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I-495/Southwest Regional Commuter Rail and Operations Study

I-495/Southwest Region, Massachusetts

SUBMITTED TO

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DRAFT Executive Summary

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Prepared for **Mirick O'Connell, Attorneys At Law**
Massachusetts

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Executive Summary

Introduction

The *I-495/Southwest Regional Commuter Rail and Operations Study* is an initiative to evaluate the feasibility of expanding public transit systems along the southwest region of the I-495 corridor in order to address existing needs and future growth in the region. New or expanded public transit options can:

- Alleviate existing and future capacity issues on the Massachusetts Bay Transportation Authority's (MBTA) south side commuter rail system.
- Advance the Massachusetts Department of Transportation's (MassDOT) "GreenDOT" policy initiative to reduce greenhouse gas (GHG) emissions; promote healthy transportation options of walking, bicycling, and public transit; and support smart growth development.
- Assist with future long-term economic development plans for the area and region and support opportunities for public/private partnerships.

In September 2010, a study was conducted by the MBTA and the Commonwealth of Massachusetts Executive Office of Housing and Economic Development (EOHED) that explored the feasibility of offering full-time commuter rail service to the existing special-event rail station in Foxborough, MA. The findings of this study concluded that "the ridership data contained in this report provides a compelling argument that expanded MBTA service to the Foxborough Growth District will offer a number of benefits to the service region and the MBTA system."

In today's economy with limited financial resources available, it is difficult to initiate new expansion programs within the Commonwealth to serve new areas in the state. However by evaluating existing public transit services or infrastructure that may be underutilized in the region, particularly in areas where the MBTA currently has or can obtain trackage rights, it may be possible to test the feasibility of a service without making a significant financial commitment. The initiation of a pilot program can be a low-cost, low-risk option to determine the overall benefits of a service proposal, in a relatively short timeframe often with small incremental capital and/or operating costs.

The purpose of this study is to evaluate the opportunities to implement such a pilot program for services in the southwest region of the I-495 corridor utilizing existing rail equipment, infrastructure and available regional parking to the greatest extent possible, with the added goal of examining the requirements for implementing shorter and/or longer term programs.

The study area for this evaluation includes the area in the southwest region of I-495 roughly bounded by Route 128 on the east, I-495 on the west, the MBTA's Worcester Line on the north and the MBTA's Providence Line on the south. An existing CSX-owned rail line known as the Framingham Secondary links the area from Framingham on the north to Mansfield on the south, and travels through the towns of Sherborn, Medfield, Walpole, and Foxborough. Figure ES-1 shows the MBTA's regional transportation system within the study area.

The *I-495/Southwest Regional Commuter Rail and Operation Study* evaluated existing and future operations and infrastructure requirements for the following:

- A pilot program for Boston to Foxborough service, utilizing existing equipment and infrastructure with minimal capital expenditures.
- Potential short-term and longer-term expanded services in the I-495/Southwest region from Central Massachusetts (including, but not limited to Worcester, Shrewsbury, Westborough, Hopkinton, Southborough, Ashland and Framingham) and Providence, Rhode Island utilizing existing railroad rights-of-way.

Commuter Rail Pilot Program

The purpose of a pilot program for commuter rail service in the I-495/Southwest region is to provide cost-effective transit service to the underserved communities between the MBTA's Franklin and Providence commuter rail lines. These services would be low-cost in nature by utilizing existing infrastructure to the maximum extent possible with minimal infrastructure upgrades.

Continued population growth in the I-495/Southwest region has resulted in heavy demand on the transportation infrastructure. According to 2010 U.S. Census Bureau data, the I-495/Southwest Region had a population growth rate of approximately 12% between 1990 and 2000; more than double that of the Commonwealth of Massachusetts. Even during years of global economic hardship, between 2000 and 2010 the growth rate was an average of approximately 5% throughout the communities within the I-495/Southwest

Region. This population growth has increased demand throughout the region on commuter rail service to Boston.

Current MBTA commuter rail services on the Franklin Line and Providence Line are approaching capacity both in terms of seating available on trains and in terms of parking available at stations. The top five peak period trains range between 79% and 83% of capacity on the Franklin Line and between 91% and 98% on the Providence Line. Based on the projected ridership growth rate for both the Franklin and Providence Line, by 2030 almost all of the top five peak period trains on the Franklin Line and all of the top five peak period trains on the Providence Line will be over capacity. Furthermore, parking lots at several Franklin Line stations have become chronically overstressed with demand needing and, in several instances, exceeding capacity. According to the 2008 *Projections for Parking Demand*,[1] in the year 2000, parking utilization on the Franklin Line was approximately 96%. Demand exceeded capacity at Forge Park/I-495, Walpole, and Endicott. Additionally, models for the year 2030 have indicated that seven of the Franklin Line's eleven stations will be at or beyond capacity, with severe overcrowding of more than 120% utilization at three stations.

Regional highways leading to Boston including I-95, Route 128, and I-93, are heavily congested during peak periods. Travel times for the approximately 30 miles from Foxborough to Boston can range from 45 minutes to two hours depending on traffic conditions. Additionally, development plans in the I-495/Southwest region, specifically within the Foxborough Growth District, anticipate growth in the region as it relates to housing and commercial development. From 1980 to 2008, the region experienced the addition of 112,000 jobs, an astounding increase of 62%.[2] At the same time that the region is experiencing growth and capacity constraints, funds for infrastructure improvements are limited. By looking for opportunities to utilize existing public transit services or infrastructure that may be underutilized in the region, it may be possible to test the feasibility of a service without making a significant financial commitment.

The purpose of this study is to evaluate the existing infrastructure along the CSX-owned Framingham Secondary section of railroad right-of-way between Walpole and Mansfield to determine if an opportunity exists to expand passenger rail services to this region with a minimal capital expenditure. Additionally, this study also included the development of an operations plan for the pilot program that would provide peak period service for commuters (ideally, three peak period trains in each direction), as well as some off-peak

1 Projections of Parking Demand, Kiss and Ride, Passengers, and Ridership for MBTA Commuter Boat, Express Bus, Commuter Rail, and Rapid Transit Services; prepared by Central Transportation Planning Staff (CTPS), December 2008.

2 Pushing through the Downturn, A Summary of the I-495/MetroWest Region's Economy 2010; I-495/MetroWest Partnership.

trips, utilizing available existing MBTA equipment with minimal disruptions to existing commuter rail services on other lines. The study also identified potential order-of-magnitude costs for infrastructure improvements and operations and maintenance costs.

Existing Conditions

The Framingham Secondary is an existing rail line that runs from the MBTA-owned Worcester Line in Framingham on the north to the MBTA-owned Northeast Corridor in Mansfield on the south, a distance of 21.4 miles. The line is owned, maintained and dispatched by CSX, which operates freight service with three train movements per day between Framingham and Walpole, two train movements per day between Walpole and Foxborough, and less than one train movement per day between Foxborough and Mansfield. Passenger service is limited to the MBTA's special event service to Foxborough Station. Special event service currently consists of one train from Boston and one train from Providence, each arriving before the event starts and departing after the event is over. Trains currently operate at approximately 10 miles per hour along the Framingham Secondary section of track.

There are currently three passenger stations within the corridor, including Walpole Station, Foxborough Station and Mansfield Station. Walpole Station consists of a low-level platform and is not currently fully accessible. At one time, the platform served both the MBTA Franklin Line and the Framingham Secondary, but track realignments have resulted in the platform serving only the Franklin Line. Foxborough Station is located near Gillette Stadium and Route 1. It consists of a low-level platform for passenger loading during events and is fully accessible with a mini-high platform. Mansfield Station, located on the Northeast Corridor just south of the junction with the Framingham Secondary, is an ADA-accessible station with both low and mini-high platforms.

Operating Plans

Operating plans to test potential pilot program services were developed and modeled using Berkeley Simulation Software's Rail Traffic Controller™ (RTC) software. For this study, the MBTA's Fairmount Line was modeled, as well as the Framingham Secondary and the MBTA's Franklin Line from Forge Park to Readville. South Station and the other MBTA south side commuter rail services were not included in this model. In discussions with the MBTA, the following parameters were identified as goals in the development of the pilot program operating plans:

- Provide three trips in the peak direction near or during MBTA defined peak periods.
- Provide some off-peak service for people who miss a peak period train, work different hours, or take the train for trips other than work. This includes midday service and evening service.
- Provide weekday service only; no Saturday or Sunday service.
- Utilize existing infrastructure and equipment to the greatest extent practicable and minimize capital expenditures, such as track, signals, and additional train equipment, if possible.
- Modify the existing MBTA Franklin Line train schedule no more than five minutes, and attempt to minimize the impact to and/or enhance the MBTA Fairmount Line service.
- As the Northeast Corridor is near capacity today, avoid utilizing the Northeast Corridor for service and, therefore, utilize the Fairmount Line exclusively.
- Identify infrastructure improvements that will need to be made in order to operate commuter rail trains at 40 mph between Walpole and Foxborough.

Comparison of Options

A number of initial service options were developed and reviewed with the MBTA Railroad Operations Directorate. Based on these discussions, two potential service options were identified and further developed. Each option's service plan meets the requirements established early on in the study. Both options utilize existing MBTA equipment with modifications to existing schedules and shifting of trainsets, in order to achieve a reasonable service to Foxborough that meet the goals of the pilot program. The two potential operating plan scenarios are:

- Option 1: Utilizes Existing Equipment Only - Option 1 provides nine round trips each weekday, including three peak period trains in the peak direction. It does not require any new consists, and has one train layover in Foxborough.
- Option 2: Requires One New Trainset - Option 2 provides ten round trips each weekday, including four peak period trains in the peak direction. It requires one new trainset (also referred to as a consist), and has two trains layover in Foxborough.

The following table compares the proposed schedules for the two service options showing the times that peak direction trains would depart and arrive at Foxborough and South Stations during the morning and evening peak periods. The table also includes the total number of daily round trips for service, which includes both peak and off-peak period trains.

Table ES-1 Comparison of Pilot Program Service Options

	AM Peak Inbound		PM Peak Outbound		Total
Option	Depart Foxborough	Arrive South Station	Depart South Station	Arrive Foxborough	Round Trips
1	5:32 AM	6:30 AM	5:25 PM	6:23 PM	9
	6:37 AM	7:35 AM	6:30 PM	7:28 PM	
	8:27 AM	9:10 AM	7:45 PM	8:43 PM	
2	5:27 AM	6:28 AM	5:00 PM	5:43 PM	10
	6:07 AM	7:05 AM	5:55 PM	6:53 PM	
	6:37 AM	7:35 AM	6:30 PM	7:28 PM	
	8:27 AM	9:10 AM	7:45 PM	8:43 PM	

As shown in Table ES-1, both pilot program service options provide reasonable commuter rail service to/from Foxborough during the peak periods. However, in order to achieve this schedule, modifications to existing MBTA Franklin and Fairmount Line trains were required. In both options Franklin Line train schedules were shifted by no more than five minutes.

Service on the Fairmount Line has been reduced since 2008 due to on-going construction projects, including bridge reconstruction and new stations. A goal of the pilot program was to develop an operating plan that would provide service levels similar to the Fairmount Line schedule that was in place in 2008, prior to the service reductions. In the future, once the new stations on the Fairmount Line are open and in operation, the schedule again will be modified. However, the basis of this analysis was to determine that the pilot program would not adversely impact the ability to restore the Fairmount Line to service levels that were in place prior to construction.

For Option 1, proposed modifications of peak period trains consisted of seven trains, with schedule modifications adjusted by less than 30 minutes. Of these seven trains, two of them were shifted by no more than five minutes. For the remaining five trains, the approximate magnitude of their schedule adjustments is described below:

- 15 minutes: one outbound train departing South Station at 6:40 AM will now depart at 6:25 AM (3 passengers per day), and one outbound train departing South Station at 7:30 PM will now depart at 7:45 PM (59 passengers per day).

- 20 minutes: one outbound train departing South Station at 5:50 AM will now depart at 5:30 AM (19 passengers per day), and one outbound train departing South Station at 5:45 PM will now depart at 5:25 PM (72 passengers per day).
- 30 minutes: one inbound train from Readville currently arrives at South Station at 7:02 AM and will now arrive at 6:30 AM (55 passengers per day).

Additionally, one inbound PM peak train (7 passengers per day) was combined with a subsequent train that is scheduled only four minutes later.

While the Option 1 pilot program service is feasible, the severity of impacts and service changes to the Fairmount Line could result in some opposition with the riding public.

The Option 2 service plan was developed in order to achieve a schedule that provides reasonable pilot program service to Foxborough and lessens the impact on the MBTA Fairmount Line trains. This option introduces an additional trainset (one locomotive and six low-level coaches) that not only minimizes the impacts to the Fairmount Line but also provides sufficient capacity to get back to a level of service on the line similar to what was operating in 2008. Restoration of service to this level is contingent upon completion of the Fairmount Line construction work. Table ES-2 shows the proposed operating plan for peak period Fairmount Line trains under both service plan options. The table also includes the total number of daily round trips for service, which includes both peak and off-peak period trains.

Table ES-2 Revised Fairmount Line Schedule

	AM Peak Inbound		PM Peak Outbound		Total
Option	Depart Readville	Arrive South Station	Depart South Station	Arrive Readville	Round Trips
1	5:58 AM	6:30 AM	4:30 PM	5:03 PM	17
	7:03 AM	7:35 AM	5:10 PM	5:43 PM	
	8:01 AM	8:33 AM	5:25 PM	5:58 PM	
	8:33 AM	9:05 AM	6:30 PM	7:03 PM	
2	5:56 AM	6:28 AM			21
	6:33 AM	7:05 AM	4:30 PM	5:03 PM	
	7:03 AM	7:35 AM	5:10 PM	5:43 PM	
	7:45 AM	8:17 AM	5:55 PM	6:28 PM	
	8:01 AM	8:33 AM	6:30 PM	7:03 PM	
	8:33 AM	9:05 AM			

Infrastructure Needs

Capital infrastructure investments on the Framingham Secondary between Walpole and Foxborough in order to support passenger rail service include upgrades to the tracks, drainage, signals, and grade crossings and stations, as well as construction of a new mainline track in Foxborough, as shown on Figures ES-2, ES-3, and ES-4.

Improving the track infrastructure would have positive impacts for both freight and passenger service to and from the I-495/Southwest region. For passenger service, improving the track infrastructure would make riding trains more attractive to customers by increasing the speed of the event day service, which would decrease the travel time to any given destination. Track infrastructure improvements not only provide a higher level of safety for the passengers, they also make the ride more reliable, smooth and comfortable. All of these factors would support future commuter rail service. Additionally, these improvements would also support improvements to existing event service to Foxborough Station.

In addition to the above-cited infrastructure improvements, Option 2 would require one additional train consist to provide this service. Alternatives for providing this additional trainset include the procurement of a new locomotive and coaches and/or rehabilitation and reuse of existing MBTA surplus equipment that may be available.

Costs

Because the pilot program makes efficient use of existing infrastructure, the service could be implemented for a relatively modest capital cost. Based on spot inspections at grade crossings and limited field reviews from public areas, a general assessment of the existing infrastructure along the Framingham Secondary was performed. Because the infrastructure needs were based on limited field data, there is uncertainty in the level of investment needed in areas that could not be inspected. Therefore, as is appropriate at this level of sketch planning, a range of contingencies from 30% to 50% have been applied to the order-of-magnitude capital cost estimates in order to establish the potential range of costs for the project. The order-of-magnitude capital cost estimate for the infrastructure improvements needed to implement the pilot program is detailed in Table ES-3. Costs for improvements at Foxborough Station, including the new track and layover plug-ins, are included under the "Track, Drainage, & Grade Crossings" category. Additionally, the cost carried for the new train equipment shown in the table assumes the acquisition of a fully new trainset, including a

locomotive and coaches. This cost would not be applicable if existing MBTA equipment were found to be available.

Table ES-3 Commuter Rail Pilot Program Order-of-Magnitude Capital Cost Estimate

Item	Costs	
	With 30% Contingency	**With 50% Contingency**
Track, Drainage, & Grade Crossings	**$4,684,000**	**$4,684,000**
Contingency (30%-50%)	$1,405,200	$2,342,000
Total (Track, Drainage, Grade Crossings)	*$6,089,200*	*$7,026,000*
Signals	**$1,375,000**	**$1,375,000**
Contingency (30%-50%)	$412,500	$687,500
Total (Signals)	*$1,787,500*	*$2,062,500*
Walpole Interlocking	**$ 375,000**	**$ 375,000**
Contingency (30%-50%)	$ 112,500	$ 187,500
Total (Walpole Interlocking)	*$ 487,500*	*$ 562,500*
Subtotal Capital Costs - Option 1	**$8,364,200**	**$9,651,000**
Soft Costs (10% of capital costs, included for administrative, design, and professional services)	$836,420	$965,100
Total - Option 1 Costs	**$9,200,620**	**$10,616,100**
New Train Consist (Option 2 Only)*	**$20,000,000**	**$20,000,000**
Total Capital Costs - Option 2	**$29,200,620**	**$30,616,100**

**Equipment Cost provided by MBTA Commuter Rail Operations*

In discussions with the MBTA, it has been indicated that some improvements listed above that are proposed for the Framingham Secondary and in the Walpole area are either currently underway or anticipated to be completed in the near future. These improvements include track and drainage work along the Framingham Secondary, and upgrades to the Walpole Interlocking. As such, the following table, Table ES-4, summarizes only those remaining infrastructure improvements that would be required in order to support the pilot program, including signal work, grade crossing warning systems and work associated with Foxborough Station.,

Table ES-4 Order-of-Magnitude Capital Cost Estimate for Outstanding Infrastructure Improvements to Support Commuter Rail Pilot Program

Item	Costs	
	With 30% Contingency	**With 50% Contingency**
Track & Grade Crossings – Warning Systems	**$2,764,000**	**$2,764,000**
Contingency (30%-50%)	$829,200	$1,382,000
Total (Track & Grade Crossings – Warning Systems)	*$3,593,200*	*$4,146,000*
Signals	**$1,375,000**	**$1,375,000**
Contingency (30%-50%)	$412,500	$687,500
Total (Signals)	*$1,787,500*	*$2,062,500*
Walpole Interlocking	**$0**	**$0**
Subtotal Capital Costs - Option 1	**$5,380,700**	**$6,208,500**
Soft Costs (10% of capital costs, included for administrative, design, and professional services)	$538,070	$620,850
Total - Option 1 Costs	**$5,918,770**	**$6,829,350**
New Train Consist (Option 2 Only)*	**$20,000,000**	**$20,000,000**
Total Capital Costs - Option 2	**$25,918,770**	**$26,829,350**

**Equipment Cost provided by MBTA Commuter Rail Operations*

Utilizing the 2010 National Transit Database (NTD), operations and maintenance (O&M) costs for vehicle operations and vehicle maintenance (inflated to 2011 dollars) were calculated for the incremental cost of the pilot program. Because the length of the extension of newly upgraded track between Walpole and Foxborough is relatively small, compared to the total length of the commuter rail system, maintenance-of- way costs have not been carried as part of the O&M costs. O&M costs are estimated to be approximately $1.7 million dollars per year for Option 1, and approximately $3.7 million dollars per year for Option 2.

Ridership and Revenue Assessment

In an effort to review the impact that the pilot program may potentially have on ridership and revenue, the ridership methodology conducted by the Central Transportation Planning Staff (CTPS) in the *Foxborough Commuter Rail Feasibility Study,* dated September 1, 2010, was reviewed. Based upon this review, a general assessment of the ridership calculations previously developed was performed and a qualitative assessment of the potential ridership and revenue under the pilot program was conducted.

Because the CTPS regional model was not available for the purposes of this study, the analysis was limited to utilizing available information from the previous study and focused on the pilot program impact on limited area stations only. Potential service changes and revenue impacts on the regional stations were not estimated for this assessment. This qualitative assessment did not present a detailed analysis of changes in mode choice or station assignments or the effectiveness of changes to fare assumptions, service assumptions and parking costs on ridership at Foxborough Station. However, the potential ridership opportunities, fare assignments and revenue generated under the pilot program were generally evaluated. In order to fully understand the full effect of the service on the MBTA systemwide, it is recommended that the regional model be rerun in the future.

Background

The 2010 *Foxborough Commuter Rail Feasibility Study* presented a service alternative ("Option C") similar in type to the service plan developed for the pilot program. As such, the ridership information developed for the Option C alternative was utilized as the basis for this analysis. This alternative estimated 990 boardings at Foxborough Station and assumed sixteen roundtrips with eight of them being during the peak period. The average

travel time between Foxborough Station and South Station was about 58 minutes. Other assumptions in the previous report included the following:

- Foxborough Station is located in the MBTA's Zone 5 for fares.
- Parking at Foxborough Station would initially be provided free of charge.
- The service would be provided on both weekday and weekends.
- The increase in revenue for Option C alternative would be approximately $2.3 million systemwide.

The pilot program operating plans for Options 1 and 2 assumes 9 and 10 daily roundtrips, respectively. For Option 1, three of these roundtrips would take place during each the AM and PM peak periods. For Option 2, four roundtrips would take place the AM and PM peak periods. Average travel times from Foxborough Station to South Station are estimated to be between 52 minutes and 54 minutes.

Evaluation of Potential Ridership

When comparing the previous Option C alternative to the pilot program, it is important to compare the proposed service levels and travel times as part of the ridership analysis. While the Option C alternative has a similar level of service to Option 2 during the peak periods, there is an off-peak service reduction of six roundtrips daily, which could result in some loss in overall ridership. However, the reduction in service during the off-peak could be offset by the decrease in travel time between Foxborough Station and South Station, which typically results in an increase in ridership.

To evaluate the pilot program's impact on ridership at Foxborough Station, the service frequency elasticities were first reviewed in order to understand the impact that service level changes could have on ridership. Based on information from the 2008 MBTA Blue Book, it is estimated that 81% of passengers that travel on both the MBTA Providence and Franklin Lines travel during the peak period. Based on this information, ridership was reduced accordingly. Travel time elasticities were also reviewed to adjust the ridership based on increases in demand resulting from faster travel times. The resulting adjusted ridership from the previous report, ranged from a low of 926 to a high of 1,017. The ridership of the previous study, 990 daily boardings, was found to be safely within this range. Therefore, it is assumed that the previous ridership demand estimated would be similar under the pilot program.

For the purposes of this analysis, it was assumed that there at 990 inbound daily boardings at Foxborough Station, some of which are new riders and

some of which were shifted from area stations. This scenario assumed that while some are new riders on the system, some Foxborough Station passengers are shifting from Norfolk, Walpole, Attleboro or Mansfield. Utilizing the information from the 2010 report, the total number of diversions from stations and total new riders were calculated. The following table shows the diversions by station under the pilot program as compared to the 2010 Study information. As shown, the pilot program would result in approximately 660 new daily boardings on the service.

TABLE ES-5
Ridership Forecasts from 2010 Study Table 5.3.4

Station	Fare Zone	CTPS No-Build	Option C	Pilot Program
Norfolk	Zone 5	720	600	-120
Foxborough	-		990	990
Walpole	Zone 4	1,050	980	-70
Attleboro	Zone 7	1,490	1,460	-30
Mansfield	Zone 6	1,450	1,340	-110
Total		**4710**	**5370**	**660**

Evaluation of Potential Revenue

Utilizing information from the 2010 study, an evaluation of the potential revenue that could be generated by the pilot program was calculated. While the previous report assumed that Foxborough Station would be located in fare Zone 5, in consultation with the MBTA it was determined that it would be prudent to establish Foxborough Station as a Zone 6 fare during the pilot program. In part, this is due to a desire to not adversely impact the ridership from other area stations such as Norfolk, Walpole, Attleboro and Mansfield by establishing a lower fare, coupled with free parking initially.

Calculation of the potential revenue generated by the increase in ridership for the pilot program was calculated assuming a Zone 6 fare at Foxborough Station. It was also assumed, for the purposes of the calculation, that 90 percent of all boardings use a commuter rail pass and the remaining 10 percent pay the single ride fare, and that passengers traveling inbound also return on an outbound trip. The pilot program is proposed as a weekday-only service initially and this factor was used to calculate the daily pass cost from the monthly pass cost. The following table shows the fare assumptions by zone.

TABLE ES-6
Fare Assumptions

Fare Zone	Single Ride	Monthly Pass	Daily Pass Cost
Zone 4	$5.75	$186	$4.29
Zone 5	$6.25	$210	$4.85
Zone 6	$6.75	$223	$5.15
Zone 7	$7.25	$235	$5.42

Utilizing the ridership forecasts shown in Table ES-5, based on the CTPS analysis, it was possible to calculate the potential revenue generated by the pilot program as compared to the no-build condition. Estimating the revenue at each station based on the fare assumptions described above and comparing them in both the no-build and build conditions, it was possible to determine the estimated increase in total annual revenue from the pilot program.

For this alternative, the revenue was calculated using the new trips at Foxborough Stations and the build condition ridership at other area stations, accommodating for shifts in boardings. As shown in the following table, the pilot program is estimated to result in an annual revenue increase of approximately $1.8M.

TABLE ES-7
Total Annual Revenue for Pilot Program (based on 660 Total New Riders)

No-Build Revenue*	Revenue with Pilot Program	Annual Revenue Increase
$19,721,420	$21,589,536	$1,868,116

**No-Build Revenue was calculated based on the station-level data provided in Table ES-5.*

As indicated previously, the estimated costs of operations and maintenance of the pilot program is approximately $1.7M for Option 1 and $3.6M for Option 2. When comparing the cost to operating and maintenance the pilot program against the potential revenue generated by it, it is possible to determine the fare recovery ratio for the service. According to the FY2009 National Transit Database, the MBTA's current Commuter Rail Fare Recovery Ratio is 49.6%. The following table compares the range of revenue increases for each option as compared to the estimated annual O&M costs and calculates the potential percentage of fare box recovery that could be anticipated for the service.

TABLE ES-8
Fare Recovery Ratio

Station	Revenue Increase	Annual O&M Cost	Fare Ratio Recovery
Pilot Program – Option 1	$1,868,116	$1.7M	109%
Pilot Program – Option 2	$1,868,116	$3.6M	52%

Evaluation of Potential Parking

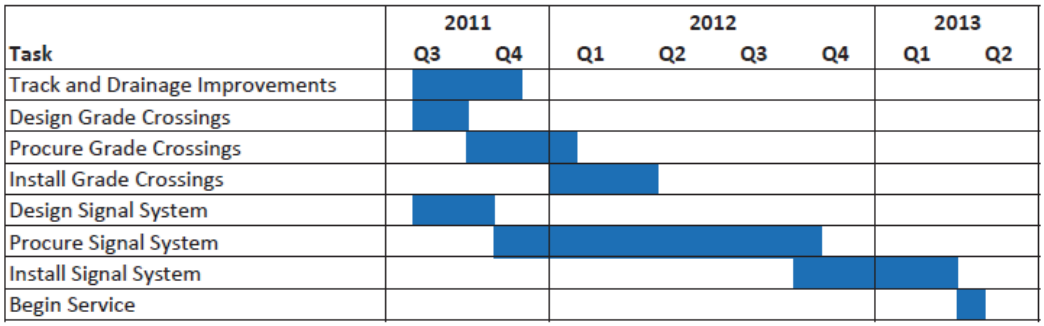
The fare revenue generated above assumed that parking at Foxborough Station would initially be free and that parking capacity would be unconstrained. During the previous study, CTPS's forecasting tested an increase in parking costs and its impact on ridership at Foxborough Station. This analysis estimated a 20% reduction in ridership if a $2 parking fee were applied and a 45% reduction if a $4 parking fee were applied. When applied, it is anticipated that total boardings at Foxborough would decrease from 990 to 792 with a $2 parking fee and from 990 to 545 with $4 parking fee.

Upon initial review, it is anticipated that the increased revenue that could result from the parking fees would potentially be offset by the loss of ridership at Foxborough Station or diversions back to other area stations due to parking fee increases, resulting in no significant increase in revenue.

Implementation

A general implementation schedule for the pilot program is provided in the following figure. Different elements of the improvements would have different design and procurement lead times. For example, ties, spikes, and other track material can be procured relatively quickly, allowing track work to progress at a faster pace. In contrast, the signal system would require more design, and signal equipment takes more time to procure.

Assuming that construction of the service improvements would begin in September 2011, it is anticipated that the project could be completed and opened for service by May 2013. As shown in the general schedule presented below, the longest lead item for the pilot program improvements would be the procurement and installation of the signal system. As the passenger rail service currently operates under "dark territory" or unsignalized controls, if the decision were made to continue to operate under dark territory, service could be in place by May 2012 if all other improvements were made and the equipment was available.



Next Steps

The following elements of planning and design are recommended in order to move this project into the next phase of development. Work elements recommended include:

- Refine the operating plan and verify that the proposed plan works with operations at South Station and equipment maintenance schedules.
- Initiate coordination with CSX in order to develop an access agreement for the service.
- Conduct detailed field investigations, including a hi-rail trip, track inspection, culvert inspection, and bridge inspection, in order to verify conceptual design assumptions.
- Initiate preliminary and final design of track, drainage, grade crossing, and signal improvements.
- Initiate procurement of long lead signal equipment and other track materials.
- Reassess the ridership estimations based on the new operating and service plan, and subsequently identify the potential projected revenue, operational benefits, and benefits to parking on the MBTA's system in the region.

Expanded I-495/Southwest Regional Service Options

With the goal of expanding rail options within the I-495/Southwest region by utilizing existing infrastructure to the greatest extent possible, several other short-term and longer-term options for expanding service on the Framingham Secondary were preliminarily evaluated. Increasing utilization of the existing Framingham Secondary between Framingham and Mansfield presents an opportunity to increase rail service and rail access within the region with limited capital investment.

Several initial service options were developed for better utilizing the Framingham Secondary for expanded passenger rail service to the Central Massachusetts areas such as Worcester, Shrewsbury, Westborough, Hopkinton, Southborough, Ashland and Framingham, as well as to Providence, Rhode Island. These alternatives included an evaluation of short and longer-term potential service options that could be implemented to serve the I-495/Southwest region by utilizing the Framingham Secondary. Additionally, infrastructure needs and an estimation of order-of-magnitude capital costs, where appropriate, for these service options have been identified. The alternatives identified as part of this study are:

- Alternative 1: Central Massachusetts Expanded Passenger Rail Service -
  - *Alternative 1A: Implement Central Massachusetts Event Service* – This alternative involves investing in the Framingham Secondary between Walpole and Framingham to increase speeds to 40 mph and implement event service from Central Massachusetts and along the Worcester Line, which would make the trip from Foxborough to Worcester in approximately 1 hour and 15 minutes.
  - *Alternative 1B: Central Massachusetts Full-Time Commuter Rail Service* – This alternative proposes to upgrade the entire Framingham Secondary to increase speed to 60 mph in order to implement full-time commuter rail service.
- Alternative 2: Improvements to Providence Event Service -
  This alternative involves investment in the Framingham Secondary between Foxborough and Mansfield on the south in order to increase speed to 40 mph and reduce travel times for Providence event service by up to 20 minutes.

Alternative 1: Central Massachusetts Expanded Passenger Rail Service Options

The MBTA currently offers passenger rail service from Central Massachusetts to Boston via the MBTA's Worcester Line. Communities within the I-495/Metrowest area that are served by this line include, but are not limited to Worcester, Shrewsbury, Westborough, Hopkinton, Southborough, Ashland and Framingham.

Worcester, the second largest city in the Commonwealth of Massachusetts and one of the largest in New England with over 180,000 residents, experiences significant and growing regional highway congestion. Other Central Massachusetts communities are also experiencing the same increase in highway congestion, with limited transportation options. Area residents increasingly require enhanced transit mobility options to support employment opportunities, educational advancement, and recreational/ services access.

A strong population base along the MBTA's Worcester Line communities, coupled with the I-495/Southwest region's historic job growth and future development plans, could result in the potential for noteworthy rail ridership demand from the Central Massachusetts area to points along the Framingham Secondary.

This section describes the potential short and longer-term conceptual rail service options possible from the Central Massachusetts area along the MBTA's Worcester Line to the I-495/Southwest region. The first option would be to implement special event service to Foxborough from Central Massachusetts via the Framingham Secondary. This option could be a viable alternative for event service and could be implemented more quickly than full-time commuter rail service to the area. A longer-term option could be to implement regular commuter rail service from the Central Massachusetts to points along the Framingham Secondary.

The following sections preliminarily explore the concept of (1) providing event service from the Central Massachusetts/Worcester area and along the MBTA's Worcester Line to Foxborough Station, and (2) providing regular commuter rail service from the Central Massachusetts/Worcester area along the Framingham Secondary. Figures ES-5 and ES-6 show the improvements required for these services.

Alternative 1A: Implement Central Massachusetts Event Service

Currently there is no event service from the Central Massachusetts region to Foxborough Station, despite the fact that Worcester is a larger city than Providence and ticket sales to events indicate that there are thousands of individuals in the Central Massachusetts region attending events on a regular basis.

By investing in the Framingham Secondary between Walpole and Framingham to increase speed to 40 mph, an event service train could be run from Worcester to Framingham along the MBTA's Worcester Line, and then down the Framingham Secondary to Foxborough Station. The trip time from Framingham to Foxborough would be 28 minutes, and the overall travel time from Worcester to Foxborough would be approximately 1 hour and 15 minutes. The uncongested drive time for the approximately 43 miles from Worcester to Foxborough is 55 minutes; however, roadway congestion that occurs regularly and especially during events can increase travel times by up to two hours, based on anecdotal evidence. Long travel times and increasing fuel prices combined with approximately $40 for parking at events suggest that there is the potential that a Worcester event train similar to the Boston and Providence event trains would be a viable and welcome option.

To increase the speed on this section of the Framingham Secondary to 40 mph, infrastructure improvements must be made to the track, drainage, and grade crossings. No signals costs have been included in the capital cost, because the low volume of trains may not justify the investment, as evidenced by the existing Boston and Providence event services along the Framingham Secondary. Because the infrastructure needs were based on limited field data and spot inspections, a range of contingencies from 30% to 50% have been applied to the capital costs and a range of potential total costs for the infrastructure improvements were calculated. The estimated order-of-magnitude capital costs for infrastructure improvements for the Central Massachusetts/Worcester event service is detailed in Table ES-9.

Table ES-9 Central Massachusetts Event Service Improvements Capital Costs

Item	Costs	
	With 30% Contingency	**With 50% Contingency**
Track, Drainage, & Grade Crossings	**$10,530,000**	**$10,530,000**
Contingency (30%-50%)	*$3,159,000*	*$5,265,000*
Subtotal Capital Costs	**$13,689,000**	**$15,795,000**
Soft Costs (10% of capital costs, included for administrative, design, and professional services)	$1,368,900	$1,579,500
Total (Track, Drainage, Crossings)	**$15,057,900**	**$17,374,500**

Alternative 1B: Central Massachusetts Full-Time Commuter Rail Service

Longer-term improvements to the entire Framingham to Mansfield corridor of the Framingham Secondary could include an option to introduce a regional commuter rail service along this line. These improvements represent a significant investment, appropriate for the introduction of frequent passenger service along the entire line, which would be a much longer-term vision than the other options explored in this study. If upgrades to the line were made in order to achieve a passenger rail maximum authorized speed (MAS) of 60 mph on the line, travel times along the Framingham Secondary would be as follows:

- 22 minutes between Framingham and Foxborough
- 7 minutes between Foxborough and Mansfield

Potential stops between Framingham and Foxborough have not been identified at this time. However, each additional station stop can be assumed to add 2 to 3 minutes to the train travel time and need to be spaced in an appropriate manner. Logical locations for additional stops along the line may include in the vicinity of Route 109 in Medfield and in the vicinity of Route 27 in Sherborn.

In order to support full-time passenger rail service, infrastructure improvements along the Framingham Secondary would be required, including completely replacing and upgrading the track, repairing drainage, rebuilding existing at-grade highway-railroad grade crossings, and constructing a complete signal system.

However, without a well-defined operating plan established, several additional items to support the service could not be determined at this time. Elements needing further analysis include station locations, train consists/ equipment, layover yards and maintenance facilities, maintenance-of-way yards, commuter and employee parking facilities, and Operations Control Center (OCC) improvements. As such, capital costs have not been developed for this alternative. It is recommended that in the next stage of project development, a comprehensive operating plan be developed and all necessary infrastructure needs and capital and operating costs be developed in detail, in order to better understand the total costs associated with the full-time commuter rail service from Central Massachusetts to Foxborough Station.

Alternative 2: Improvements to Providence Event Service

The Providence event service to Foxborough Station is a service that exists today and regularly sells out train seats well in advance for major events, indicating a strong demand. The MBTA currently provides one train for event service from Providence to Foxborough. This train is subject to the 10 mph speed along the Framingham Secondary, resulting in travel times from Mansfield to Foxborough at about 28 minutes and a total travel time from Providence of about 1 hour.

By investing in infrastructure improvements along the Framingham Secondary between Foxborough and Mansfield, speeds could be increased to 40 mph along the line and the travel time could be reduced to about 9 minutes, with some additional time for operation of the new switches to enter the Foxborough Station. The total travel time for Providence event trains would be approximately 40-45 minutes, which is reduction in travel time of approximately 20 minutes from today.

To increase the speed on this section of the Framingham Secondary to 40 mph, infrastructure improvements must be made to the track, drainage, and highway-railroad at-grade crossings. Additionally, a new platform track would be constructed at Foxborough Station, allowing the existing side platform to serve as a center platform. This would allow Boston event train and the Providence event train to serve the platform from different tracks. Today, the trains must stop nose-to-nose on the same track. Some modifications would be needed to the existing platform to allow it to serve the new track. Figure ES-6 shows the improvements necessary for the Mansfield to Foxborough segment of the Framingham Secondary and Figure ES-7 shows the improvements needed at Foxborough Station for the Providence Event service.

If the pilot program improvements are complete between Walpole and Foxborough, including signals upgrades, then it is recommended that the Providence event service improvements also include signalizing the track between Foxborough and Mansfield.

Because the infrastructure needs were based on limited field data and spot inspections, a range of contingencies from 30% to 50% have been applied to the capital costs and a range of potential total costs for the infrastructure improvements were calculated. The estimated order-of-magnitude costs for infrastructure improvements for the improvements to Providence event service is detailed in Table ES-10.

Table ES-10 Providence Event Service Improvements Capital Cost

Item	Costs	
	With 30% Contingency	**With 50% Contingency**
Track, Drainage, & Grade Crossings	**$6,065,500**	**$6,065,500**
Contingency (30%-50%)	*$1,819,650*	*$3,032,750*
Total (Track, Drainage, Crossings)	**$7,885,150**	**$9,098,250**
Signals	**$4,125,000**	**$4,125,000**
Contingency (30%-50%)	*$1,237,500*	*$2,062,500*
Total (Signals)	**$5,362,500**	**$6,187,500**
Subtotal Capital Costs	**$13,247,650**	**$15,285,750**
Soft Costs (10% of capital costs, included for administrative, design, and professional services)	$1,324,765	$1,528,575
Total Capital Costs	**$14,572,415**	**$16,814,325**

Figures

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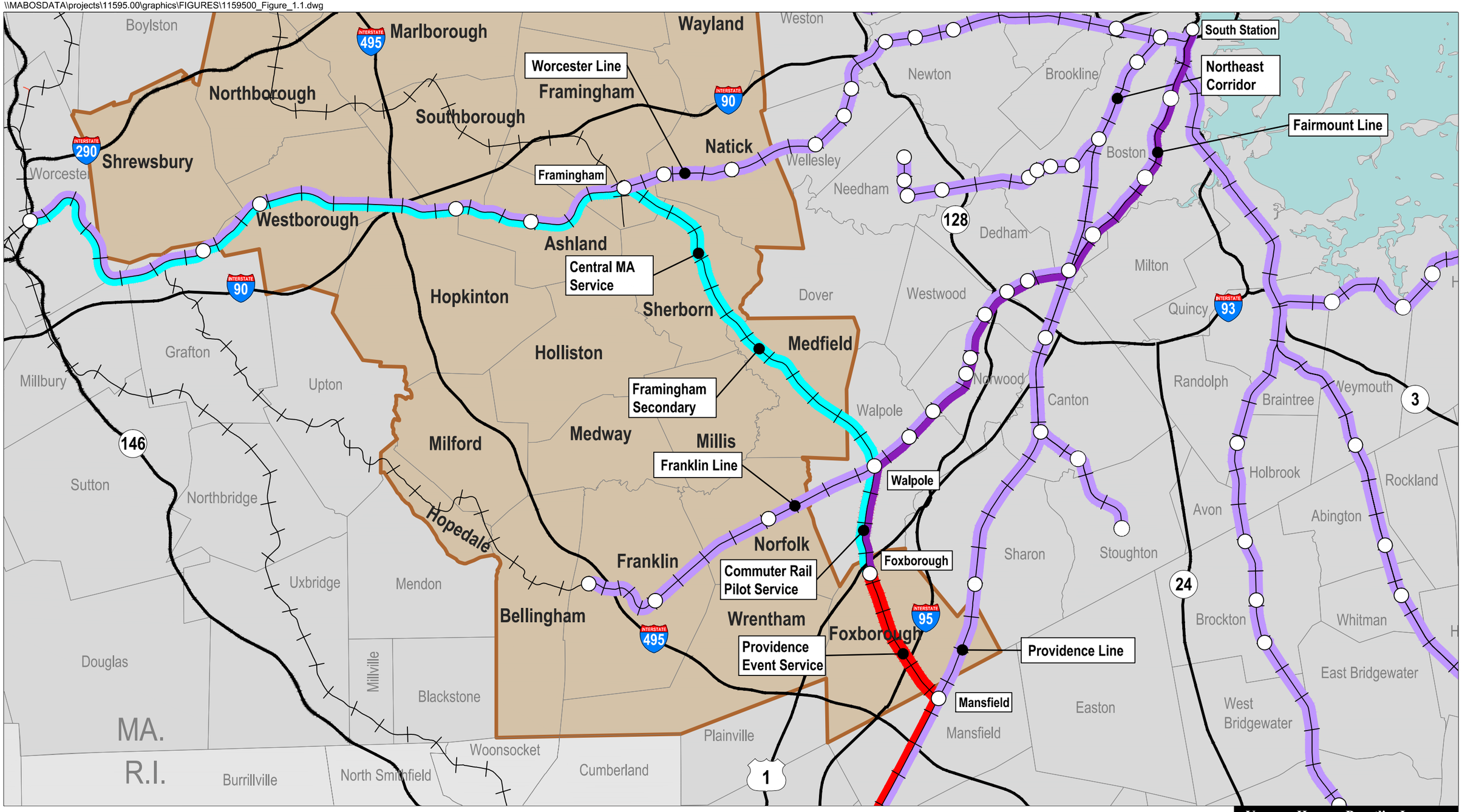

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Figure ES-1

I-495/Southwest Region and Service Options

VHB Transit & Rail

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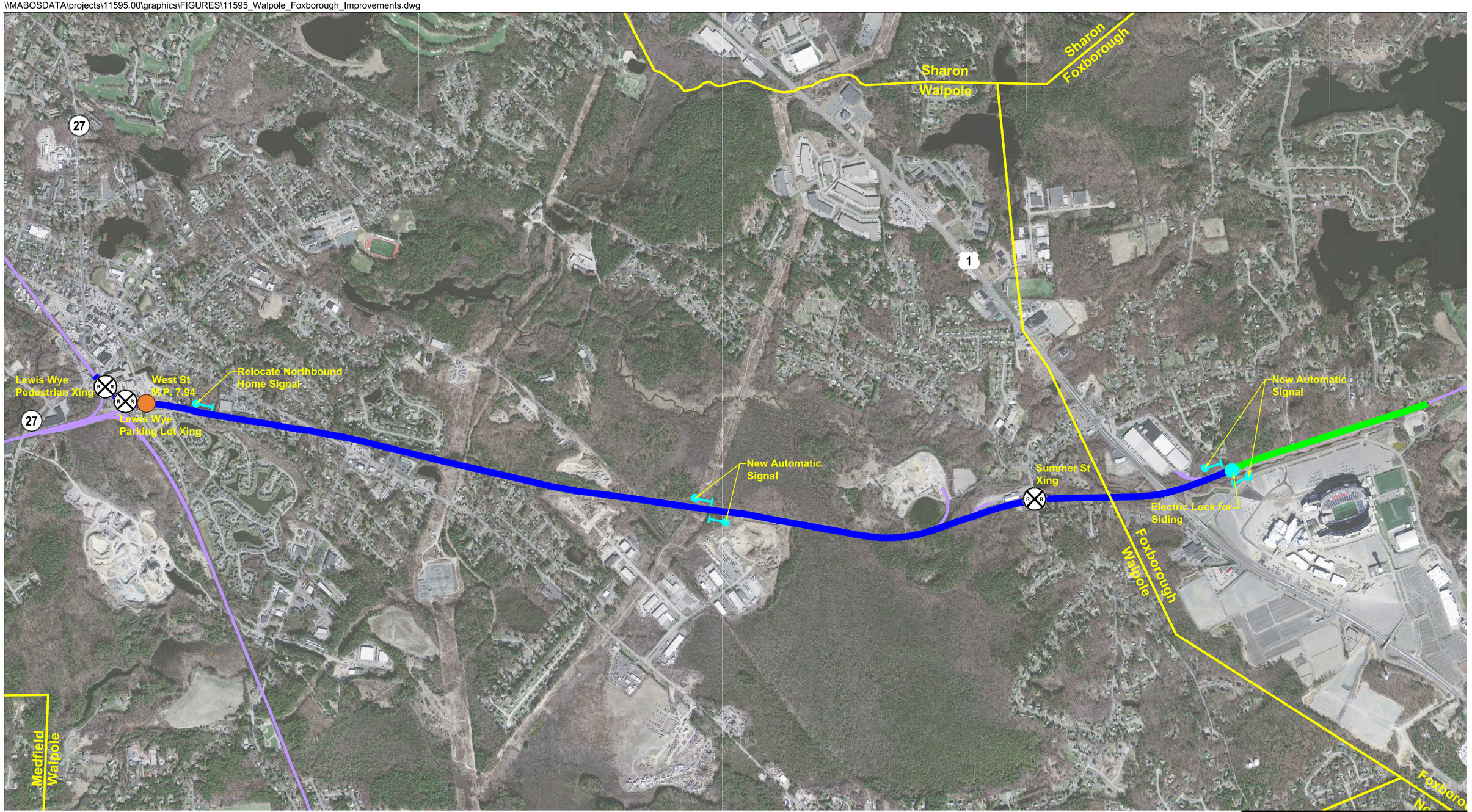

Legend

- Replace rail, ties and, joints as needed. Clean existing ditches and culverts, and replace as needed
- Construct New Mainline Track and Convert Existing Track to Layover
- Existing Bridges - Condition to be Inspected
- Existing Grade Crossing - To be Reconstructed

0 750 1500 Feet

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Figure ES-2

Pilot Program
Walpole to Foxborough Improvements

VHB Transit & Rail

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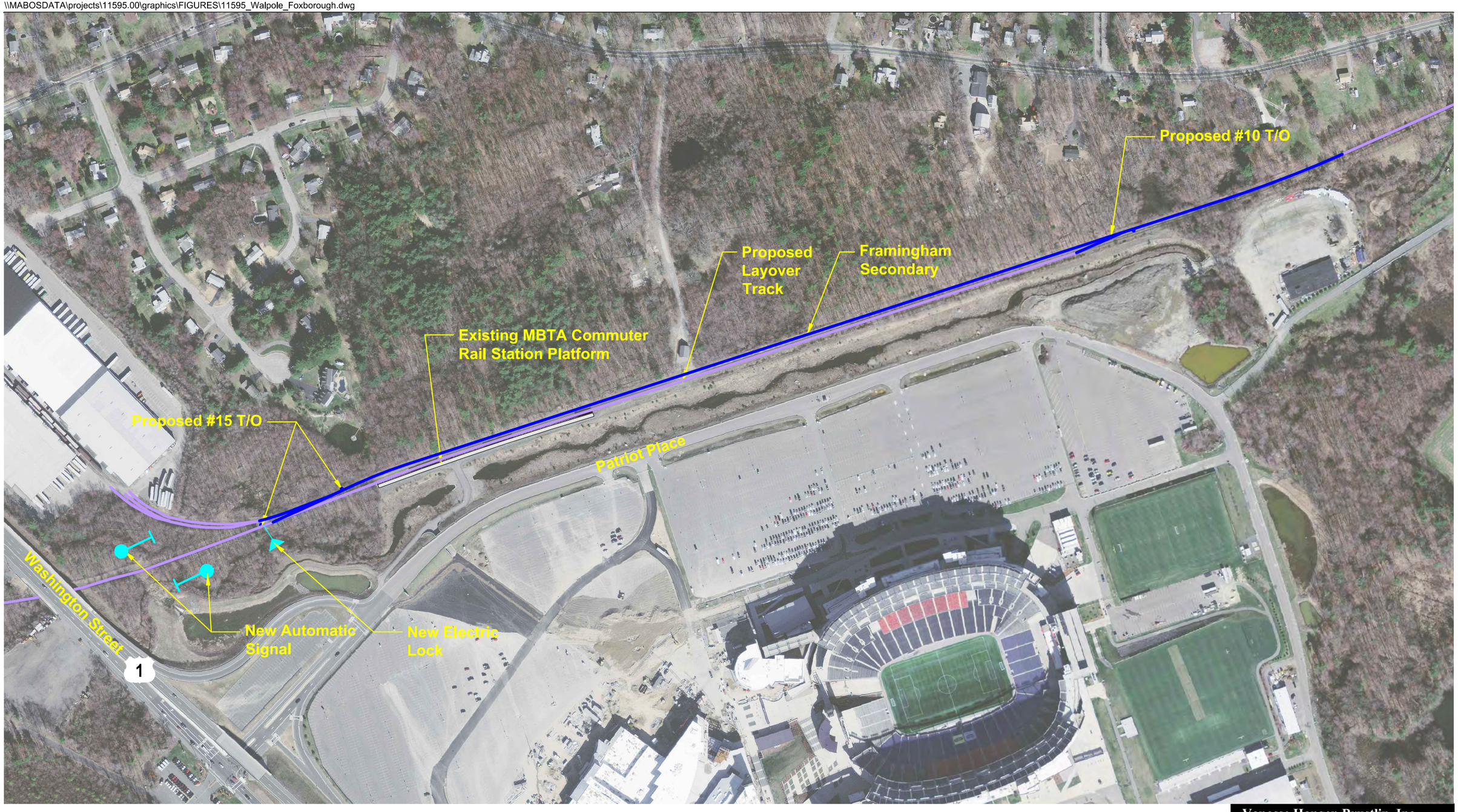

0 150 300 Feet

Vanasse Hangen Brustlin, Inc.

Figure ES-3

Pilot Program
Foxborough Station Improvements
Existing Platform with New Track

VHB Transit & Rail

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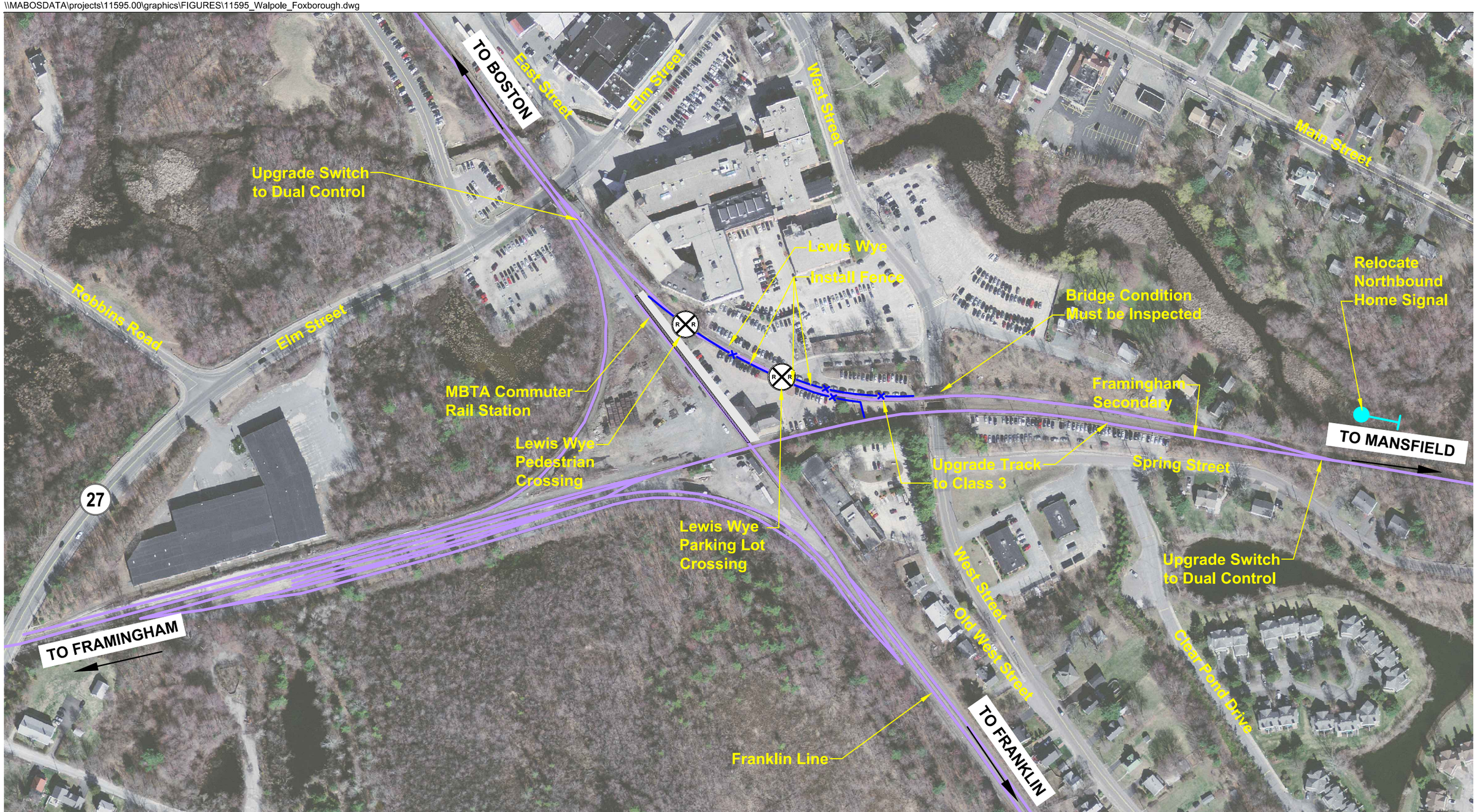

Legend

⊗ Rail Road Crossing

0 100 200 Feet

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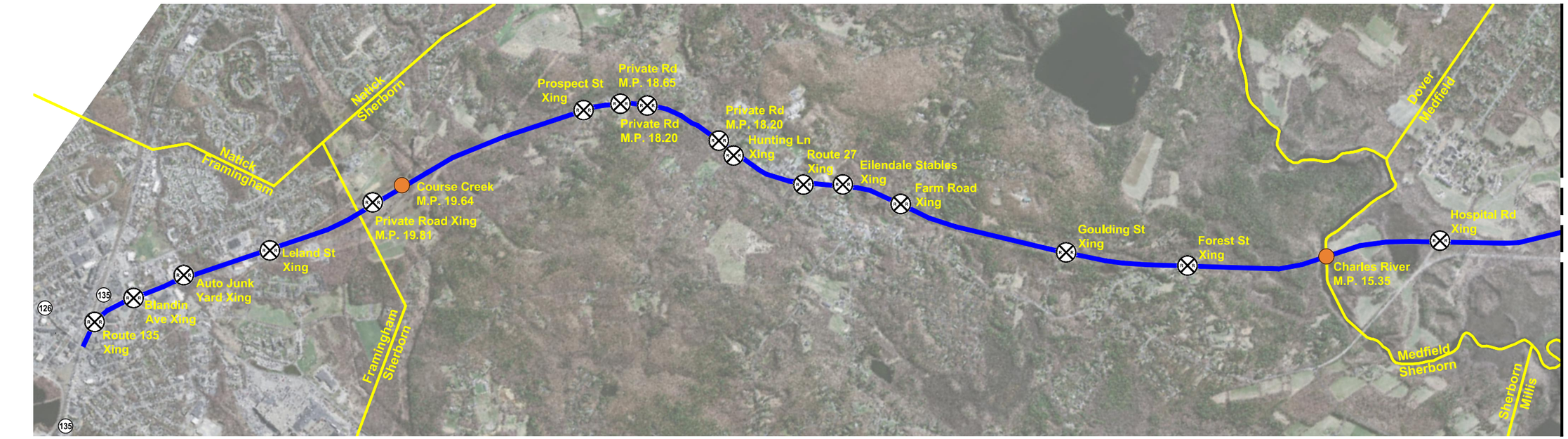
Figure ES-4

Pilot Program
Walpole Station Area Improvements

VHB Transit & Rail



Legend

- Replace rail, ties and, joints as needed
  Clean existing ditches and culverts,
  and replace as needed
- Existing Bridges - Condition to be Inspected
- Existing Grade Crossing - To be Reconstructed

0 1250 2500 Feet

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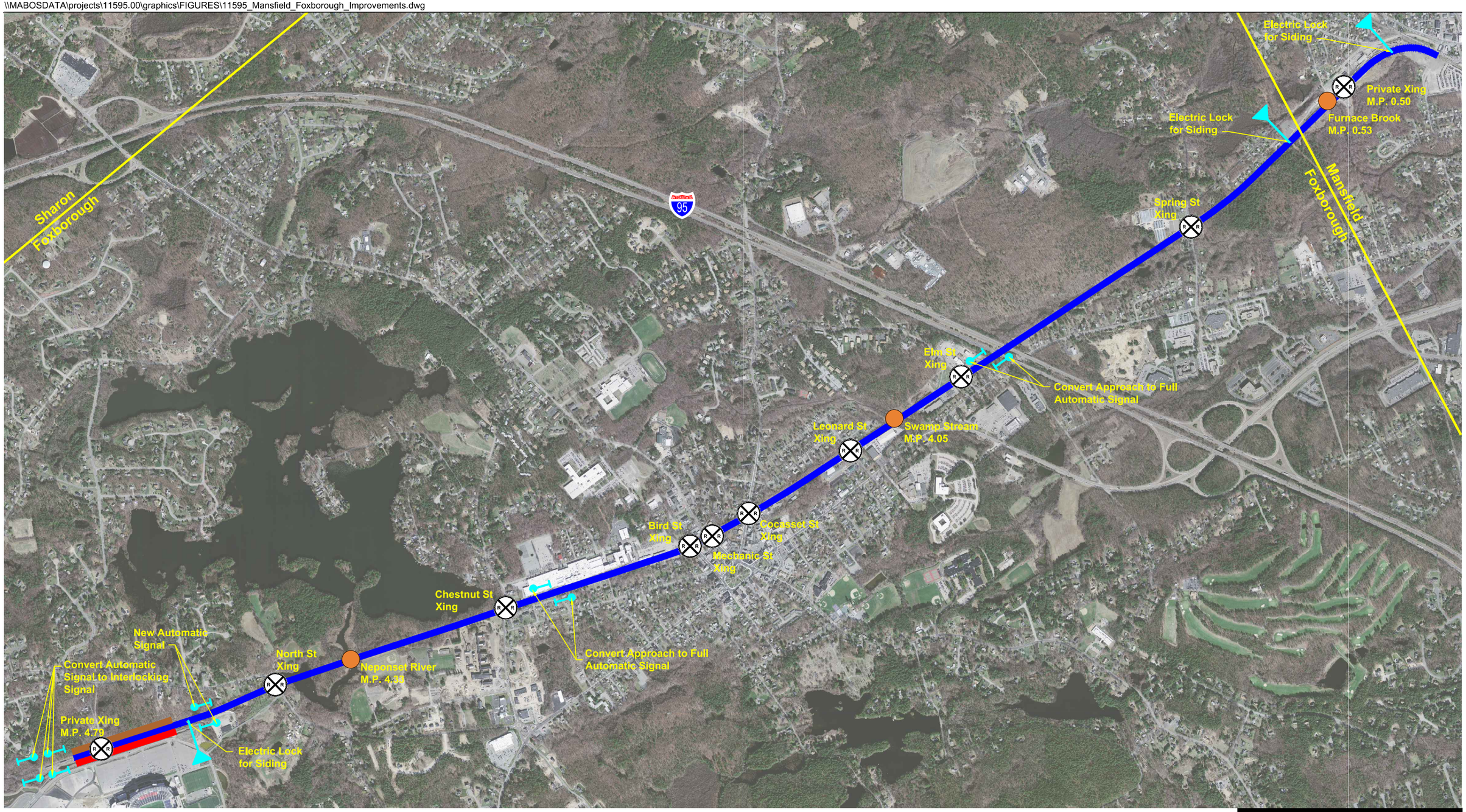
Figure ES-5

Central Massachusetts Service
Walpole to Framingham Improvements

Transit & Rail

\\MABOSDATA\projects\11595.00\graphics\FIGURES\11595_Mansfield_Foxborough_Improvements.dwg



Legend

- Replace rail, ties, and joints as needed. Clean existing ditches and culverts, and replace as needed
- Construct Platform Modifications
- Construct New Platform Track
- Existing Bridges - Condition to be Inspected
- Existing Grade Crossing - To be Reconstructed

0 750 1500 Feet

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Figure ES-6

Central Mass and Providence Event Service
Mansfield to Foxborough Improvements

VHB Transit & Rail

\\MABOSDATA\projects\11595.00\graphics\FIGURES\11595_Walpole_Foxborough.dwg

0 150 300 Feet

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Figure ES-7

Providence Event Service
Foxborough Station
New Track and Platform

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