxiliary turn lanes are provided at each of these intersections, as described below. For this study, the relatively low volume intersection with Flutie Pass signalized intersection was not included.

From north to south:

At its intersection with Burr Street, the westbound Burr Street approach provides two lanes including a shared through/left lane and a shared through/right lane. The southbound Shoppers World Drive approach provides four lanes, including two through lanes, as well as exclusive left and right-turn lanes. An unnamed westbound Shoppers World driveway approaches this intersection in three lanes including a shared through/left lane, an exclusive through lane, and an exclusive right-turn lane. The northbound Shoppers World Drive approach has three approach lanes including an exclusive left-turn lane, a through lane, and a shared through/right-turn lane.

At its intersection with the Ring Road West Couplet, the southbound approach of the Shoppers World Drive has four lanes; two are exclusive right-turn lanes channelized by a median toward the Ring Road West Couplet (ultimately travelling westbound on Route 9) and two are southbound through lanes. The eastbound Ring Road West Couplet approach to the intersection is median divided and has three lanes comprised of an exclusive left-turn lane to an east-west Shoppers World distributor driveway, an exclusive left-turn lane to the Shoppers World Drive, and a shared left/right lane to Shoppers World Drive. The northbound Shoppers World Drive approach also has three lanes including an exclusive left-turn lane to the east-west Shoppers World distributor driveway, and two through lanes.

Burr Street

Burr Street is undivided adjacent to the FLEX facility and has two lanes in each direction. At its intersection with the Shoppers World Drive, Burr Street is striped for one lane in each direction to the east of the FLEX facility exit driveway. Primarily commercial uses and open space/wetlands abut Burr Street.

Shoppers World Roadways

Shoppers World provides several internal driveways including Shoppers World Drive and the Ring Road that serve primarily adjacent retail/commercial users. These roadways located between Worcester Road (Route 9) Cochituate Road (Route 30) were constructed to minimize the need for Shoppers World users to make U-turns and left turns onto the regional highway system. The circular roads provide the same advantage for use of the FLEX facility.

Traffic Volumes

Traffic volume data was collected during the last week of July 2013. Two types of counts were performed, automatic traffic recorder counts and manual turning movement counts. Refer back to Figure 3 for an illustration of the locations where automatic and manual counts were performed.

Automatic Traffic Recorder Counts

Automatic traffic recorder counts were performed over a two-day period on July 23-24th on a Tuesday and Wednesday at four driveways to obtain a two-day record of activity at the FLEX site and the primary overflow lot leased from Kohl's Department Store at Shoppers World. Observations indicate no to very little use of the two secondary overflow lots during this period. The four locations included:

- The FLEX entrance/exit on the Shoppers World Drive;
- The FLEX entrance/exit to the 356-space long term parking lot;
- The FLEX exit to Burr Street; and
- The 150-space FLEX overflow lot leased from Kohl's Department Store.

Additionally, automatic traffic recorder counts were performed at:

- Burr Street south of Cochituate Road (Route 30)
- Shoppers World Drive south of Burr Street
- Cochituate Road west of Shoppers World Drive
- Cochituate Road east of TJX Driveway
- Flutie Pass east of AMC lots
- Speen Street north of TJX Driveway
- Whittier Street north of Cochituate Road
- Ring Road south of Kohl's north driveway

On the basis of the automatic traffic recorder counts, approximately 2,562 vehicle trips are made into or out of the FLEX parking lot system during a typical M-F weekday. Of these vehicle trips, no more than 547 (21%) are related to long term Logan Airport parking and employee trips. Of the daily vehicle trips, at least 2,000 (78%) are related to drop-

off/pick-up vehicles, Massport employees, and bus trips.

Rounded and seasonally adjusted average weekday traffic volumes are provided on Figure 4. Traffic volumes collected during July at the roadways in the area were approximately 1% higher than average annual conditions, and were adjusted accordingly.

Manual Turning Movement/Vehicle Classification Counts

AM and PM peak hour turning movement counts were performed at 14 intersections between 7-9 AM and 4-6 PM, the typical commuter peak hours and when roadways typically carry the highest volumes. Of these, 11 intersections were evaluated for existing and future No-Build/Build conditions. A total of 10 intersections were evaluated to represent year 2015 construction period conditions. It is only during this period that the former Boston Scientific site will temporarily serve as the terminal and primary parking area for FLEX operations while the garage is being constructed. From the data collected, the typical AM commuter peak hour in the study area occurs from 7:45-8:45 AM, while the typical PM commuter peak hour occurs from 5:00-6:00 PM. Traffic volume counts include truck and automobile turning movements as well as pedestrians and bicycles at the locations illustrated previously on Figure 3. Manual count locations included:

- Burr Street at Cochituate Road (Route 30)**
- Whittier Street and Shoppers World Drive at Cochituate Road (Route 30) **
- Shoppers World Way at Cochituate Road (Route 30) at and Ring Road **
- Burr Street at Shoppers World Drive [Framingham]
- Shoppers World Drive at the Ring Road West Couplet [Framingham]
- Worcester Road (Route 9) at Shoppers World Drive [Framingham] **
- Worcester Road (Route 9) at the Ring Road West Couplet [Framingham] **
- Worcester Road (Route 9) at Ring Road (west) [Framingham] **
- Shoppers World Drive at Logan Express Driveway and Shopper's World Interior Driveway [Framingham]
- Burr Street at Logan Express Driveway [Framingham]
- Speen Street at Cochituate Road (Route 30) [Framingham] **
- Speen Street at Natick Mall Road [Natick]*
- Superior Drive at Temporary Framingham Logan Express Driveway [Natick]*
- Speen Street East at Superior Drive [Natick]*
- Superior Drive at Northern Mathworks Parking lot driveway
- Superior Drive at Southern Mathworks Parking lot driveway

* Locations evaluated for 2015 construction period only.

** Locations evaluated for existing, construction period, and post-construction.

Existing AM and PM peak hour turning movement volumes at 15 intersections are summarized on Figures 5 and 6.

Existing Traffic Operations

Traffic volume data illustrated on Figures 5 and 6 was analyzed to determine the quality of existing traffic operations in the vicinity of the Logan Framingham Express site.

Level of Service (LOS) is a commonly accepted measure of effectiveness of peak hour traffic operating conditions. The methodology for determining LOS is identified in the Highway Capacity Manual (HCM, 2010 Edition). LOS accounts for such factors as automobile and truck volumes, roadway capacity, speeds, grades, traffic control devices, the progression of vehicular traffic flow along an arterial roadway, roadway types, pedestrian and bicycle activity, roadway widths and geometric layouts, as well as anticipated delays. Levels of service range from **A**, the optimal condition, to **F**, the condition where traffic demands are beyond capacity or create excessive delay conditions. At LOS **E** and LOS **F**, roadway or intersection operations are typically regarded as 'undesirable'. Thus, LOS **D** has typically become a threshold between desirable and undesirable peak hour traffic operations.

Traffic operations at *unsignalized two-way stop controlled intersections* are given LOS rankings based on conflicting traffic flows and anticipated control delays related to conflicting minor movement traffic flows. These conflicting flows are vehicular, pedestrian, and bicycle turning movements at an intersection that potentially must yield the right-of-way to other traffic movements at an intersection. Examples of these conflicting movements would be left turns from a major street to a minor side street (across the opposing flow of traffic), or left and right turns from a minor street or side street to the major street. *LOS's are only given for conflicting movements at unsignalized intersections.* The LOS ranking at an ***unsignalized intersection*** is determined by calculating the average total control delay in seconds per vehicle for conflicting traffic movements. Total control delay is the total elapsed time from when a vehicle stops at the end of a queue until the time when a vehicle departs from the stop line and enters the traffic stream. The average total delay for any particular minor movement is a function of the traffic demand flow rate and the capacity of the approach.

For ***unsignalized intersections***, average total delay of less than 10 seconds per vehicle is defined as LOS A. According to the 2010 Highway Capacity Manual, total delay of 50 seconds per vehicle is the break point between LOS E and F. LOS F exists when there are an insufficient number of gaps available to allow a conflicting demand to safely cross a major street traffic movement.

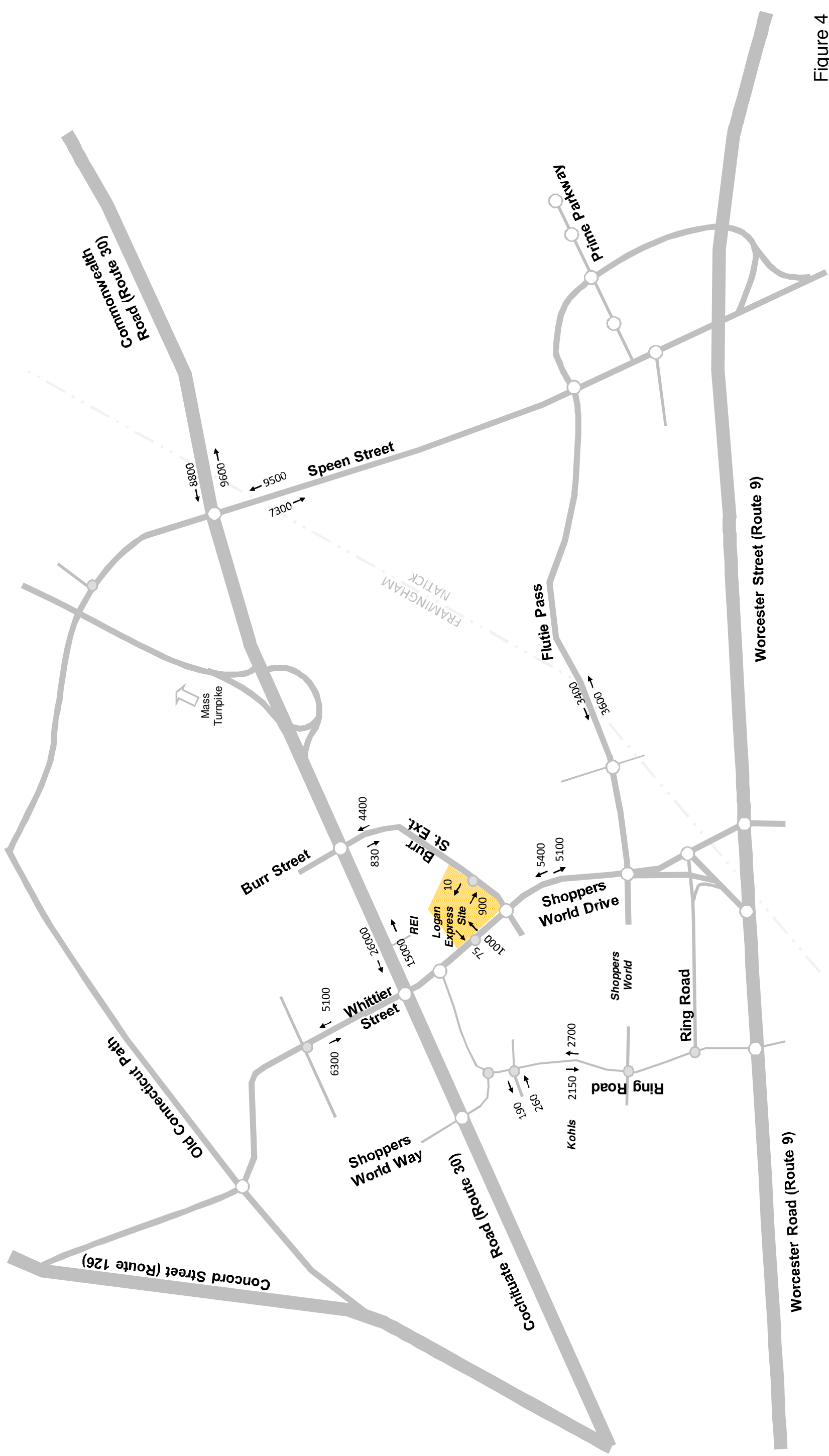
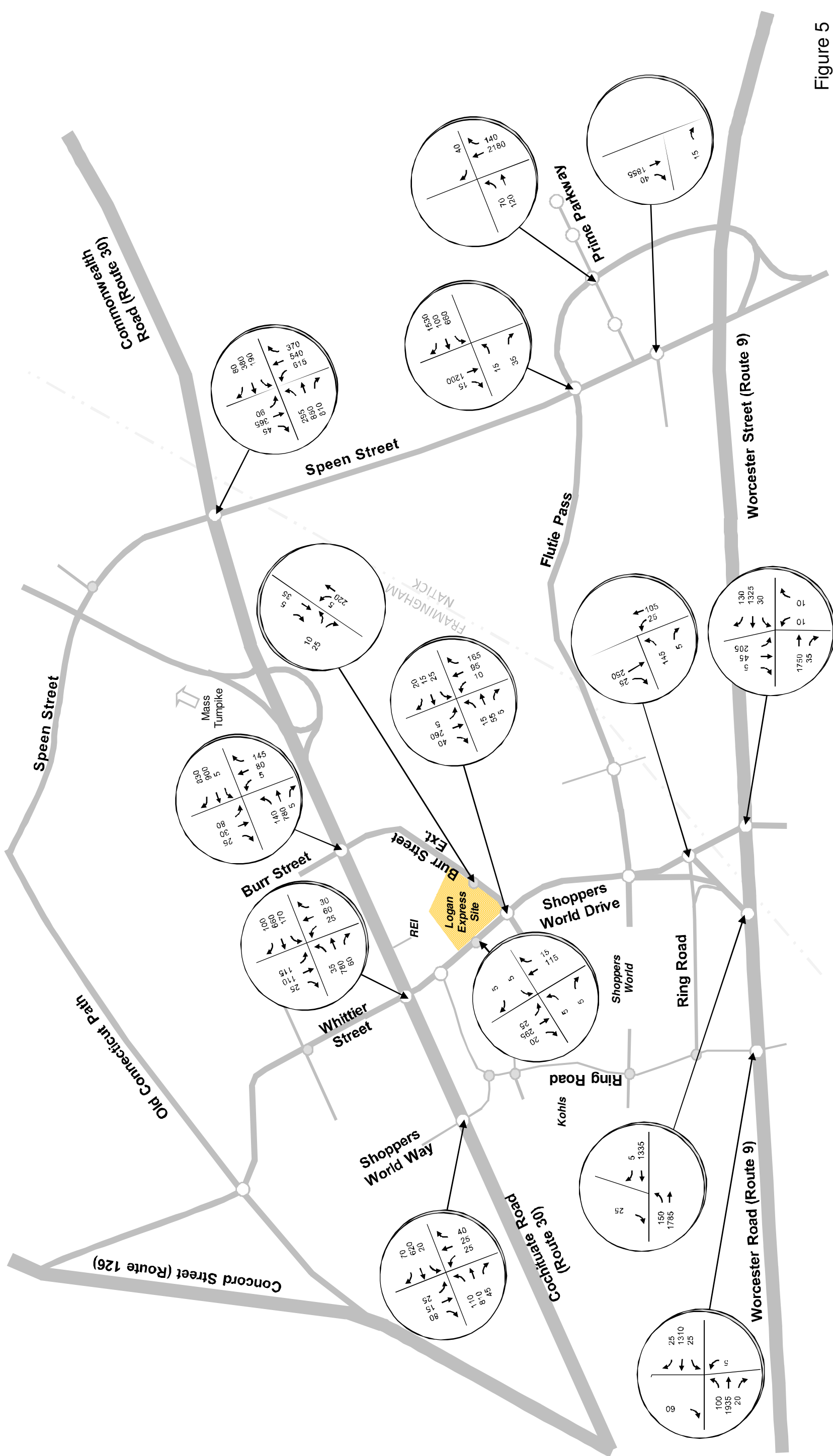


Figure 4

2013 ADT Traffic Volumes
 Logan Express - Framingham
 January 2014

Schematic Diagram:
 Not to Scale





Schematic Diagram:
Not to Scale



2013 AM Peak Hour Traffic Movement Volumes
Logan Express – Framingham
January 2014

Figure 5

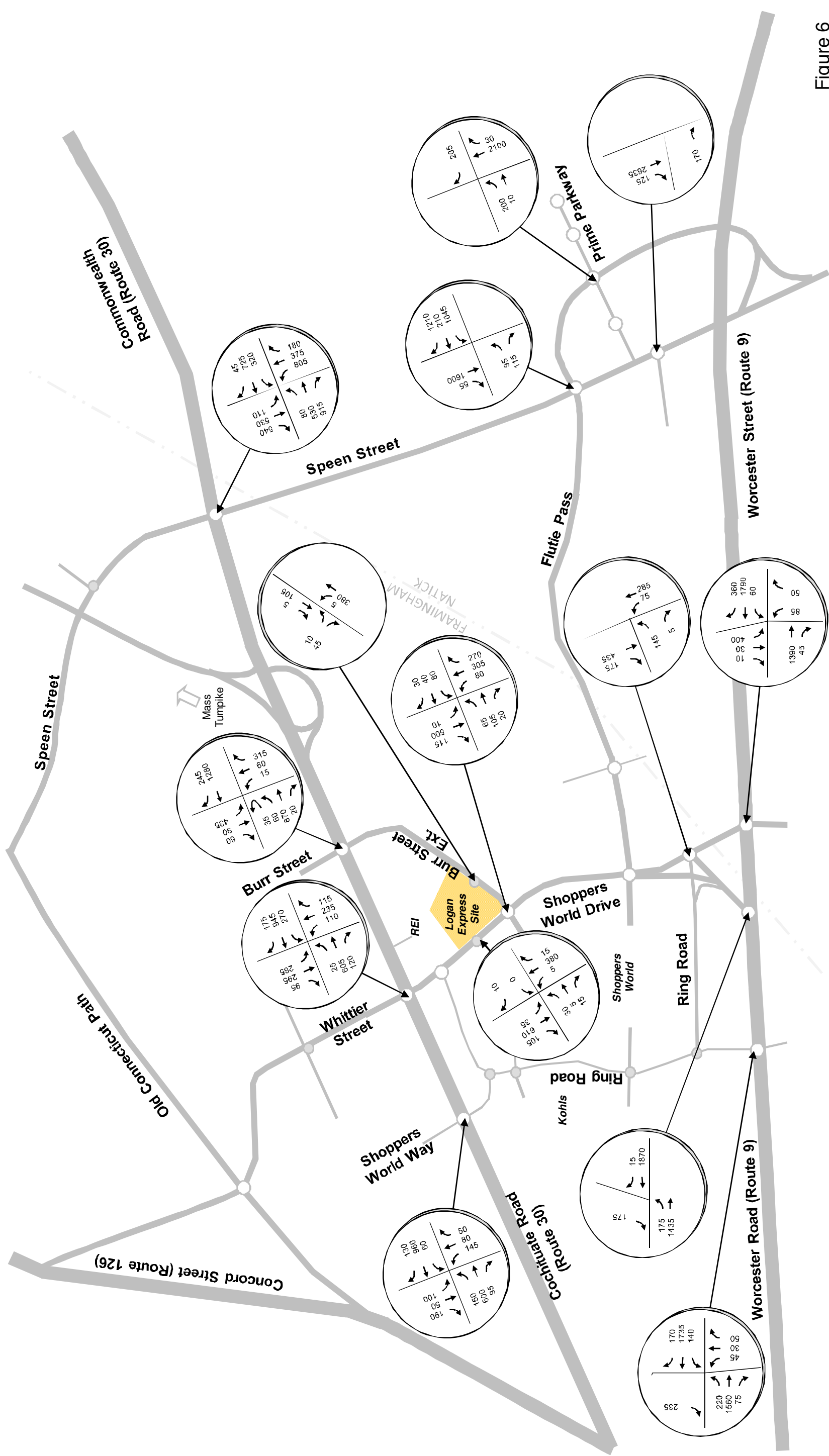


Figure 6

2013 PM Peak Hour Traffic Movement Volumes
 Logan Express – Framingham
 January 2014

Schematic Diagram:
 Not to Scale



Signalized intersections have different criteria for acceptable total delay than unsignalized intersections. At **signalized intersections**, higher total delay values are generally considered to be more acceptable than at unsignalized intersections. While

the LOS A criteria is the same as at unsignalized intersections, LOS F involves 80 seconds of total control delay; 30 seconds more than unsignalized intersections.

The relationship between LOS and average total delay at unsignalized and signalized intersections is summarized in Table 1.

Table 1
Intersection Level of Service Criteria

Level of Service	Unsignalized Intersections Average Total Delay Range* (seconds/vehicle)	Signalized Intersections Average Total Delay Range* (seconds/vehicle)
A	≤10	≤10
B	>10 and ≤15	>10 and ≤20
C	>15 and ≤25	>20 and ≤35
D	>25 and ≤35	>35 and ≤55
E	>35 and ≤50	>55 and ≤80
F	>50	>80

* Source: HCM 2010, Transportation Research Board

Capacity analyses were performed using the SYNCHRO 8 program for signalized intersections and the Highway Capacity Software program for unsignalized intersections at the FLEX site driveways. SYNCHRO 8 was used because it provides signal coordination analysis along with capacity level of service analyses in accordance with the 2010 HCM¹ and is approved for use by MassDOT. Table 2 summarizes existing levels of service at the intersections studied. Refer to the Technical Appendix for detailed intersection level of service analysis reports.

¹ 2010 Highway Capacity Manual, Transportation Research Board.

Table 2
Existing Level of Service and Delay¹
2013 AM (PM) Peak Hour

Intersection	Average Total Delay (seconds/vehicle)	Volume to Capacity Ratio (v/c)	Level-of-Service (LOS)
Signalized			
Shoppers World Way/Cochituate Road (Route 30) /Ring Road	6 (5)	0.78 (0.80)	A (A)
Whittier St/Shoppers World Drive/Cochituate Road (Route 30)	17 (67) ²	0.70(1.00+)	B (E)
Burr Street/ Cochituate Road (Route 30)	26 (25)	1.00+ (0.76)	C (C)
Shoppers World Drive/Burr Street	11 (17)	0.38 (0.62)	B (B)
Shoppers World Drive/Flutie Pass	4 (9)	0.27 (0.54)	A (A)
Ring Road/ W Couplet/Shoppers World Drive	4 (5)	0.52 (0.77)	A (A)
Worcester Road (Route 9)/Shoppers World Drive/Michael's Driveway	11 (18) ²	0.61 (0.86)	B (B)
Shoppers World Drive/Ring Road West Couplet	4 (5)	0.52 (0.77)	A (A)
Worcester Road (Route 9)/Ring Road West Couplet	3 (3)	0.75 (0.78)	A (A)
Worcester Road (Route 9)/West Driveway/Bed Bath Drive	14 (13)	0.67 (0.82)	B (B)
Speen Street at Cochituate Road (Rte. 30)	76(136)	1.00+ (1.00+)	E (F)
Unsignalized			
Shoppers World Drive /FLE Driveway ³	EB 10 (EB 19)	0.03 (0.16)	A (C)
Burr Street/FLE Driveway ³	SB 9 (SB 10)	0.04 (0.07)	A (A)

- 1 Reported results from Synchro Version 8 analysis. Levels of Service are from A-F, where A is the best and F the worst. Seconds of delay rounded to nearest second during the highest 15-minute period of the AM or PM peak hours and represents total control delay per motorist including acceleration, deceleration, and stop delays. V/C (volume to capacity) is for the worst individual traffic movement in the intersection. Synchro 8 has some known reporting problems when intersections do not have standard National Electrical Manufacturers Association (NEMA) phasing sequences.
- 2 Per HCS 2010 recommendation, Synchro 8 modeling cannot be used for the existing lane configurations at this intersection where an exclusive turn is next to a shared turn lane. LOS's reported from HCS+ as recommended by the University of Florida. "Until HCS 2010 is modified, the Signals module from HCS+ can be used to model this situation."
- 3 Worst unsignalized intersection approach is reported.

From Table 2, only the intersection of Speen Street with Cochituate Road (Route 30) has an LOS E or capacity conditions during the morning peak hour. None of the remaining Study Area intersections operate worse than LOS A-D during the AM peak hour.

However, during the afternoon peak hour, two Cochituate Road intersections – with Speen Street and Whittier Street/Shoppers World Drive -- operate with congestion at LOS F.

During both the morning and afternoon peak hours, the unsignalized driveway intersections of the FLEX site driveway with Shoppers World Drive and Burr Street operate at LOS A-C. Similarly, the signalized intersection of the Burr Street and Shoppers World Drive are operating at LOS A-C.

Origin/Destination Survey of Framingham Logan Express Lots

On August 5, 2013, an O-D survey was conducted of drop-off /pick-up, and long-term parking users at the FLEX site and the Kohl's overflow lot. The license plate survey took place between the hours of 7-9 AM and involved a total sample size of 683 vehicles. Information contained in the license plate survey assisted in compiling a distribution pattern for Future FLEX traffic.

In order, communities with two or more drop-off/pick-up license plates, representing approximately 82% of the 169 vehicles surveyed were, in descending order:

- Framingham (16)
- Natick (14)
- Marlborough (5)
- Sudbury (5)
- Worcester (4)
- Holliston (3)
- Hudson (3)
- Medway (3)
- Ashland (2)
- Dover (2)
- Maynard (2)
- Newton (2)
- Shrewsbury (2)
- Southborough (2)
- Wayland (2)
- Wellesley (2)

Similarly, long term parkers at the main FLEX site originated in the following communities, representing 85% of the 386 vehicles surveyed, with two or more plates:

- Framingham (19)
- Ashland (13)
- Marlborough (11)
- Hopkinton (10)
- Natick (10)
- Northampton (10)
- Holliston (9)
- Southborough (8)
- Medway (7)
- Shrewsbury (7)
- Westborough (6)
- Acton (5)
- Amherst (5)
- Hudson (5)
- Worcester (5)
- Milford (4)
- Newton (4)
- Northborough (4)

- Wellesley (4)
- Boston (3)
- Chicopee (3)
- Clinton (3)
- Franklin (3)
- Longmeadow (3)
- Springfield (3)
- Upton (3)
- Belchertown (2)
- Bellingham (2)
- Cambridge (2)
- Grafton (2)
- Uxbridge (2)
- Hampden (2)
- Holden (2)
- Holyoke (2)
- Lowell (2)
- Maynard (2)
- Medfield (2)
- Millis (2)
- Northbridge (2)
- Princeton (2)
- Sterling (2)
- Sudbury (2)
- Westfield (2)

Parkers at the Kohl's lot overflow parking lot originated in the following communities, representing 50% of the 125 vehicles surveyed, with two or more plates:

- Framingham (10)
- Worcester (9)
- Holliston (5)
- Grafton (4)
- Marlborough (3)
- Medway (3)
- Amherst (2)
- Auburn (2)
- Uxbridge (2)
- Westfield (2)
- Hopkinton (2)
- Natick (2)
- Northampton (2)
- Southbridge (2)
- Sturbridge (2)
- Sudbury (2)
- Sudbury (2)

Historical Crash Data Review – 2009-2011

FST contacted Massachusetts Highway Department Bureau of Transportation Planning and Development to obtain historical trends in traffic crashes in the project study area between 2009 and 2011, the latest three-year crash data period available from MassDOT. Crash data includes only reported crashes with greater than \$1,000 in property damage. This particular study area presents substantial crash tabulation difficulties because much of the area is on private property and precise locations are more difficult to identify, as many of the driveways are unmarked or referenced by different names (e.g., Shoppers World Drive is sometimes referred to as the North-South Connector and Ring Road). The average statewide / (District 3) crash rates are 0.80/ (0.89) crashes per million entering vehicles for signalized intersections and 0.60 / (0.66) crashes per million entering vehicles at unsignalized intersections. Table 3 summarizes FLEX study area crash data from 2009 to 2011. Details are contained in the Technical Appendix to this report, including MassDOT crash rate calculation forms for intersections where 5 or more crashes per year were reported.

Table 3
Framingham, MA – Logan Express Study Area Crash Data Summary – 2009-2011¹

<u>Intersection</u>	<u>Number of Crashes¹</u>		<u>Number by Severity</u>			<u>Number by Crash Type¹</u>				<u>Calculated Crash Rate²</u>
	<u>Av./Year</u>	<u>3 Yr. Total</u>	<u>PDO³</u>	<u>INJ⁴</u>	<u>FATAL</u>	<u>Angle</u>	<u>Rear End</u>	<u>Pedestrian Bike</u>	<u>Other</u>	<u>2009-2011</u>
Cochituate Road (Route 30) at Burr Street	6.33	19	12	7	-	7	5	-	7	0.42
Cochituate Road (Route 30) at Whittier and Shoppers World Drive	9	27	19	7	-	9	13	-	5	0.64
Route 30 at Shoppers World Way and Ring Road	7	21	20	1	-	10	7	-	4	0.62
Shoppers World Drive at Burr Street	1.33	4	3	1	-	3	1	-	-	0.21
Shoppers World Drive at West Couplet Ring Road	1	3	2	1	-	1	1	-	-	0.25
Shoppers World Drive at Worcester Road (Route 9)	14.67	44	34	10	-	9	30	-	5	0.85 ⁵
Worcester Road (Route 9) at West Couplet Ring Road	4.67	14	11	3	-	3	8	-	3	0.31
Worcester Road (Route 9) at Ring Road West	14.67	44	31	11	-	10	23	-	11	0.83 ⁵
Shoppers World Drive at Burr Street	0.33	1	-	-	-	1	-	-	-	0.07
Speen Street at Superior Drive and Natick Mall Drive	11	33	28	5	-	2	14	-	17	0.93 ⁵
Speen Street at Superior Drive	27	81	73	8	-	12	36	-	28	2.66 ⁵
Prime Parkway at Mathworks Northern Parking Lot ⁶	0	0	-	-	-	-	-	-	-	0
Prime Parkway at Mathworks Southern Parking Lot ⁶	0	0	-	-	-	-	-	-	-	0
Speen Street at Cochituate Road (Route 30)	20.67	62	38	20	-	30	20	-	8	0.99 ⁵
Shoppers World Drive at Flutie Pass	3.3	10	7	2	-	4	1	-	5	0.48
Shoppers World Drive at Burr Street	2	6	3	3	-	4	1	-	1	0.24
Shoppers World Way at Route 30	0.7	2	1	1	-	1	-	-	1	0.06

1. Reported crashes as summarized by the Massachusetts Highway Department from Registry of Motor Vehicles statistics. Data excludes unreported crashes with less than \$1,000 in damage.
2. Crash rate in accordance with Crash Rate calculation procedures
3. PDO – Accident involving Property Damage Only

4. INJ – Accident involving personal injuries.
5. Intersection *exceeds* average statewide or District 3 crash rate.
6. No crashes were found at these locations. This is probably because the intersecting driveways with Prime Parkway are privately owned.

Five of the study area signalized intersections exceeded statewide or District 3 crash rates for signalized intersections. In order of severity, they are:

➤ Speen Street at Superior Drive

With 81 total reported crashes, this intersection operates in two phases including simultaneous left and right turns with an upstream weave that may be contributing to the very high 2.66 crashes per million entering vehicles rate calculated for the three-year reporting period.

➤ Speen Street at Cochituate Road (Route 30)

With 62 total reported crashes, this intersection has a relatively high occurrence of angle and rear end collisions and 0.99 crashes per million entering vehicles rate calculated for the three-year reporting period.

➤ Speen Street at Natick Mall Drive/Superior Drive

With 33 total reported crashes, this intersection has merging turn lanes close to a downstream weave may be contributing to the 0.93 crashes per million entering vehicles calculated for the three-year reporting period.

➤ Worcester Road (Route 9) at Shoppers World Drive

With 44 total reported crashes, this intersection has a relatively high occurrence of rear end collisions on Worcester Road (Route 9) that is contributing to its 0.85 crashes per million entering vehicles during the three-year reporting period. While exceeding the statewide crash rate, the calculated rate is lower than the District 3 average crash rate of 0.89 crashes per million entering vehicles.

➤ Worcester Road (Route 9) at the Ring Road West

Also with 44 total reported crashes, this intersection also has a relatively high occurrence of rear end collisions on Worcester Road (Route 9) that is contributing to its 0.83 crashes per million entering vehicles during the three-year reporting period. Again, while exceeding the statewide crash rate, the calculated rate is lower than the District 3 average crash rate of 0.89 crashes per million entering vehicles.

Potential crash reduction factors at each of the above intersections are discussed further on.

III. FUTURE (2020) TRAFFIC CONDITIONS WITHOUT THE FRAMINGHAM LOGAN EXPRESS GARAGE

Year 2020 Access and Traffic Growth Assumptions

To assess Year 2020 traffic conditions in the area – garage opening year plus five years -- future infrastructure and development information was obtained from the Towns of Framingham and Natick. Framingham and Natick do not anticipate programmed infrastructure modifications that will affect traffic conditions in the study area. Figure 7 shows their locations within the Study Area.

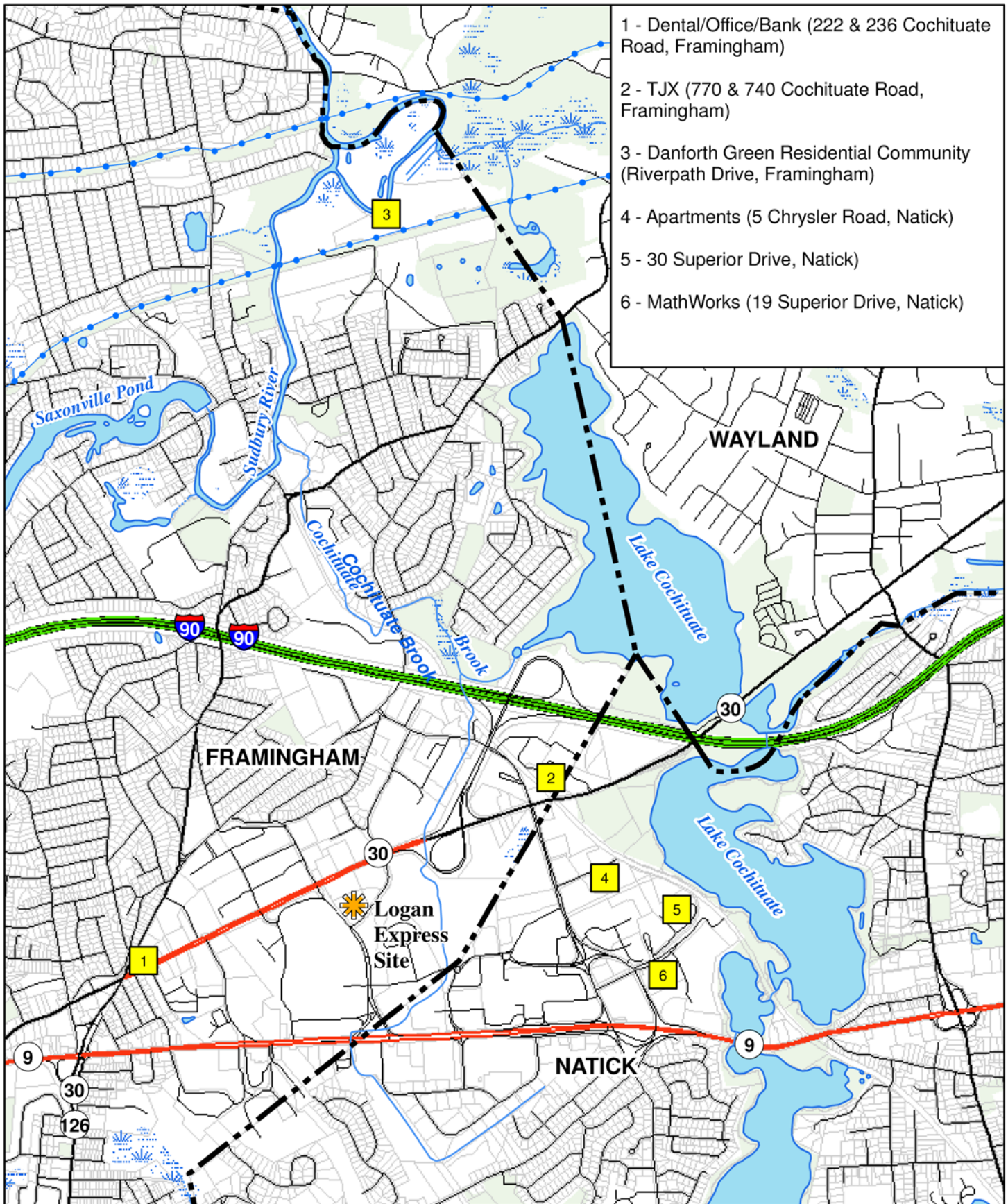
On the basis of the information obtained, Table 4 below summarizes a list of developments and potential AM/PM trips that are approved for construction and could affect future traffic conditions in the vicinity of the FLEX site:

Table 4
Framingham Logan Express Study Area Approved Developments
With Projected AM/PM Peak Hour Trip Generation

Development	Type	Size	AM Entering	AM Exiting	PM Entering	PM Exiting
222 & 236 Cochituate Road, Framingham	Dental Office Bank	4,100 sf ¹ 5,700 sf	10 39	5 31	5 74	10 74
TJX – 770 & 740 Cochituate Road, Framingham	Corporate Support Center	96,000 sf ²	2	2	2	2
Danforth Green, Riverpath Drive Apartments, Framingham	Residential	360 units	24	120	115	57
5 Chrysler Road Apartments, Framingham	Residential	404 units	36	137	150	81
FedEx Ground distribution facility 30 Superior Drive, Natick	Package delivery	171,000 sf	118	123	131	114
MathWorks re-occupancy Boston Scientific campus at 19 Superior Drive, Natick	Corporate	460,000 sf 470 spaces	490 180	67 25	43 32	423 155

1 sf- square feet

2 Development is not projected to add new trips, as it supports existing corporate campus with no increases in the campus population or parking supplies.



Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

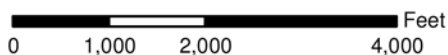


Figure 7 - Logan Express Study Area Approved Developments

Logan Express - Framingham

The following year 2020 No-Build analysis assumptions were made:

- The FLEX services, off-site overflow parking lot leases and access characteristics will remain approximately as they are today.
- Background traffic growth between 2013-2020 will be 0.5% per year or a cumulative of 4% over existing traffic volumes based on projections by Central Transportation Planning Staff. Background growth addresses all development in the area *except* the developments cited on Table 4.
- Projected vehicle trips cited on Table 4 were added to the AM and PM No-Build network volumes in accordance with the site trip distribution pattern provided by reports on each respective development. Refer to the Technical Appendix for a summary of the trips added for each development.

Projected Year 2020 No-Build Traffic Volumes and Operations

On the basis of the assumptions listed on the previous page, year 2020 AM and PM No-Build peak hour traffic volumes were compiled and are illustrated on Figures 8 and 9. Employing the turning movement volumes from Figures 8 and 9, the 2010 HCM² capacity analysis methodology used to evaluate existing conditions was employed to evaluate future No-Build conditions. Table 5 summarizes the results of the projected year 2020 No-Build Case traffic operations analysis.

From Table 5, traffic operational levels of service by the year 2020 at the intersections studied are expected to be very similar to the year 2013 existing levels of service identified on Table 2 previously.

Table 5 results indicate nearly the same levels of service and delays will be found during the year 2020 No-Build as year 2013 existing conditions shown on Table 2 previously, with some minor increases in delays and volume to capacity ratios. One exception is the intersection of Whittier Street at Cochituate Road (Route 30) during the morning peak hour. During that peak hour, according to HCM 2010 methodology, this intersection will have an overall LOS F primarily due to increased volumes associated with background development of a regional FedEx facility and the future MathWorks/Boston Scientific site reuse.

² 2010 Highway Capacity Manual, Transportation Research Board.

Table 5
Projected No-Build Level of Service and Delay¹
 2020 AM (PM) Peak Hour

Intersection	Average Total Delay (seconds/vehicle)	Volume to Capacity Ratio (v/c)	Level-of-Service (LOS)
Signalized			
Shoppers World Way/Cochituate Road (Route 30) /Ring Road	6(3)	0.78 (0.80)	A (A)
Whittier St/Shoppers World Drive/Cochituate Road (Route 30)	19(76)	0.71 (1.00+)	B (E)
Burr Street/ Cochituate Road (Route 30)	30 (26) ²	1.00+(0.76)	C (C)
Shoppers World Drive/Burr Street	11 (17)	0.38 (0.63)	B (B)
Shoppers World Drive/Flutie Pass	4 (9)	0.27 (0.54)	A (A)
Ring Road/ W Couplet/Shoppers World Drive	4 (5)	0.52 (0.77)	A (A)
Worcester Road (Route 9)/Shoppers World Drive/Michael's Driveway	12 (19) ²	0.69 (0.90)	B (B)
Shoppers World Drive/Ring Road West Couplet	4 (5)	0.52 (0.77)	A (A)
Worcester Road (Route 9)/Ring Road West Couplet	3 (3)	0.76 (0.78)	A (A)
Worcester Road (Route 9)/West Driveway/Bed Bath Drive	15 (12)	0.67 (0.83)	B (B)
Speen Street at Cochituate Road (Rte. 30)	136 (210)	1.00+ (1.00+)	F (F)
Unsignalized			
Shoppers World Drive /FLE Driveway ²	EB 10 (EB 19)	0.03 (0.17)	B (C)
Burr Street/FLE Driveway ²	SB 9 (SB 10)	0.04 (0.08)	A (A)

- 1 Reported results from Synchro Version 8 analysis. Levels of Service from A-F, where A is the best a F the worst. Seconds of delay rounded to nearest second during the highest 15-minute period of tl AM or PM peak hours and represents total control delay per motorist including acceleration, deceleration, and stop delays. V/C (volume to capacity) is for the worst individual traffic movement the intersection. Synchro 8 has some known reporting problems when intersections do not have standard National Electrical Manufacturers Association (NEMA) phasing sequences.
- 2 Per HCS 2010 recommendation, Synchro 8 modeling cannot be used for the existing lane configurations at this intersection. LOS's reported from HCS+ as recommended by the University c Florida. "Until HCS 2010 is modified, the Signals module from HCS+ can be used to model this situation."
- 3 FLE – Framingham Logan Express. Worst unsignalized intersection approach is reported.

IV. FUTURE (2020) TRAFFIC CONDITIONS WITH THE FRAMINGHAM LOGAN EXPRESS GARAGE

Build Circulation Modifications

Consolidation of FLEX parking and bus services to a single site will benefit the FLEX service and operations by making the site a much more reliable 'one-stop' location. As such it will have enough capacity to accommodate long-term peak FLEX parking demands well beyond the year 2020 without requiring the use of overflow parking lots that encroach on retail parking supplies when needed. The enhanced FLEX facility will also greatly increase the bus mode share of trips to Logan Airport, which has positive regional traffic implications by reducing trips between the western Boston metropolitan communities and downtown Boston.

Specifically, the proposed Build Case garage will have a maximum $\pm 1,500$ spaces capacity with phased construction. Initially, the garage will contain 1,100 spaces including 61 short term spaces, 20 employee/taxi spaces, and 1,019 long term spaces replacing the existing 18 drop-off/pick-up spaces, three taxi spaces and 854 long-term spaces including the 500 overflow lot spaces. In the long term, Massport proposes a total of 1,419 long term parking spaces plus retention of the 61 short term and 20 employee/taxi spaces. Because most of the short term parking will be located in the garage demands for short term parking should decrease in the future.

With the construction of the new FLEX garage facility, access modifications to the FLEX and Peter Pan bus service access are envisioned to include the following:

- *Existing FLEX site curb cuts – one on the Shoppers World Drive approximately 300 feet north of the Burr Street Extension, and the exit on the Burr Street Extension approximately 130 feet east of Shoppers World Drive will be retained, but enhanced. The existing two-way Shoppers World Drive will be converted to one-way only inbound operation. The Burr Street exit curb cut closest to Shoppers World Drive will be retained as an exit only for buses and short term users. Neither of these driveways will be usable by long term parkers. All entering bus movements as well as short term drop-off/pick-up vehicles arriving to the site from the north and south will either turn left or right in at the existing Shoppers World Driveway. Non-bus drop-off/pick-up motorists except taxis and Massport employees will be required to exit at Burr Street.*
- *The terminal will continue to have four bus bays, but buses will be stacked in a linear manner, no longer needing to stop in locations requiring passengers to cross a bus path when either loading or unloading. This will provide safer operations for passengers and bus operators than the existing configuration which includes tandem bus loading/unloading.*

- *A new long-term 'T' garage entrance/exit intersection will be added to Burr Street approximately 400 feet west of Shoppers World Drive. Addition of the new curb cut will allow FLEX long-term parking demands to be completely separated from its short term parking demands. An automated ticket dispenser/payment system will be used to control garage operations.*
- *It will no longer be necessary for long term parking motorists and Logan Express buses using the service to make extra trips between the main site and the overflow parking areas. These additional bus and user trips will be eliminated by the consolidation of the Logan Express long-term and short-term parking to one area. The Logan Express service travel time between the site and Logan Airport in Boston should be improved slightly by eliminating the need to circulate and shuttle people between the overflow parking area and the main site.*
- *New sidewalks will be provided along the site perimeter for pedestrians on the east side of the North-South Connector and on the north side of the Burr Street Extension.*

Trip Generation Assumptions

The future estimate of trip generation from FLEX Garage was largely based on 48-hour automatic traffic recorder count data obtained during the July 2013 supplemental count program plus the FLEX main lot parking usage and passenger usage data supplied by Massport. The use of *ITE Trip Generation*³ report rates for Park-Ride lots was not assumed to be applicable, as the ITE rates are associated with typical commuter park-ride lots for public transportation services. Table 6 provides a comparison of existing and projected hour-by-hour trip generation assuming the ±1,500 space FLEX garage is constructed. Table 4 also provides a comparison to existing hour by hour traffic volumes measured at the site on a typical weekday. Trip generation assumptions include the following:

- *The increase in generation of future vehicle trips to and from the FLEX garage will be proportional to the ratio of existing vehicle trips/long-term space. As mentioned previously, it was found that the long-term component of existing site-related trips represents no more than 20% of site-generated trips. This is a conservative assumption because a portion of the long term arrival trips to the overflow lots are double counted, as users drop by the main site to determine whether parking is available, thereby entering and exiting the main site prior to entering, or exiting, the overflow parking sites.*
- *Bus services to and from the site will remain at approximately current levels. This assumes that existing frequencies and schedules for FLEX, Peter Pan, and Greyhound services will be retained in the future.*

³ Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012.

Table 6
*Comparison of Projected Framingham Logan Express Garage Build Trip Generation
 To Existing Trip Generation
 Average Weekday (Monday through Friday)*

Hour	Total Existing 2013 Site Generation Including FLE + Kohl's			Projected 2020 Build Total All Traffic Movements			Projected Difference (Add-ons)		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
12-1 AM	10	18	28	14	25	38	4	7	10
1-2	4	12	16	5	16	22	1	4	6
2-3	9	17	26	12	23	35	3	6	9
3-4	27	16	43	37	22	59	10	6	16
4-5	44	28	72	60	38	98	16	10	26
5-6	61	36	97	83	49	132	22	13	35
6-7	70	53	123	95	72	168	25	19	45
7-8	60	68	128	82	93	175	22	25	47
8-9	65	55	120	100	85	185	35	30	65
9-10	55	56	111	75	76	151	20	20	40
10-11	74	64	138	101	87	188	27	23	50
11-12	68	76	144	93	104	196	25	28	52
12-1 PM	62	65	127	85	89	173	23	24	46
1-2	62	75	137	85	102	187	23	27	50
2-3	71	71	142	97	97	194	26	26	52
3-4	82	92	174	112	125	237	30	33	63
4-5	105	115	220	145	155	300	40	40	80
5-6	59	64	123	80	87	168	21	23	45
6-7	52	68	120	71	93	164	19	25	44
7-8	64	61	125	87	83	171	23	22	46
8-9	50	77	127	68	105	173	18	28	46
9-10	32	53	85	44	72	116	12	19	31
10-11	30	45	75	41	61	102	11	16	27
11-12	21	40	61	29	55	83	8	15	22
Daily	1237	1325	2562	1700	1815	3516	463	490	954

Source: FST projected estimates assume a 1,500 space garage. During construction 2014-2015, it is assumed the site generation at the temporary former Boston Scientific site will be the equivalent of the existing combined Kohl's + FLEX site traffic demands. Projected peak hour and daily volumes are highlighted in yellow.

- *A substantial portion of traffic movements from the main site to the remote overflow lots will be eliminated after the garage is open. It is assumed that most remote lot users go to the main site before being diverted to the overflow lot sites.*
- *The level of drop-off/pick-up activity will remain at approximately current levels. This is a conservative assumption, as drop-off/pick-up activity trips, by far the largest component of existing FLEX traffic, theoretically will decrease with the construction of the garage.*

From Table 6 on the previous page, on a typical weekday, the FLEX garage is expected to add approximately **954** vehicle trips per day to traffic volumes in the vicinity of the site, and from **65-80** total trips during the AM and PM peak hours. This is a conservative (high side) estimate, as drop-off/pick-up activity should eventually decrease with the enhanced availability of convenient/secure long term parking.

During the morning peak hour, approximately 65 vehicle trips, 35 in and 30 out were added to the local street network, while approximately 80 vehicle trips, 40 in and 40 out were added during the PM peak hour.

Trip Distribution Assumptions

Three sources of information were used to identify the potential trip distribution pattern of the FLEX garage:

- 1) Existing ground count turning movements at the FLEX site;
- 2) Results of the new FLEX drop-off/pick-up and long term parking license plate surveys.

A comparison of the two trip distribution pattern sources indicates that the future FLEX trip distribution pattern after construction and occupation of the future garage is likely to be similar to the distribution pattern found during the license survey and exhibited by turning movements at the existing Logan Express driveways. Generally, traffic to and from the FLEX facility dilutes relatively quickly, as approximately half the new trips are expected to travel to and from the north on the Shoppers World Drive and half to and from Route 9 intersections. To summarize, the assumed trip distribution pattern based on the license plate survey, and confirmed by the site lot driveway counts is as follows:

- Approximately **36%** to and from the east on Cochituate Road (southbound traffic via the Shoppers World Driveway and north eastbound traffic via Burr Street);
- **13%** to and from the north via Whittier Street;
- **31%** to and from the east on Route 9 via Shoppers World Driveway and
- **13%** to and from the west of Route 9 via Shoppers World Driveway and the West Couplet/Ring Road.
- **7%** to and from the west on Cochituate Road (southbound traffic via Shoppers World Driveway).

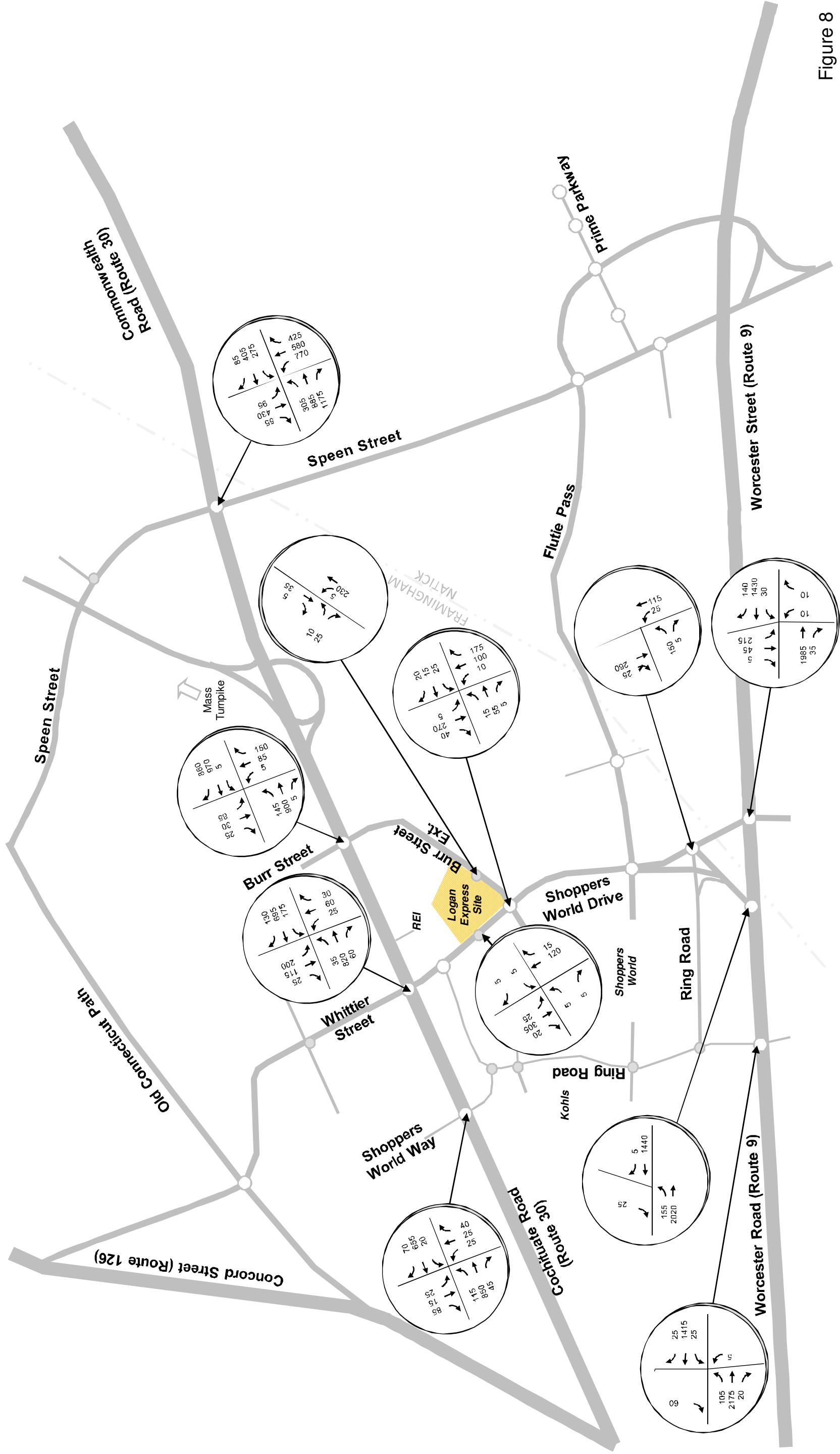


Figure 8

2020 No-Build AM Peak Hour Turning Movement Volumes
 Logan Express – Framingham
 January 2014

Schematic Diagram:
 Not to Scale



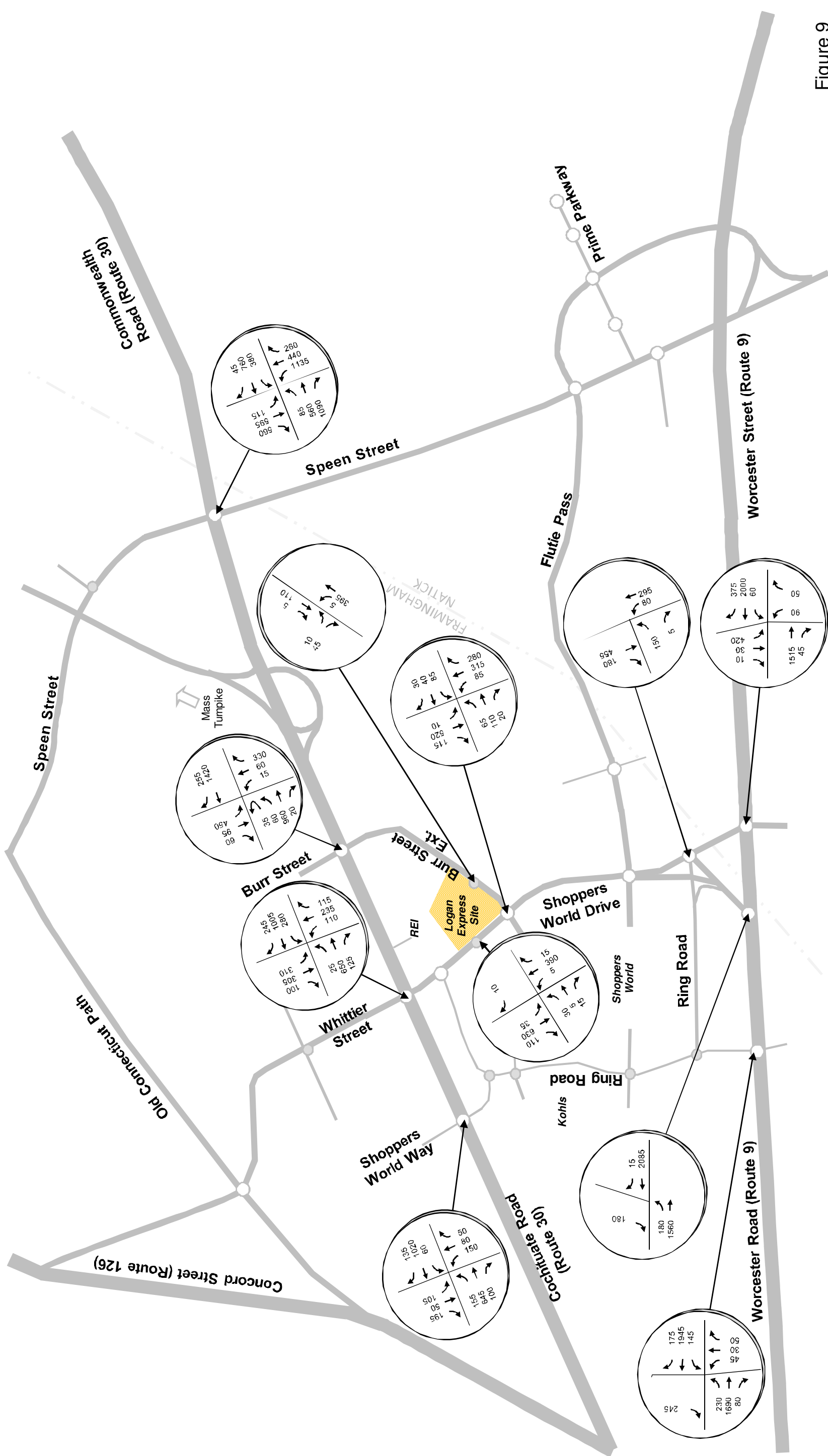


Figure 9

2020 No-Build PM Peak Hour Turning Movement Volumes
 Logan Express – Framingham
 January 2014

Schematic Diagram:
 Not to Scale



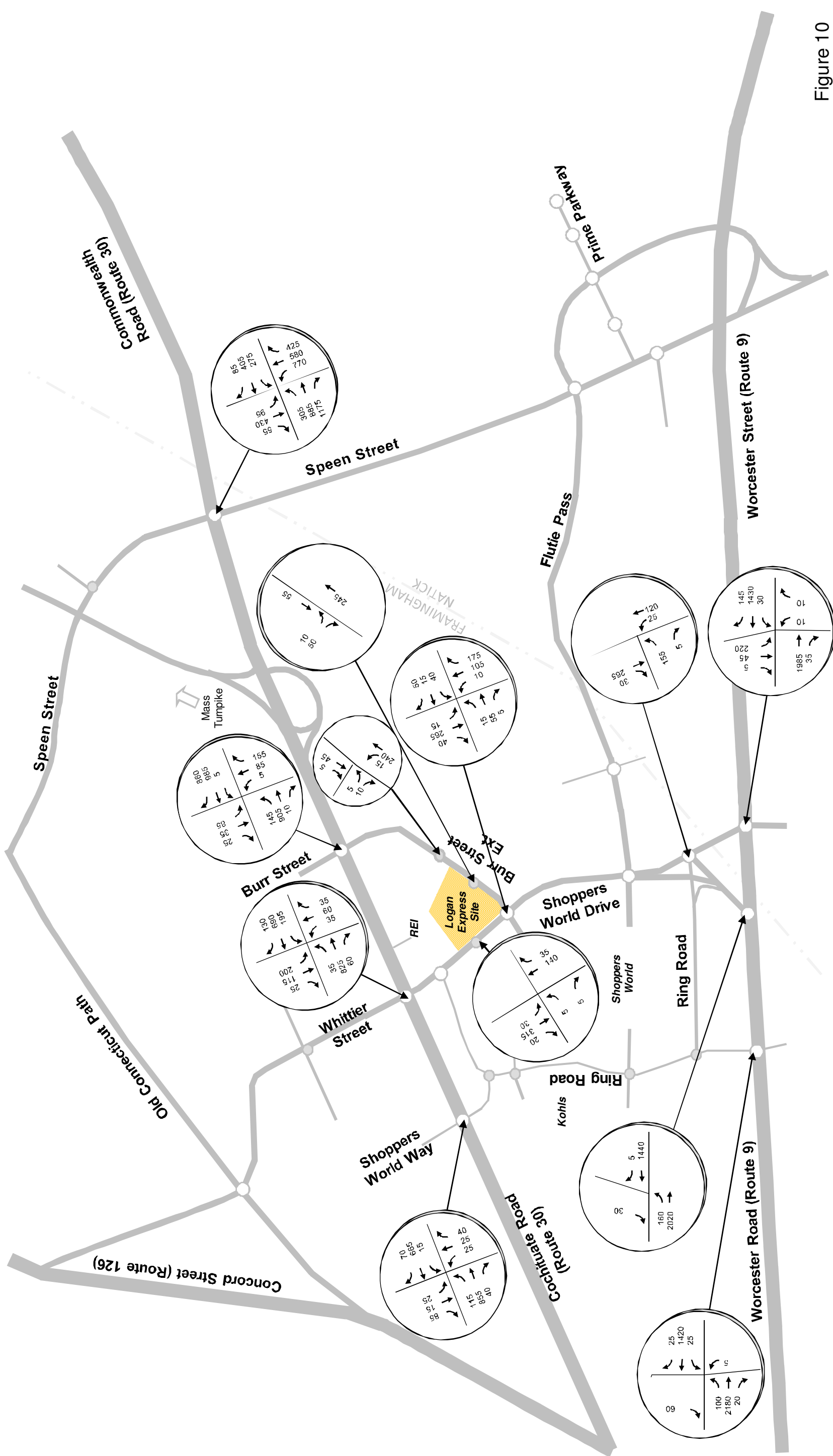


Figure 10

2020 Garage Build AM Peak Hour Turning Movement Volumes
 Logan Express – Framingham
 January 2014

Schematic Diagram:
 Not to Scale



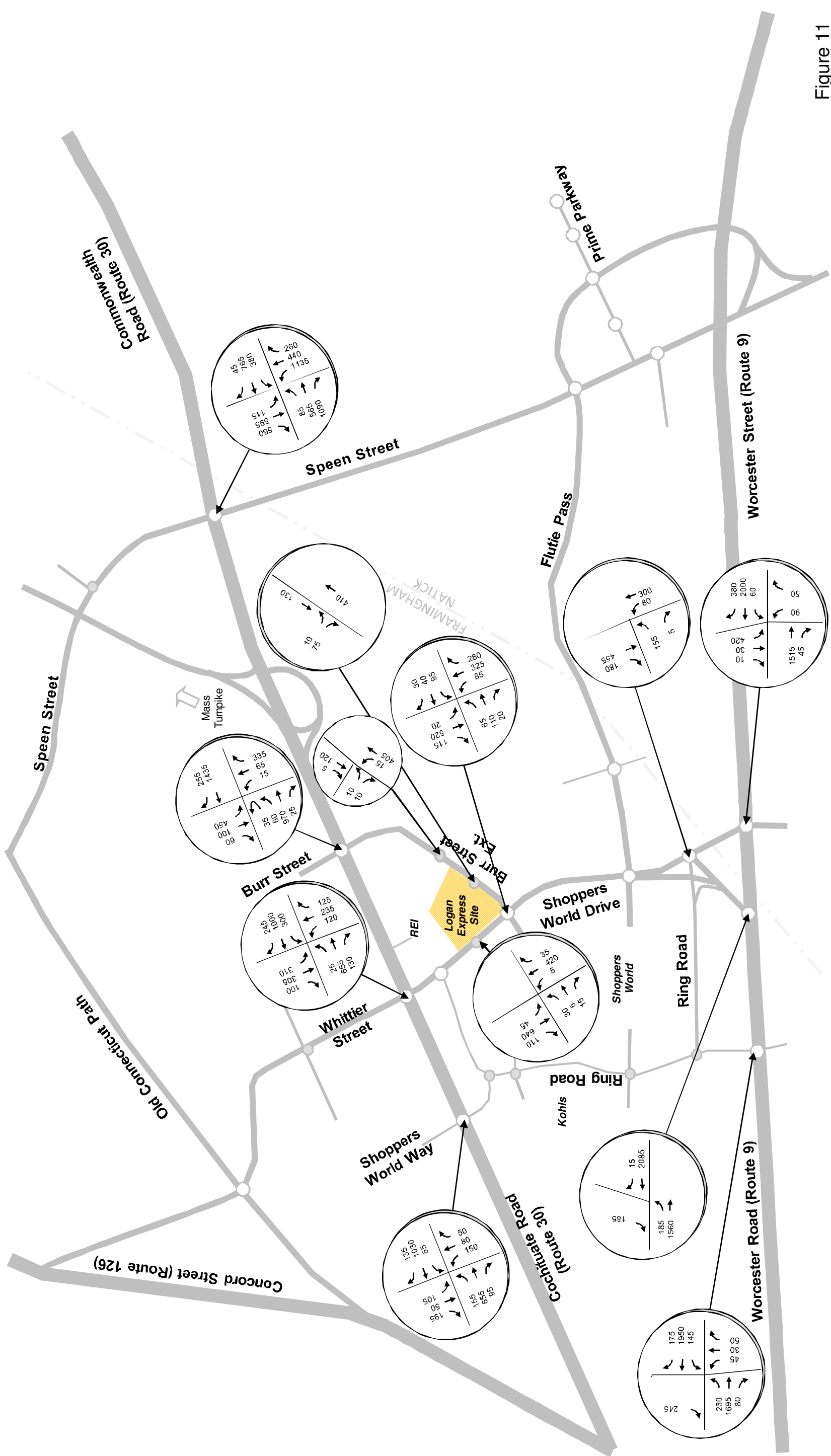


Figure 11

2020 Garage Build PM Peak Hour Turning Movement Volumes
 Logan Express – Framingham
 January 2014

Projected Year 2020 Build Volumes and Peak Hour Traffic Operations

Projected year 2020 Build Weekday AM and PM peak hour traffic volumes are presented on Figures 10 and 11, respectively. With one exception, roadway intersections evaluated are identical to those identified under existing (2013) and No-Build conditions. In the Build case only is a second access onto Burr Street analyzed, where the garage's long term entrance will be located approximately 300 feet east of Shoppers World Drive.

Again, incremental trip-making in the post-construction Build case represents a relatively small amount of additional trip-making through most affected intersections and will not require the re-timing of study area signalized intersections.

Year 2020 levels of service and delays at the signalized intersections throughout the study area are presented on Table 7. Level of service results are *identical with or without the FLEX garage* (refer back to Table 5 for the year 2020 No-Build level of service findings). The only changes found were slight changes (10 seconds or less) in delay and in V/C ratios, which were no more than 0.1.

Table 7
Projected Build Levels of Service and Delay¹
 2020 AM (PM) Peak Hour

Intersection	Average Total Delay (seconds/vehicle)	Volume to Capacity Ratio (v/c)	Level-of-Service (LOS)
Signalized			
Shoppers World Way/Cochituate Road (Route 30) /Ring Road	6(7)	0.78 (0.80)	A (A)
Whittier St/Shoppers World Drive/Cochituate Road (Route 30)	20(77) ²	0.76 (1.00+)	B (E)
Burr Street/ Cochituate Road (Route 30)	30 (26)	1.00+ (0.80)	C (C)
Shoppers World Drive/Burr Street	13 (18)	0.42 (0.653)	B (B)
Shoppers World Drive/Flutie Pass	4 (7)	0.27 (0.54)	A (A)
Ring Road/ W Couplet/Shoppers World Drive	4 (5)	0.52 (0.77)	A (A)
Worcester Road (Route 9)/Shoppers World Drive/Michael's Driveway	12 (19)	0.69 (0.90)	B (B)
Shoppers World Drive/Ring Road West Couplet	4 (5)	0.52 (0.77)	A (A)
Worcester Road (Route 9)/Ring Road West Couplet	3 (3)	0.76 (0.79)	A (A)
Worcester Road (Route 9)/West Driveway/Bed Bath Drive	15 (12)	0.67 (0.83)	B (B)
Speen Street at Cochituate Road (Rte. 30)	136 (211)	1.00+ (1.00+)	F (F)
Unsignalized			
Shoppers World Drive /FLE Driveway ³	EB 10 (EB 21)	0.03 (0.19)	B (C)
Burr Street/FLE Driveway ³	SB 9 (SB 10)	0.04 (0.08)	A (A)
Burr St. Ext./ FLE long term parking Driveway 2 entrance/exit ³	SB 9 (SB 11)	0.01 (0.02)	A (B)

- 1 Reported results from Synchro Version 8 analysis. Levels of Service are from A-F, where A is the best and F the worst. Seconds of delay rounded to nearest second during the highest 15-minute period of the AM or PM peak hours and represents total control delay per motorist including acceleration, deceleration, and stop delays. V/C (volume to capacity) is for the worst individual traffic movement in the intersection. Synchro 8 has some known reporting problems when intersections do not have standard National Electrical Manufacturers Association (NEMA) phasing sequences.
- 2 Per HCS 2010 recommendation, Synchro 8 modeling cannot be used for the existing lane configurations at this intersection. LOS's reported from HCS+ as recommended by the University of Florida. "Until HCS 2010 is modified, the Signals module from HCS+ can be used to model this situation."
- 3 FLE – Framingham Logan Express. Worst unsignalized intersection approach is reported.

Post-construction, by the year 2020, the assumed trip distribution pattern effectively dilutes the impact of the garage to fewer than 40 peak hour trips through all of the intersections analyzed except the signalized intersection of Burr Street at Shoppers World Drive and the three unsignalized FLEX site driveway intersections --one at the Shoppers World Drive and the other two FLEX driveways at Burr Street.

At Study Area intersections, trips will increase due to the re-distribution of vehicle trips to the new FLEX curb cuts, but their projected levels of service will remain acceptable during the year 2020. Because additional traffic add-ons are expected to be less than 1 vehicle per minute at intersections in the study area, we do not anticipate the need to modify signal timing to enhance the performance of intersections. However, we do recommend reviewing and adjusting as necessary clearance intervals to accommodate the most recent MassDOT procedures calculating clearance intervals to provide traffic safety enhancements at signalized intersections where crash rates exceed statewide crash rates.

During construction, when the FLEX main terminal will be unavailable during 2014, regular FLEX operations temporarily will occur at a former Sam's Boston Scientific/ proposed Mathworks site, located in Natick off of Speen Street and Prime Parkway. A discussion of traffic operations while this temporary situation is in force is contained in the next section on Construction Period Impacts.

V. CONSTRUCTION PERIOD (2015) IMPACTS

Construction Period Assumptions

To facilitate a one year construction schedule for the proposed garage it is necessary to clear the FLEX site by relocating FLEX operations from Framingham to a temporary location. The selected location is the parking lot associated with a former Boston Scientific site (now under the control of Mathworks) in the Town of Natick. The buildings and their associated parking lots are currently unoccupied but proposed for occupancy by Mathworks following the temporary use of the site by FLEX. The Mathworks site is located on Prime Parkway approximately 1.4 miles away from the existing FLEX facility, on the eastern side of Speen Street (Figure 12). The existing parking lot will be modified with paint striping and signage to provide approximately 500 parking spaces. The revised site would accommodate a terminal, short and long term site parking, as well as accommodations for bus services now provided at the FLEX terminal. A total of four linear bus spaces will be created just west of the proposed temporary FLEX terminal.

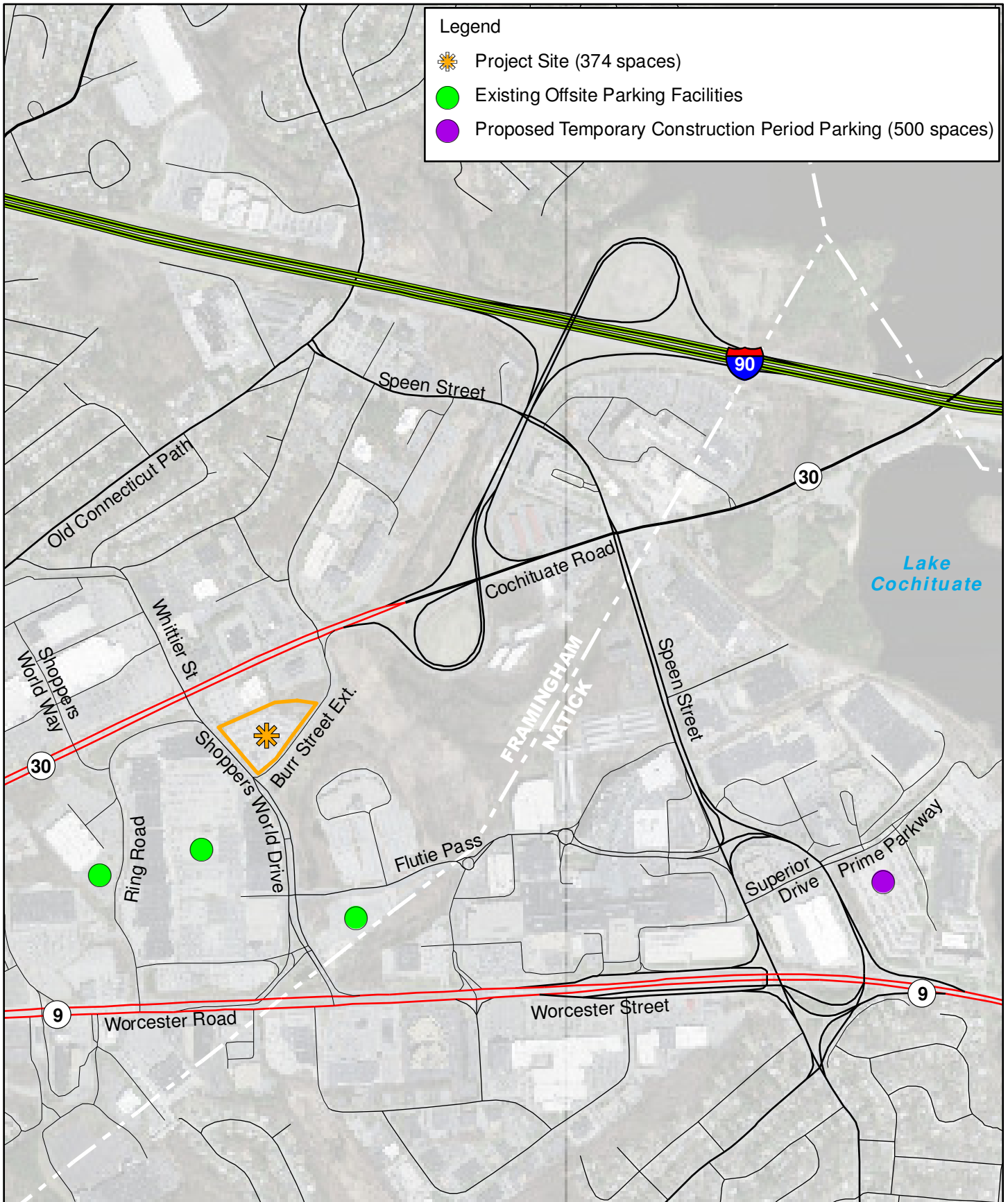
During the one year construction period, all three existing leased overflow lots in the Shoppers World area totaling 500 spaces will remain available to satisfy peak season parking demands as required. This will bring the total construction period parking supply to approximately 1000 vehicles, inclusive of short term and designated employee spaces, a temporary increase of approximately 120 parking spaces in the FLEX parking system. Based on Massport's peak parking demand data for 2013, total parking demands could conceivably be accommodated at the Mathworks site approximately 90% of the time with overflow lots capacity needed only 10% of the time.

Prime Parkway is a two-way median divided roadway that intersects Speen Street at a signalized intersection. The driveway for the temporary FLEX operation intersects Prime Parkway eastbound at an unsignalized intersection.

Traffic volumes in the vicinity of the current FLEX site are projected to remain constant and/or be slightly reduced with the temporary relocation of operations to the Mathworks site. Thus, existing traffic operations in the vicinity of the current FLEX location remain unchanged during the construction period. Consequently, the following construction period analysis is focused along Speen Street where rerouted traffic will increase traffic volumes at four key intersections.

For analysis purposes, we have assumed that the trips attracted to the temporary site will be comparable to the total trips generated by the existing Kohl's plus FLEX site and that the Kohl's overflow parking site will continue to be used. For example, Massport employees or users may, at times, be directed to the Kohl's overflow lot during high demand periods.

For analysis of construction period impacts, we have projected traffic volumes and evaluated traffic operations during a typical 2015 weekday's AM and PM peak hours. Year



Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs



0 250 500 1,000 Feet



Figure 12 - Temporary Parking Location and Existing Parking Facilities

Logan Express - Framingham
January 9, 2013

2015 No-Build and Build AM and PM peak hour volumes are illustrated on Figures 13-16. Year 2015 No-Build AM and PM level of service analysis results are summarized on Tables 8 and 9.

To be conservative, background traffic growth is assumed to be 1% between 2013 and 2015, or 0.5% per year. Additionally, with one exception all of the developments cited in Table 4 of this study are assumed to be in place for the No-Build and Build year 2015 cases. The one exception involves the proposed development of Mathworks on the former Boston Scientific site which as mentioned will not occur until after the temporary use of the site by FLEX.

Table 8
*Projected No-Build Levels of Service and Delay**
2015 AM (PM) Peak Hour

Intersection	Average Total Delay (seconds/vehicle)	Volume to Capacity Ratio (v/c)	Level-of-Service (LOS)
Signalized			
Speen Street at Cochituate Road (Rte. 30)	127 (197)	1.00+ (1.00+)	F (F)
Speen Street East at Superior Drive	46 (37)	0.88 (0.78)	D (D)
Speen Street at Natick Mall Road	11 (22)	0.46 (0.65)	A (C)
Unsignalized			
Temporary FLEX Driveway at Prime Parkway	NA	NA	NA

- 1 Reported results from Synchro Version 8 analysis. Levels of Service are from A-F, where A is the best and F the worst. Seconds of delay rounded to nearest second during the highest 15-minute period of the AM or PM peak hours and represents total control delay per motorist including acceleration, deceleration, and stop delays. V/C (volume to capacity) is for the worst individual traffic movement in the intersection. Synchro 8 has some known reporting problems when intersections do not have standard National Electrical Manufacturers Association (NEMA) phasing sequences.
 - 2 Per HCS 2010 recommendation, Synchro 8 modeling cannot be used for the existing lane configurations at this intersection. LOS's reported from HCS+ as recommended by the University of Florida. "Until HCS 2010 is modified, the Signals module from HCS+ can be used to model this situation."
 - 3 FLE – Framingham Logan Express. Worst unsignalized intersection approach is reported.
- NA – Not Applicable

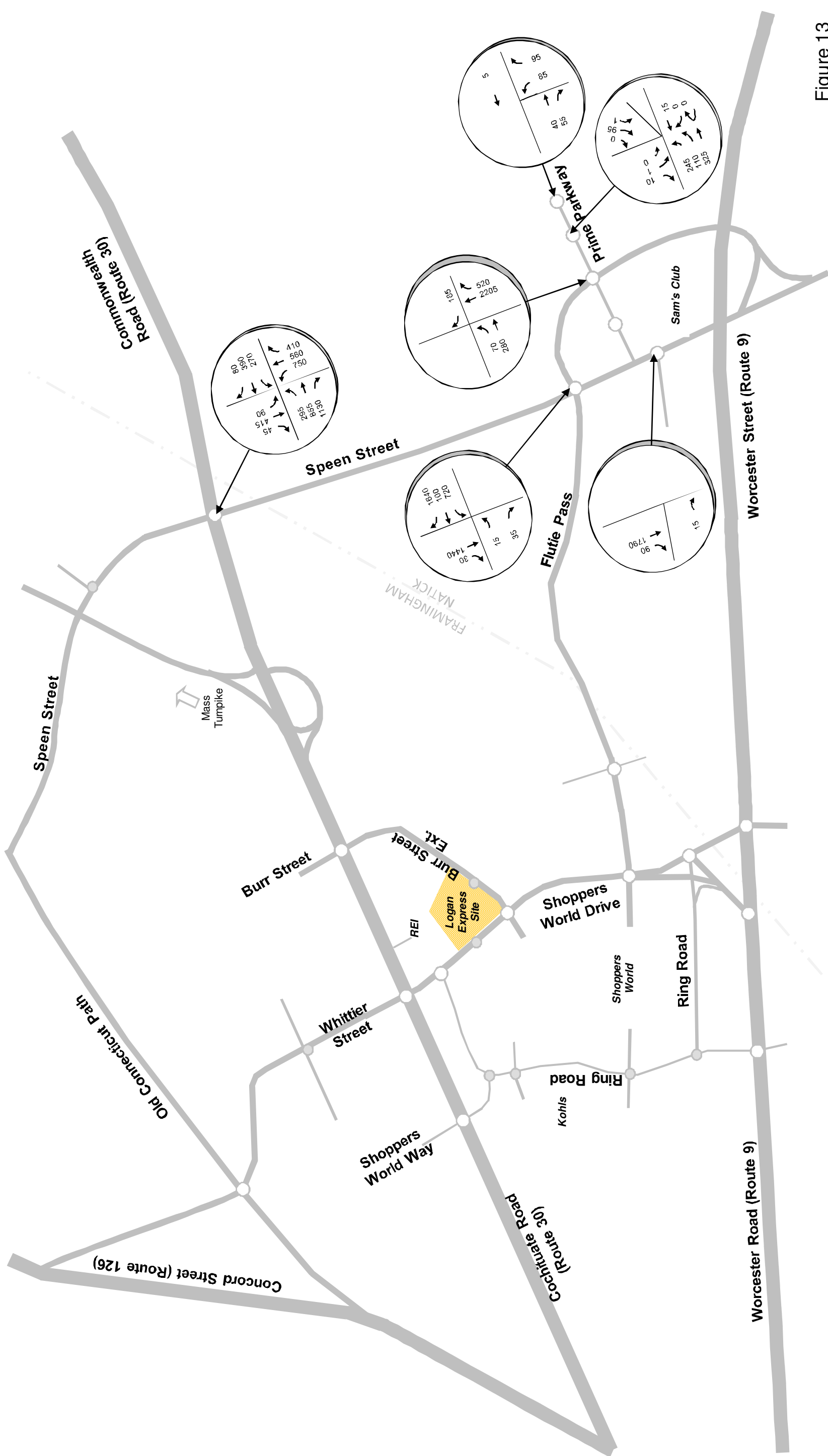


Figure 13

2015 No-Build Construction Case AM Peak Hour Traffic Movement Volumes
 Logan Express – Framingham
 January 2014



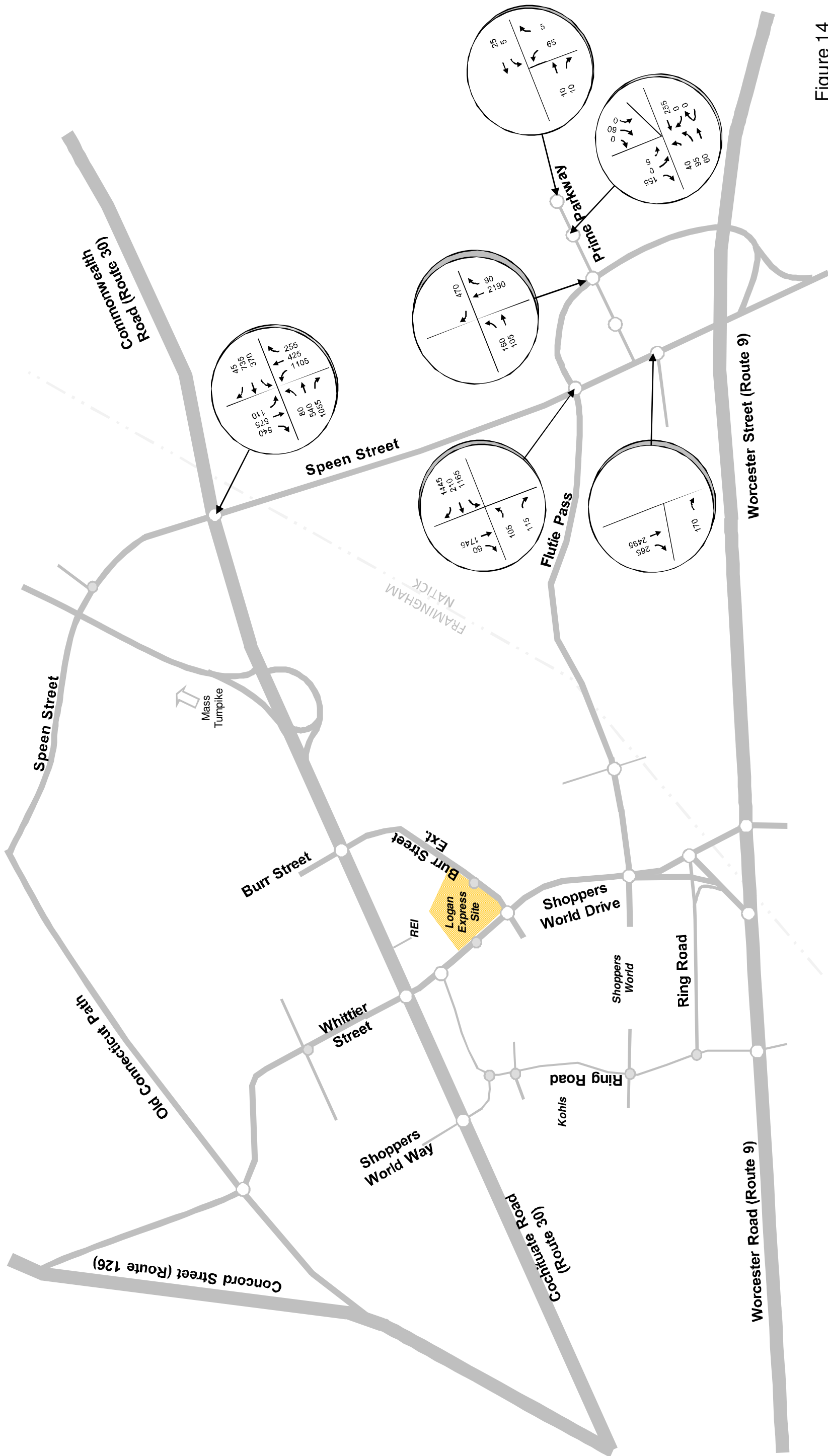


Figure 14

2015 No-Build Construction Case PM Peak Hour Traffic Movement Volumes
 Logan Express – Framingham
 January 2014

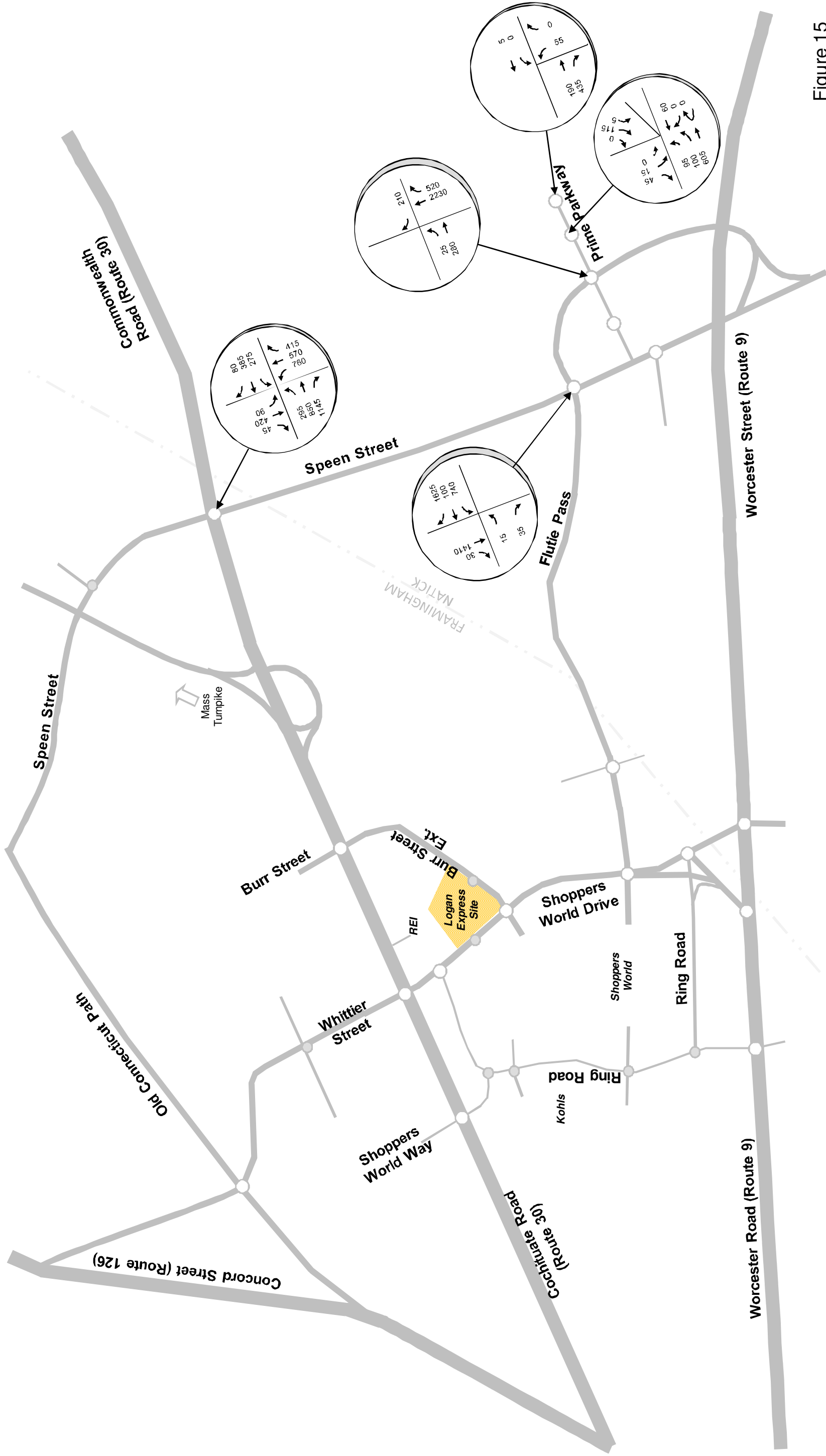


Figure 15

2015 Construction Period – AM Peak Hour Traffic Movement Volumes
 Logan Express – Framingham
 January 2014



Schematic Diagram:
 Not to Scale



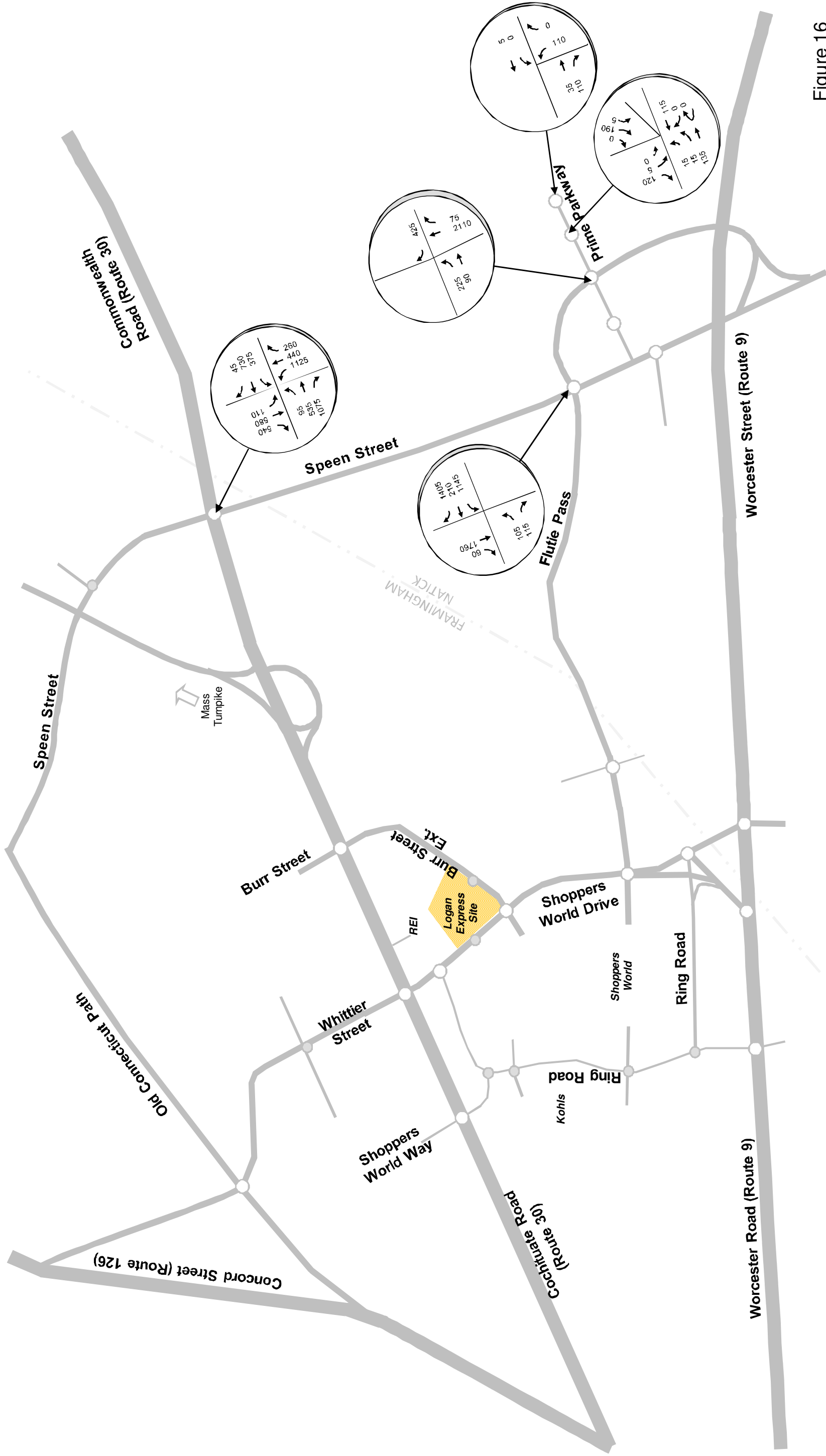


Figure 16

2015 Construction Period – PM Peak Hour Traffic Movement Volumes
 Logan Express – Framingham
 January 2014

Table 9
*Projected Construction Build Levels of Service and Delay**
 2015 AM (PM) Peak Hour

Intersection	Average Total Delay (seconds/vehicle)	Volume to Capacity Ratio (v/c)	Level-of-Service (LOS)
Signalized			
Speen Street at Cochituate Road (Rte. 30)	129 (201)	1.00+ (1.00+)	F (F)
Speen Street East at Superior Drive	68 (47)	1.10 (1.0)	E (D)
Speen Street at Natick Mall Road	12 (45)	0.49 (0.73)	B (D)
Unsignalized			
Temporary FLEX Driveway at Prime Parkway	12 (10)	0.1 (0.13)	B (A)

- 1 Reported results from Synchro Version 8 analysis. Levels of Service are from A-F, where A is the best and F the worst. Seconds of delay rounded to nearest second during the highest 15-minute period of the AM or PM peak hours and represents total control delay per motorist including acceleration, deceleration, and stop delays. V/C (volume to capacity) is for the worst individual traffic movement in the intersection. Synchro 8 has some known reporting problems when intersections do not have standard National Electrical Manufacturers Association (NEMA) phasing sequences.
- 2 Per HCS 2010 recommendation, Synchro 8 modeling cannot be used for the existing lane configurations at this intersection. LOS's reported from HCS+ as recommended by the University of Florida. "Until HCS 2010 is modified, the Signals module from HCS+ can be used to model this situation."
- 3 FLE – Framingham Logan Express. Worst unsignalized intersection approach is reported.

Comparing the results of Tables 8 and 9, the intersection of Speen and Cochituate Streets will operate at an LOS F with or without the relocation of FLEX operation. While the intersections of Speen Street at Natick Mall Drive does reflect a minor change in LOS from LOS A in the AM peak hour to LOS B and from LOS C in the PM park way to LOS D these two changes still result in acceptable peak hour operations and the change is only for a 12 month period. Finally, at the intersection of Prime Parkway with Speen Street and Superior Drive, there is a small degradation of LOS in the AM peak period from LOS D to LOS E. Also illustrated on Table 9 is the projected LOS at the intersection of Prime Parkway with the driveway to the relocated FLEX operation. As indicated, LOS at this intersection is projected to be a fully acceptable LOS B in the morning and a LOS B in the afternoon.

While Logan Express adds a relatively small amount of traffic to the four Speen Street intersections included in the construction period analysis, we anticipate overall acceptable levels of service with slightly increased delay.

VI. FINDINGS AND RECOMMENDATIONS

Findings

On a daily basis the proposed $\pm 1,500$ -space garage will add approximately 954 vehicle trips to the surrounding road network. On the other hand, it will eliminate approximately 900 longer distance vehicle trips per day to and from Logan Airport. During the morning peak hour, approximately 60 vehicle trips (30 in and 35 out) will be added, while during the evening peak hour, approximately 80 (40 in and 40 out) vehicle trips will be added. However, as mentioned above the ability to access the expanded garage eliminates a similar amount of longer distance peak hour trips to and from Logan Airport.

From a traffic operations perspective, the differences between the year 2020 No-Build and Build local traffic operations are relatively minor. Site FLEX bus operations should improve with the proposed reconfiguration of the terminal, and reduced pedestrian/vehicle conflicts. Overall LOS findings for analyzed cases are presented on Table 10. As indicated, in all cases traffic operations are acceptable with the garage in place and during the temporary relocation of FLEX operations to the Natick site.

Table 10 - Summary of Peak Hour Level of Service and Delay¹

	Existing 2013 AM (PM)		Projected 2020 No-Build AM (PM)		Projected 2020 Build AM (PM)	
	Average Total Delay Sec./comb./vehicle ¹	LOS Capacity Ratio	Average Total Delay Sec./comb./vehicle	LOS Capacity Ratio	Average Total Delay Sec./comb./vehicle	LOS Capacity Ratio
Signalized Intersections						
Shoppers World Way/Cochituate Road (Route 30) / Ring Road	6 (5)	0.78 (0.80) A (A)	6 (3)	0.78 (0.80) A (A)	6 (7)	0.78 (0.80) A (A)
Whittier St/Shoppers World Drive/Cochituate Road (Route 30)	17 (67) ²	0.70 (1.00+) B (E)	19 (78)	0.71 (1.00+) B (E)	20 (77) ²	0.76 (1.00+) B (E)
Burr Street/Cochituate Road (Route 30)	26 (25)	1.00+ (0.76) C (C)	30 (21) ²	1.00+ (0.76) C (C)	30 (26)	1.00+ (0.80) C (C)
Shoppers World Drive/Burr Street	11 (17)	0.38 (0.62) B (B)	11 (17)	0.38 (0.63) B (B)	13 (18)	0.42 (0.63) B (B)
Shoppers World Drive/Futile Pass	4 (9)	0.27 (0.54) A (A)	4 (8)	0.27 (0.54) A (A)	4 (7)	0.27 (0.54) A (A)
Ring Road/W Couplet/Shoppers World Drive	4 (5)	0.52 (0.77) A (A)	4 (5)	0.52 (0.77) A (A)	4 (5)	0.52 (0.77) A (A)
Worcester Road (Route 9)/Shoppers World Drive/Michael's Drive ³	11 (18) ²	0.61 (0.86) B (B)	12 (19) ²	0.69 (0.90) B (B)	12 (19)	0.69 (0.90) B (B)
Shoppers World Drive/Ring Road West Couplet	4 (5)	0.52 (0.77) A (A)	4 (5)	0.52 (0.77) A (A)	4 (5)	0.52 (0.77) A (A)
Worcester Road (Route 9)/Ring Road West Couplet	3 (3)	0.75 (0.78) A (A)	3 (3)	0.76 (0.78) A (A)	3 (3)	0.76 (0.79) A (A)
Worcester Road (Route 9)/West Drive ³ /Burr Street	14 (13)	0.67 (0.82) B (B)	15 (12)	0.67 (0.83) B (B)	15 (12)	0.67 (0.83) B (B)
Spenn Street at Cochituate Road (Rte. 30)	76 (136)	1.00+ (1.00+) E (F)	136 (210)	1.00+ (1.00+) F (F)	136 (211)	1.00+ (1.00+) F (F)
Unsignalized Intersections						
Shoppers World Drive/FLEX Drive ³	EB 10 (EB 19)	0.05 (0.16) A (C)	EB 30 (EB 19)	0.03 (0.17) B (C)	EB 10 (EB 21)	0.03 (0.19) B (C)
Burr Street/FLEX Drive ³	SB 9 (SB 10)	0.04 (0.07) A (A)	SB 9 (SB 10)	0.04 (0.08) A (A)	SB 9 (SB 10)	0.04 (0.08) A (A)
Burr St./Ext./FLEX long term parking Drive ³ way 2 entrance/exit ³	N/A	N/A	N/A	N/A	SB 9 (SB 11)	0.01 (0.02) A (B)

¹ Reported results from Synchro Version 8 analysis. Levels of Service are from A-F, where A is the best and F the worst. Seconds of delay rounded to nearest second during the highest 15-minute period of the AM or PM peak hours and represents total cone of delay per motorist including acceleration, deceleration, and stop delays. V/C (volume to capacity) is for the worst individual traffic movement in the intersection. Synchro 8 has some known reporting problems when intersections do not have standard National Electrical Manufacturers Association (NEMA) phasing sequences.

² Per MCS 20.0 recommendation. Synchro 8 modeling cannot be used for the existing lane configurations at this intersection. LOS's reported from MCS's as recommended by the University of Florida. "Until IHS 2010 is modified, the Signals module from MCS can be used to model this situation."

³ FLEX - Framingham Logan Express. Worst unsignalized intersection approach is reported.

Recommendations

Construction Period

During the interim construction phase, when the FLEX will operate temporarily out of the former Boston Scientific site in the Town of Natick, it is recommended that a second stop sign along with a sign stating that vehicles are entering from the right be added to the westbound Prime Parkway approach to the intersection of Prime Parkway with the access road servicing the FedEx facility. This recommendation is based on the unusual angle that the FedEx driveway enters the intersection. Additional research is needed to determine if the FedEx driveway is part of an approved site plan that could require local approval to modify with the proposed signage.

Post-Build

Because Build impacts were found to be relatively small, proposed off-site traffic mitigation measures are limited to the immediate FLEX facility area. Within the site limits, provide ADA/MAAB compliant sidewalks on the north side of the Burr Street Extension and the east side of the Shoppers World Drive.

ATTACHMENT 7
Previous ENF Certificate

Issued February 23, 2001



The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
 251 Causeway Street, Suite 900
 Boston, MA 02114-2119

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 GOVERNOR

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BOB DURAND
 SECRETARY

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February 23, 2001

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
 ON THE
 ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME : Logan Express Parking Structure
 PROJECT MUNICIPALITY : Framingham
 PROJECT WATERSHED : Concord/Sudbury
 EOE A NUMBER : 12412
 PROJECT PROPONENT : Massachusetts Port Authority
 DATE NOTICED IN MONITOR : January 24, 2001

Pursuant to the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and Section 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project **does not require** the preparation of an Environmental Impact Report (EIR).

As described in the Environmental Notification Form (ENF), the project involves development of a 5-level parking garage at the existing Logan Express facility in Framingham. The Garage will allow Massport to consolidate parking for Logan Express in one location, and will expand the parking supply available to the facility by 331 spaces. Massport will develop the garage entirely within the footprint of existing paved surfaces. As demand warrants, Massport will eventually expand the garage by an additional 400 spaces, again remaining within the footprint of the currently paved surfaces.

The project is undergoing review pursuant to section 11.03 (6)(b)(15) of the MEPA regulations, because the project involves construction of more than 300 new parking spaces at a single location. The project will require an Order of Conditions from the Framingham Conservation Commission for work within the buffer zone to wetlands resources (if the local Order were appealed, the

EOEA#12412

ENF Certificate

02/23/01

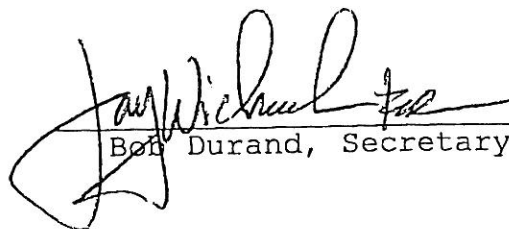
project would require a Superseding Order from the Department of Environmental Protection). Because the proponent is an Authority of the Commonwealth, MEPA jurisdiction extends to all aspects of the project that may cause significant Damage to the Environment.

The project should prove to have significant positive environmental impacts. The expansion in parking supply at Framingham will help Massport meet one of its central mitigation commitments for Logan Airport: the attainment of a 35.2 % transit/HOV mode share by the time annual passenger load reaches 37.5 million (see EOEA #3247). After years of impressive growth in the mid 1990's, ridership on Logan Express has reached a plateau in recent years, in part due to constraints in the parking supply at the Logan Express termini. This project will alleviate the parking constraint at the Framingham terminus, and will also make the Logan Express service more convenient by centralizing parking immediately adjacent to the bus terminal.

Massport will stage construction to minimize disruptions to existing parking, and will rely during construction on existing "remote" spaces leased from tenants at the adjacent shopping center. The project will not create new impervious surfaces, and the existing stormwater management system can accommodate the new development. The ENF includes a traffic study demonstrating that traffic impacts on the surrounding area will prove minor.

I conclude that no further MEPA review is required. The project is itself important mitigation for Logan Airport ground access impacts, and the review of the ENF has served adequately to disclose any (minor) impacts on the immediate surroundings of the expanded facility.

February 23, 2001
Date


Bob Durand, Secretary

Comments received:

2/13/01 Framingham Planning and Economic Development Department
2/14/01 MetroWest Growth Management Committee

BAD/ASP/asp