Rizzo Associates, Inc.

ENGINEERS AND ENVIRONMENTAL SCIENTISTS

Route 126 Corridor Study

Phase I — Alternatives Assessment
Framingham, Massachusetts

Submitted to:
Town of Framingham

Prepared by:
Rizzo Associates, Inc.
with
Gordon, Bua & Read, Inc. and
Wallace, Floyd, Associates, Inc.

January 9, 1997

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January 9, 1997

Mr. David Kutner, AICP
Director, Planning Department
Town Hall Annex
Framingham, MA 01701

Re: Route 126 Corridor Study
Phase I — Alternatives Assessment
Framingham, Massachusetts

Dear Mr. Kutner:

Rizzo Associates, Inc. is pleased to submit this Transportation Study report prepared for the Route 126 Corridor documenting the analysis methodology and the results of the evaluation of alternatives. The study revealed present operational and safety needs along the corridor and further developed short-term (two to four years) and long-term (ten years and beyond) improvement actions.

The study process does not end with this report and the recommended concepts. To move any of the recommended plans forward to the construction phase, the plans must be refined through detailed environmental, engineering, and design studies.

The guidance of the Planning Department is greatly acknowledged. We appreciate having had the opportunity to participate in this study and the assistance given to us during the course of the study by you, other town officials, and the Route 126 Corridor Advisory Committee.

Very truly yours,

Vahid Karimi, P.E.
Project Manager/Associate

Barry M. Pell, P.E.
Project Director/Vice President

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The authors of this report would like to acknowledge the significant contribution of David Kutner of the Planning Department and the participation of the following town and state agencies that aided appreciably in the development of the study program and plans. We would also like to express our appreciation to the many individuals and organizations who participated in this project and provided their time, effort, and information during the preparation of this study.

Elsa Hornfischer	Neighborhood Advisory Committee
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Robert O'Neil	Citizen Advisory Committee
Tom Egan	Conrail
Daniel Carson	Neighborhood/Business Subcommittee
Ed Bates	Metropolitan Area Planning Council (MAPC)
Mike Donnelly	Framingham Police Department
David O. Whittemore	Business Advisory Subcommittee
Barbara Magovsky	Downtown Business Association
Ted Welte	MetroWest Chamber of Commerce
John DelPrete	Precinct 13
Barbara Ford	Precinct 13
Kathy Bartolini	MetroWest Growth Management Committee
Lewis Colton	Framingham Building Department
John McMahon	Framingham Department of Public Works
John Bertonelli	Framingham Engineering Department
Jane Madden	Office of Senator Magnani
Monica Snow	Mass Highway Department
Phil Ernst	Framingham Resident
Janet Fredey	MBTA Construction Office

Executive Summary

The Route 126 Corridor has been the focus of numerous governmental activities that are intended to encourage increased economic development and to improve economic conditions. Within the town of Framingham, the downtown area has been designated by the Metropolitan Area Planning Council (MAPC) as a "Concentrated Development Center," which will positively influence its priority in receiving infrastructure improvement funding. The central obstacle to generating growth and change in downtown Framingham, however, is the extent to which the rail crossing at the Route 126/Route 135 intersection disrupts travel in Framingham and consequently impedes economic revitalization.

The Route 126 Corridor Project has been divided into two phases. Phase I, addressed in this report, is the urban design/transportation planning phase, which sets forth recommended congestion improvement measures that arise especially from the railroad/vehicular conflicts at the Route 126/Route 135 intersection. It is anticipated that a subsequent Phase II project will produce environmental and economic impact studies, and the related engineering plans and construction specifications to be used for the construction phase.

Technical work for the Phase I study has been performed for the town by a consultant team of Rizzo Associates, Inc. (transportation planning, traffic engineering, and roadway design); Gordon, Bua and Read, Inc. (railroad operation and design); and Wallace, Floyd, Associates, Inc. (urban design, landscape architecture). A Route 126 Corridor Advisory Committee (CAC), comprising representatives of governmental agencies, local businesses and residential neighborhoods, and other interested parties, has provided direction and review for all aspects of the study. During the course of the 10-month study, frequent public meetings and a public hearing were held to discuss the project and to receive community input.

The first stage of the study encompassed a comprehensive inventory, analysis, and evaluation of the transportation system and land uses comprising the Route 126 Corridor and adjoining study area. New transportation data was collected which, together with historic information, was analyzed to provide a comprehensive picture of the current system operation. System components evaluated included roadway geometrics and signalization, traffic volumes and travel patterns, pedestrian volumes, railroad gate crossing delay, vehicle travel time and delay, public transportation, rail (commuter, Amtrak, and freight) operations, parking, and accidents. The assessment identified specific locations and time periods when congestion and delay occur. While deficiencies are evident at a number of intersections along Route 126, the most severe problems were shown to result at the Route 126/Route 135 intersection, which is the control point for the operating efficiency of the entire Route 126 Corridor.

Recommendations for transportation system improvements included short-term and long-term solutions. Short-term improvements are relatively low cost solutions intended to address operating deficiencies along the corridor, principally at intersections. They can typically be implemented within two to four years. Schematic plans have been prepared at ten locations proposing short-term improvement actions including signal phasing/timing, new or revised signal equipment, signal interconnection/coordination, exclusive pedestrian phasing, new warning and regulatory signs, channelization, pavement markings, and wheelchair ramps.

The formulation of a long-term improvement strategy began with the definition by the Corridor Advisory Committee (CAC) of a set of evaluation criteria. The five subject areas of these criteria require that the recommended plan improve accessibility to downtown, minimize adverse impacts on the quality of life of residential neighborhoods and through environmentally sensitive areas, provide economic redevelopment opportunities for the downtown area and improve its attractiveness, improve capacity and safety for vehicles and pedestrians, and consider cost as a function of the project's construction feasibility.

With an understanding of the project objectives, twelve concept alternatives were developed, with an initial screening by the Technical Advisory Subcommittee (TAC) of the CAC to ten alternatives. These concepts represented four different approach strategies; namely (1) a bypass located east of Route 126 for through traffic, (2) a bypass located west of Route 126 for through traffic, (3) roadway modifications focused on the downtown core, and (4) rail depression beneath Route 126. The alternatives were rigorously analyzed as to their impacts, advantages, disadvantages, and cost, with an assessment of how well each one achieved the evaluation criteria. The resulting matrix provided an overall rating (low, medium, high) of each alternative, all of which were discussed and further evaluated by the TAC and CAC, with community input at public meetings.

Three alternatives were selected for further detailed analysis: (1) a west bypass via Pearl Street/Lexington Street and new right-of-way, (2) a Route 126 underpass beneath the rail crossing and Route 135, and (3) the depression of the rail mainline.

The analysis concluded that the west bypass alternative would result in significant adverse impacts upon the surrounding residences and public facilities. The rail mainline depression alternative carried a construction cost (at least $150 million) that would not have practical funding potential (based on meetings and discussions with representatives of state and federal funding agencies).

The recommended alternative, the Route 126 underpass beneath the rail crossing and Route 135, was adopted unanimously by the CAC at its September 12, 1996 public meeting. Subsequent work encompassed detailed traffic modeling (with year 2020 socioeconomic and land use projections from the town and MAPC), schematic/preliminary engineering studies, and design with perspective renderings (attached).

The key functional elements of the recommended alternative include a below-grade underpass (one travel lane in each direction) on Route 126 starting on the north at Park Street and on the south near Irving Street. Travel lanes will also be maintained at grade on Route 126 to intersect (with all permitted turns) at Route 135 (with upgraded signalization). Additional right-of-way will be required on both sides of Concord Street north of Route 135, on the west side of Concord Street south of Route 135, and on the north side of Route 135. Approximately 30 on-street parking spaces will be eliminated; suitable off-street replacement parking will need to be identified during Phase II assessment and design. The plan will include new crosswalks, widened sidewalks, and landscaping amenities.

The underpass is projected to serve approximately 50 to 60 percent of total traffic on Route 126. The Route 126/Route 135 intersection will achieve acceptable levels of operation for vehicular traffic and improved safety for pedestrians. A No-Build analysis was also performed, which demonstrates that significant increases in congestion, queuing, and delay will be experienced in downtown Framingham during the next 20 years if no improvements are implemented.

The preliminary construction cost (inclusive of engineering design) for this underpass concept plan is estimated to be $35 to 40 million, which includes an estimated $5 to 10 million for right-of-way acquisition. Off-street replacement parking would be an additional cost. Although several funding sources are available at the federal and state levels, the source offering the highest potential for project funding is at the federal level under two categories:

- Surface Transportation Program (STP)
- National Highway System (NHS)

As with many large transportation improvement projects, matching funds may also be required by the state for design and/or construction. The state has in the past financed most of its share of the capital improvement program, including transportation facilities, through bond sales. In order to borrow these funds, the Executive Office of Transportation and Construction (EOTC) must prepare a transportation bond bill (TBB) and submit it to the state legislature for approval.

As part of Phase II, the next steps of this project are to proceed with environmental and economic impact studies followed by detailed engineering and streetscape design.

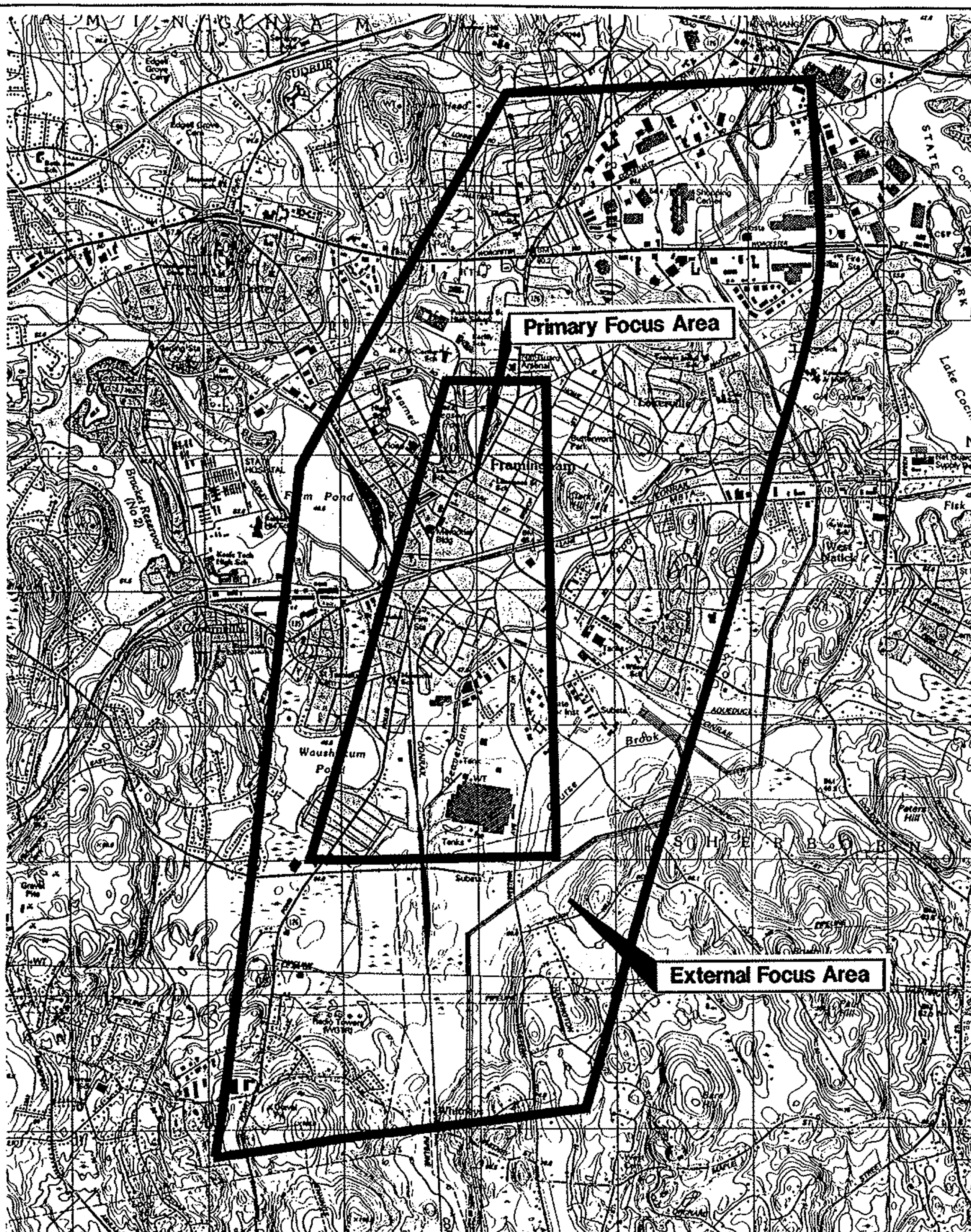
To begin the process, the town, through the Board of Selectmen, must officially apply for federal/state funding of a corridor improvement project for Route 126. The process will then progress through working with rail operators to implement recommended equipment and operating procedures to reduce traffic delays at the rail gates; and continuing to work with the CAC, businesses, and neighborhood groups to identify economic and redevelopment opportunities, vehicle access and parking needs, and desired pedestrian amenities.

Introduction

The Problem

The railroad grade crossing in the Framingham Central Business District has posed a significant impediment to vehicular and pedestrian traffic and adversely affected orderly business development in downtown Framingham for well over 100 years. For several years, various alternatives have been considered to separate rail traffic from the roadway traffic that crosses the tracks at the intersection of Routes 135 (Waverly Street) and 126 (Concord Street) (see Figure 1, Study Area). These roadways run through the center of the business district and provide a direct link to Route 9, Route 30, and the Massachusetts Turnpike (I-90) and afford one of the only north/south roadway links in the MetroWest region. The problem of traffic congestion on these roadways is considerably compounded when train crossings (36 commuter and 25 to 30 freight crossings per day) bring vehicular circulation to a standstill. Since 1898, when the first study of this problem was commissioned, no fewer than 36 studies have been undertaken to identify a solution to this problem that was economically and politically palatable, each effort meeting with resistance and ultimately faltering.

The town is now faced with conditions that are sufficient to forge consensus and finally to resolve this significant problem. A strong surge in growth in neighboring Ashland and Holliston is generating considerable new traffic on Framingham's downtown roadways. In addition, the former 3-million-square-foot General Motors plant, located to the south of the Route 135/Route 126 intersection, was recently purchased by a national automobile auction facility that is expected to generate a significant increase in truck and automobile traffic through the downtown area. Finally, the extension of the MBTA commuter rail line from Framingham, its current terminus, to Worcester will result in a substantial increase in the number of trains that will be routed across the Route 135/Route 126 intersection. These additional rail crossings, as well as the attendant increase in the number of commuters traveling to the Framingham station, threaten to significantly exacerbate traffic congestion in the downtown area. The confluence of these conditions has led to widespread acknowledgement that a definitive resolution to this problem is now essential to ensure that Framingham's downtown business district remains viable.



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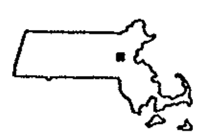

Quadrangle Location

Base Map: USGS Topographic Map
Boston South, MA Quadrangle
Map Printed, 1978; Map Edited, 1987

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Study Area

Figure
1

Background

The MetroWest Chamber of Commerce, the towns of Framingham and Ashland, the MetroWest Growth Management Committee, and the Metropolitan Area Planning Council (MAPC) have been involved in a variety of activities that are intended to encourage increased economic development and to improve the economic conditions within the Route 126 corridor area. For example, Framingham and Ashland petitioned the state, requesting that they be designated as one of the 21 Economic Target Areas in Massachusetts. The MAPC has designated the downtown area of Framingham as a "Concentrated Development Center" (CDC), which will positively influence its priority in receiving infrastructure improvement funding. Ashland has completed a Route 126 traffic study and adopted the study's recommended zoning changes that are intended to yield new economic development. Framingham is using federal and state funds for streetscape improvements in the downtown area to integrate modes of transportation through this area. Traffic circulation improvements will be included as a major element of each of these actions, and improved accessibility will be an important ingredient in generating growth and change in downtown Framingham.

The central obstacle to all of these efforts, however, is the extent to which the rail crossing at the Route 135/Route 126 intersection disrupts travel through Framingham and consequently impedes economic revitalization in the downtown core.

Study Objective

The objective of this project is to conduct a transportation corridor study that will be coordinated with other economic development plans and improvement activities already underway in the area. The study addresses traffic/transportation problems and proposes roadway and urban design improvements that will provide stimulus for other economic development and quality of living improvements. Specifically, the project sets forth recommendations to address the above-described traffic circulation problems that arise from the railroad/vehicular conflicts at the Route 135/Route 126 intersection.

The Route 126 Corridor project has been divided into two phases. Phase I, addressed in this report, is the urban design/transportation planning phase, which results in recommended congestion improvement measures within the Primary Focus Area. It is anticipated that Phase II project will include environmental studies, neighborhood impact assessment, and economic base analysis to further advance the project into final design and subsequently produce the related engineering plans and construction specifications to be used for the construction phase.

Route 126 Corridor Advisory Committee

A Route 126 Corridor Advisory Committee (CAC) has provided direction and review for all aspects of this study. The CAC comprises representatives of governmental agencies, local businesses and residential neighborhoods, and other interested parties (these representatives are listed in Appendix A). A Technical Advisory Subcommittee of the CAC was formed as a working group to provide more frequent direction of the study's technical progress. During the course of the study, 14 public meetings were also held with downtown business groups, neighborhood representatives, and the general public to discuss the project and to receive community input.

1.0 Data Collection

The study area shown on Figure 1 is composed of both an External Focus Area and a Primary Focus Area. The study identifies traffic deficiencies in both focus areas and develops alternative solutions and recommendations in the Primary Focus Area.

New traffic and transportation operational data has been collected within the study area mainly for the purpose of evaluating changes to vehicular travel patterns and to verify the magnitude of traffic volumes. The results of the data collection effort are described below.

1.1 Roadway Characteristics

Field reconnaissance was performed on May 2 through May 6, 1996, for the purpose of developing a detailed inventory of existing traffic control features along the Route 126 Corridor within the Primary Focus Area. These included roadway pavement markings, traffic signal equipment, regulatory and warning signs, on-street parking spaces and meter locations, positions of bus stops, and other miscellaneous features.

Concord Street (Route 126). Concord Street, which is under local jurisdiction, functions as an arterial road providing access between Framingham and other communities to the north. The portion of Concord Street examined as part of this study is from the Concord Street/Waverly Street intersection northward to the intersection with Hartford Street. Also known as Route 126, the roadway provides connections to Route 9 and Route 30, allowing access to the Massachusetts Turnpike. Concord Street is a two-lane, two-way roadway, generally 40 feet in width, following a north to south alignment from Hartford Street to Union Avenue. Between Union Avenue and Waverly Street, the roadway widens to approximately 60 feet with metered parking along both sides of the street. Throughout the study area, curbing and sidewalks are present along Concord Street.

Hollis Street (Route 126). Hollis Street (Route 126), which is under local jurisdiction, is an arterial roadway that extends Route 126 south from the Concord Street/Waverly Street intersection to the Ashland town line. The roadway allows access to several local streets and commercial land uses along its length through the study area. Hollis Street is a two-lane, two-way roadway, generally 36 feet in width, following a north to south alignment. Pavement markings consist of solid double yellow centerlines and a striped left turning lane on the southbound approach at the intersection with Waushakum Street. No apparent lane markings are present at other intersections in the study area.

Waverly Street (Route 135). Waverly Street, which is under local jurisdiction, serves as an arterial road providing east/west access between Natick to the east and Ashland to the west. Also known as Route 135, Waverly Street is a two-lane, two-way roadway, generally 40 feet in width, with pavement markings consisting of a double yellow centerline and crosswalks marked at the study intersections. Land use along Route 135 in the study area is primarily commercial and retail with limited residential.

Grant Street. Grant Street is a residential subdivision street, parallel to Route 126, which connects from Hartford Street to Howard Street. It is a two-lane, two-way roadway with solid double yellow centerline markings. The roadway provides access to the residential parcels along its length. Grant Street is generally 36 feet in width.

Irving Street. Irving Street is a residential subdivision street which connects from Leland Street to Hollis Street (Route 126). It provides access to the residential parcels along its length, as well as to the downtown Framingham area at the Route 126 intersection. Pavement markings and curbing exist along Irving Street, and sidewalks are present from Loring Drive to Hollis Street. Irving Street is generally 30 feet in width.

Union Avenue. Union Avenue is a collector/distributor road which connects between the Framingham Business District at Concord Street on the south and Route 9 via Main Street on the north. It primarily provides access to the residential streets along its length. Pavement markings, curbing, and sidewalks are present and in good condition. Union Avenue is a two-lane, two-way roadway that is generally 34 feet wide.

1.2 Traffic Volume

Traffic volume data was obtained from the Framingham Planning Department from the traffic impact assessment completed for the ADESA auction facility located at the former General Motors (GM) plant. These traffic volume counts were measured at numerous locations throughout the town during the morning and afternoon peak travel periods in January and July of 1995. Copies of the traffic volumes from the ADESA report are contained in Appendix A.

In addition, Rizzo Associates, Inc. performed traffic volume counts in May 1996 at the following intersections of Route 126:

- Irving Street
- Waverly Street (Route 135)
- Howard Street
- Park Street
- Kendall Street
- Union Avenue

A comparison of the peak hour traffic counts indicates that the 1995 volumes are slightly higher than the recent 1996 data. For this reason the 1995 data will be utilized for this project report. No major changes to travel patterns are apparent from the comparison of the count data.

The peak hours of traffic flow along the Route 126 Corridor generally occur from 7:15 to 8:15 A.M. in the morning and from 4:15 to 5:15 P.M. in the afternoon. These hours correspond to the peak commuter travel periods. An evaluation of this data establishes several key findings. As shown on Figure 2, there is a distinct directionality of the traffic flow on Route 126 north of Route 135 during the peak hours of the day. During the morning peak hour the majority of motorists travel northbound on Route 126 toward Route 9, Route 30, and I-90. In the afternoon peak hour this directionality is reversed, with the majority of vehicles traveling southbound.

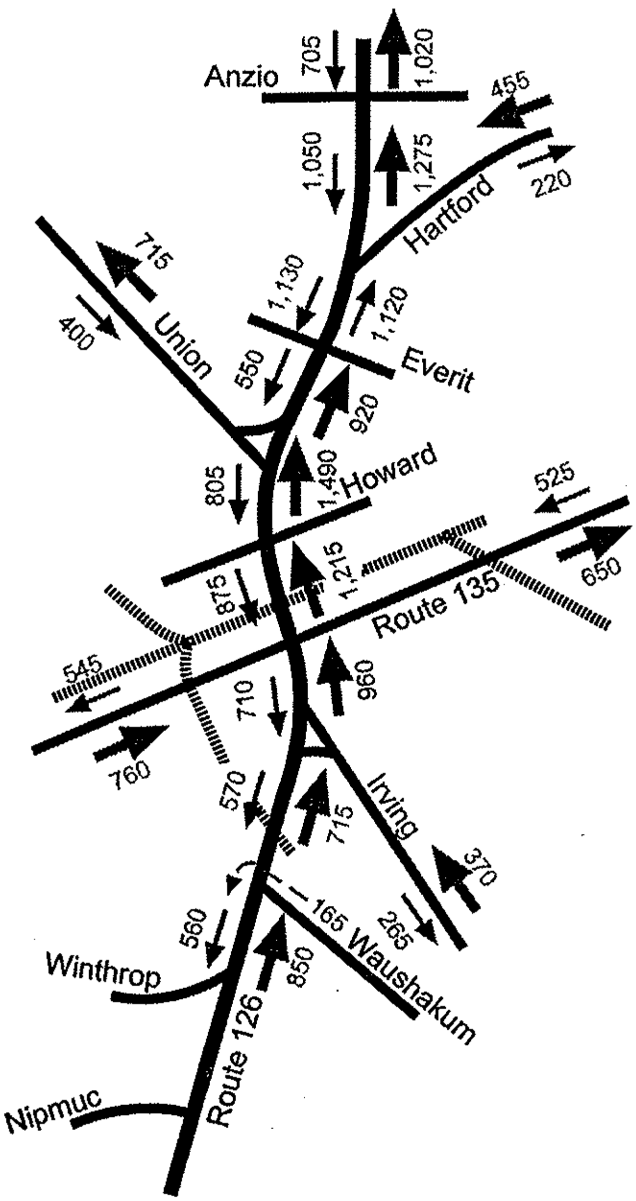
Also apparent from the volumes is that several intersecting streets contribute a high volume of traffic onto the corridor. These include Waushakum Street, Route 135, Union Avenue, Howard Street, Lincoln Street, and Hartford Street. Traffic congestion at these locations is evident from the vehicle queues observed on both Route 126 and side streets.

A seven-day automatic traffic recorder (ATR) count was performed on the studied roadways in 1995 for the town by McDonough & Scully, Inc. Table 1 presents a summary of this data.

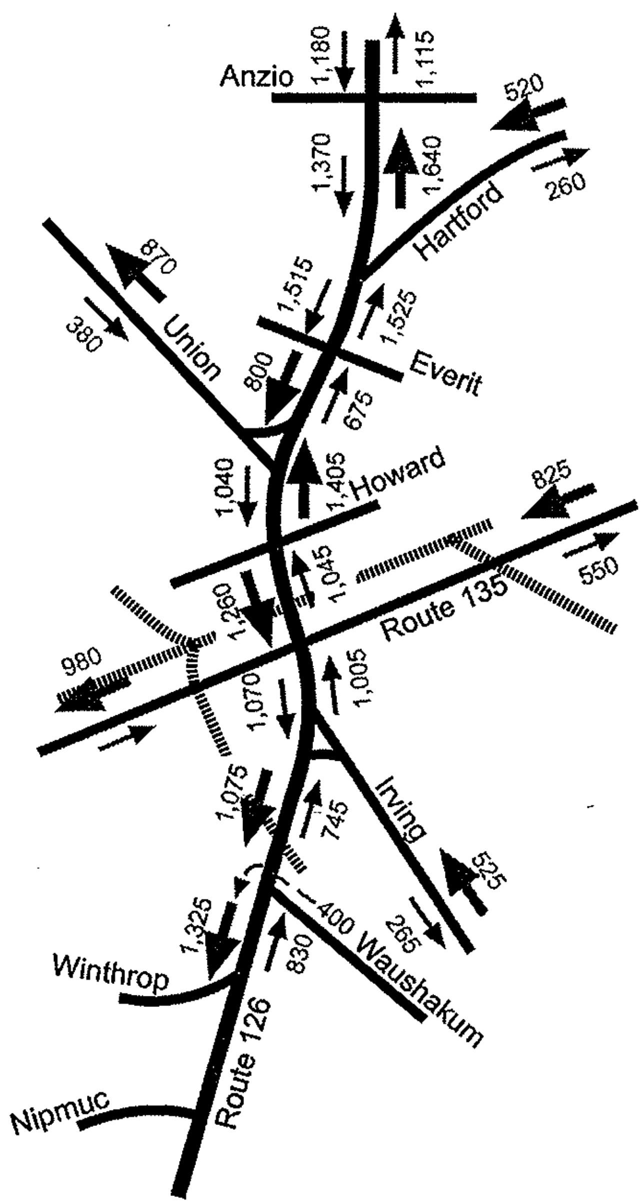
1.3 Pedestrian Volume

Pedestrian crossing volumes were collected in May 1996 at the same downtown intersection locations as the vehicle counts listed above. Figure 3 illustrates the number of pedestrian crossings counted during the morning and afternoon peak hours. Between Irving Street and Union Avenue, there are five crosswalks across Route 126. However, many of these crosswalks in the downtown area are at uncontrolled locations where the ability of pedestrians to cross is dependent on the alertness and courtesy of motorists to stop. The intersection with Howard Street is the only downtown location with pedestrian crossing under signal control.

Morning
Peak Hour 7:15-8:15 am



Afternoon
Peak Hour 4:15 -5:15 pm



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Peak Hour Roadway Traffic Volumes

Figure 2

Table 1 **Summary of Traffic Volume Counts**

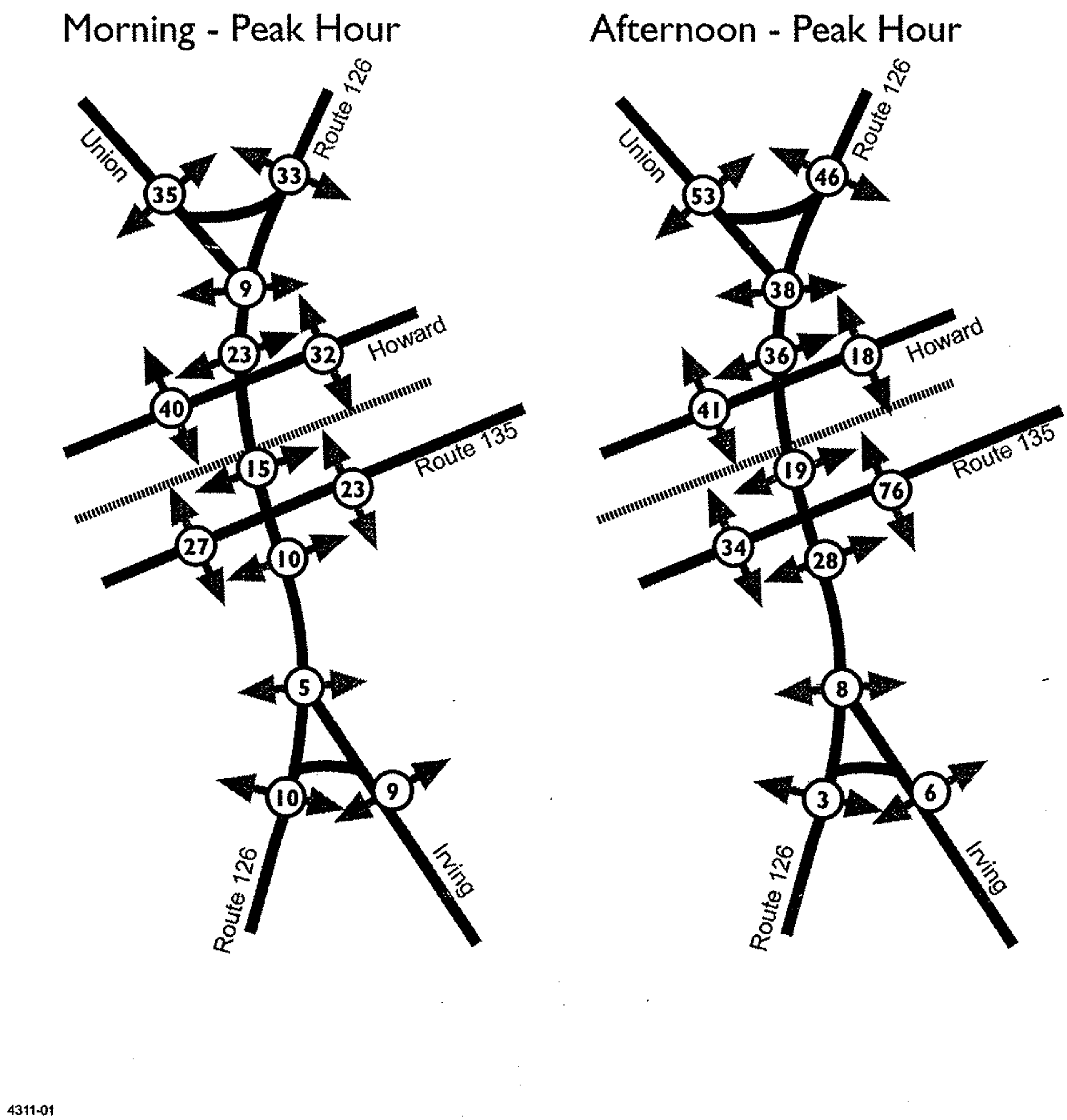
		Morning Peak Hour		Afternoon Peak Hour	
	Daily (vpd)	Volume (vph)	Percent of Daily	Volume (vph)	Percent of Daily
Concord Street (Route 126)					
North of Union Avenue	22,000	1,500	6.8	1,500	6.8
Hollis Street (Route 126)					
South of Waushakum Street	21,900	1,400	6.4	2,200	10.0
Waverly Street (Route 135)					
East of Concord Street	18,000	1,400	7.8	1,500	8.3
West of Concord Street	14,600	1,300	8.9	1,400	9.6
Union Avenue					
West of Concord Street	14,300	1,100	7.7	1,200	8.4
Irving Street					
East of Hollis Street	9,500	630	6.6	800	8.4
Bishop Street					
North of Waverly Street	14,800	2,100	14.2	2,600	17.6

vph vehicles per hour
vpd vehicles per day

The existing sidewalks in the downtown area appear to be of adequate size and width to accommodate the levels of pedestrian traffic documented by the traffic counts.

1.4 Railroad Gate Crossing Delay

Field reconnaissance was conducted to assess the delay caused by the signalized railroad gate closing at the tracks near the Route 126 and Route 135 intersection on a typical weekday during the morning and afternoon peak periods. The survey was conducted on January 6, 1996. This grade crossing is used by both freight and commuter trains. The tracks crossing Route 126 between the intersection of Route 135 and Howard Street are delineated by pavement markings, warning lights, and crossing arms that are activated when trains pass over sensors located on the tracks.



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Pedestrian Crossing Volumes

Figure 3

Table 2 summarizes the grade crossing delays on a typical weekday from 7:00 to 9:00 A.M. and from 4:00 to 6:00 P.M. From the table it is apparent that the gates are closed for a significant portion of time during the peak travel hours. This delay often causes substantial vehicle queuing back into the downtown area. Several times during the peak periods the gates are being kept closed for a longer period of time than is necessary for the train to cross over Route 126 due to improper equipment operation. This may be resolved by upgrading the existing train sensing hardware and signal controller equipment.

Table 2 Delays at Railroad Crossing

Morning Peak Period				Afternoon Peak Period			
Time	Interval	Duration of Gate Closing	Train Type	Time	Interval	Duration of Gate Closing	Train Type
6:53	--	3:30	"T"	3:58	--	2:40	No Train
7:03	10 min.	1:46	Conrail	4:10	12 min.	2:35	Amtrak
7:06	3 min.	1:26	"T"	4:56	46 min.	2:08	No Train
7:21	15 min.	2:18	"T"	5:14	20 min.	2:05	"T"
7:32	11 min.	1:00	"T"	5:25	11 min.	1:23	"T"
7:52	20 min.	1:19	"T"	5:37	12 min.	1:25	"T"
8:02	10 min.	1:50	"T"	5:47	10 min.	2:55	Conrail
8:10	8 min.	12:33	"T"	5:55	8 min.	1:25	"T"
8:37	27 min.	1:44	"T"				
8:40	3 min.	5:05	Conrail				

One notable gate closing occurred in the morning peak period at 8:10 A.M. The gates were closed for approximately 12.5 minutes. The train did not appear at the grade crossing until 11.5 minutes had elapsed. It is our understanding that there had been a malfunction with the sensing equipment. During this time period two vehicles were witnessed driving over the grade crossing by maneuvering around the gate arms.

During the field reconnaissance survey it was noted that much of the congestion at this location is the result of poor traffic signal operation and lack of signal coordination at Route 126 and Route 135 with the Howard Street intersection.

1.5 Travel Time and Delay

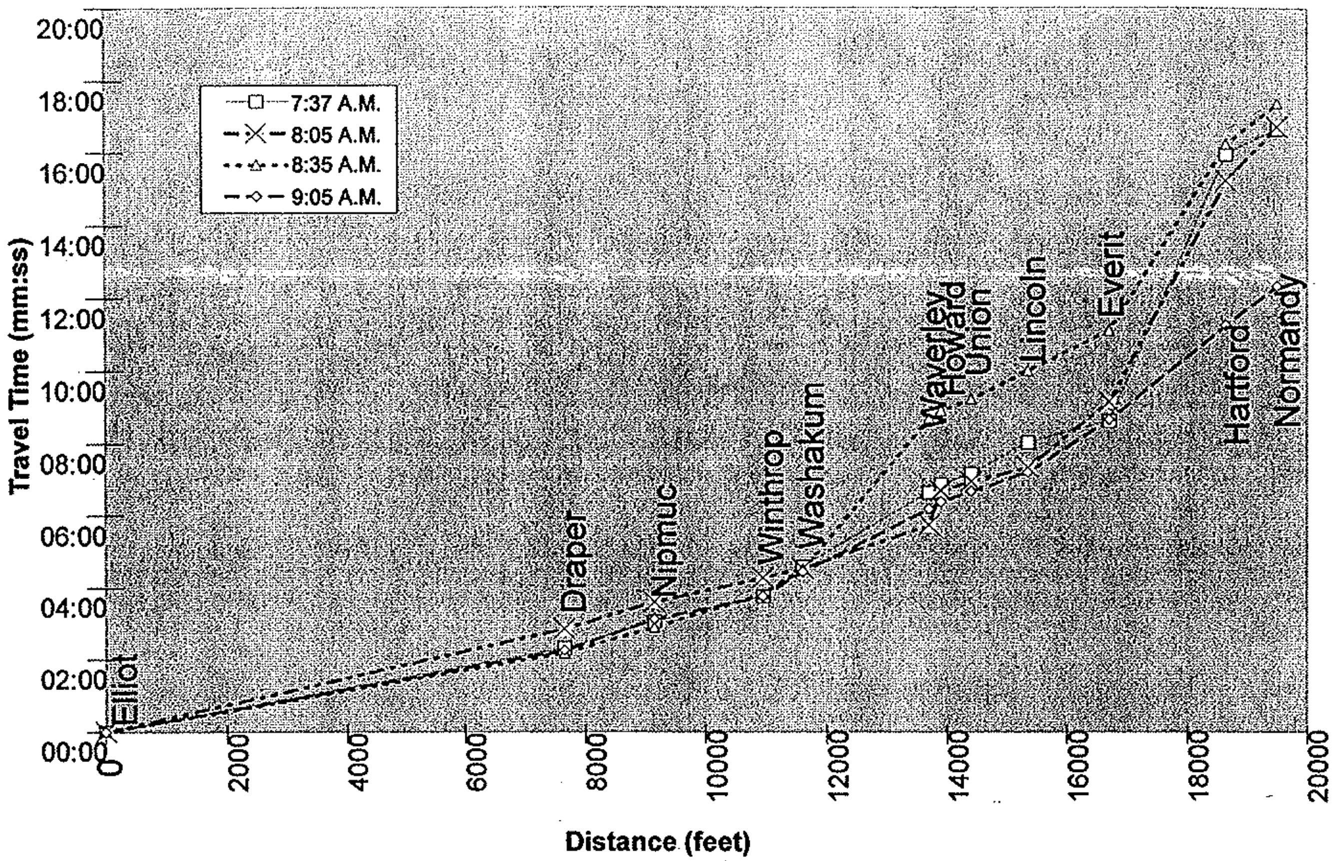
To evaluate the quality of traffic flow along the Route 126 corridor travel time and delay data was collected on April 24 and May 10, 1996, during the morning, midday, and afternoon peak periods. The purpose of this data is to determine the mean travel time and speed to traverse the corridor, as well as locations, types, and the extent of traffic delays. The general procedure of the data collection involved documenting the total running time for a vehicle traveling through the corridor, making note of the cumulative time crossing key intersecting streets and any delay information that occurred along the route. At least four data samples were collected for each peak period in both directions of travel.

Table 3 summarizes the mean travel time and mean travel speed for each of the time periods studied, for both directions of travel, along the Route 126 corridor. Graphs depicting the travel time data for each of the study periods are shown on Figure 4, Figure 5, and Figure 6. The key intersecting streets along Route 126 that were used as control points are listed on the graphs. They begin at the intersection with Eliot Street in Ashland to the south, and end on the northern end at the intersection with Normandy Street. Additional samples were collected during the afternoon peak period that extended the study boundary northerly to the Anzio/Gorman Roads intersection.

Table 3 **Travel Time and Delay — Route 126 Corridor**

	Northbound	Southbound
Morning Peak Hour		
Mean Travel Time (minutes)	15.4	9.1
Mean Travel Speed (mph)	14.5	24.4
Mid-day Peak Hour		
Mean Travel Time (minutes)	9.2	10.4
Mean Travel Speed (mph)	24.1	21.4
Afternoon Peak Hour		
Mean Travel Time (minutes)	16.2	13.2
Mean Travel Speed (mph)	15.1	18.6

In general, it was found that slower vehicle travel speeds (which result in longer travel times) occur during periods of the day and in travel directions with higher traffic volumes. In the morning peak period of



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The Route 126 Corridor Study
Framingham, Massachusetts

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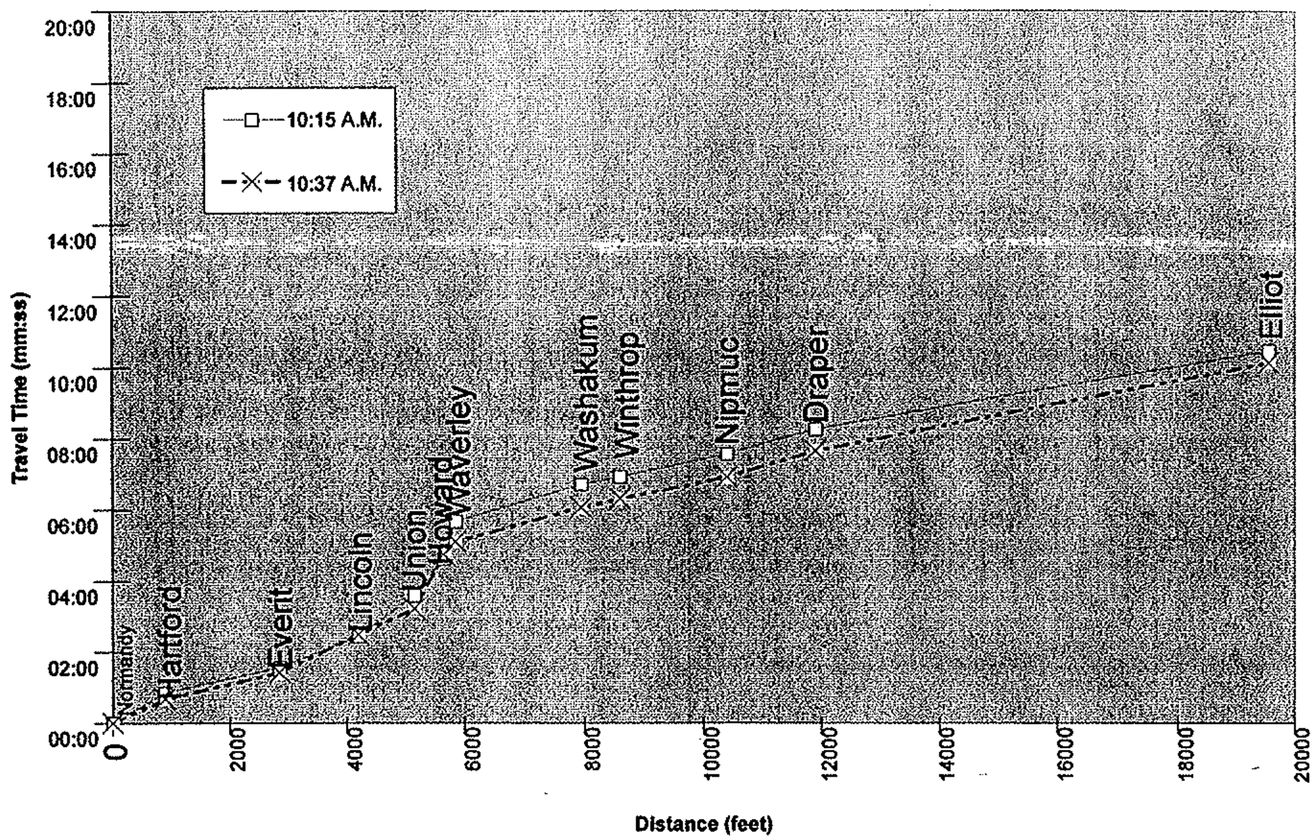
Travel Time and Delay
A.M. Peak Northbound

Figure
4



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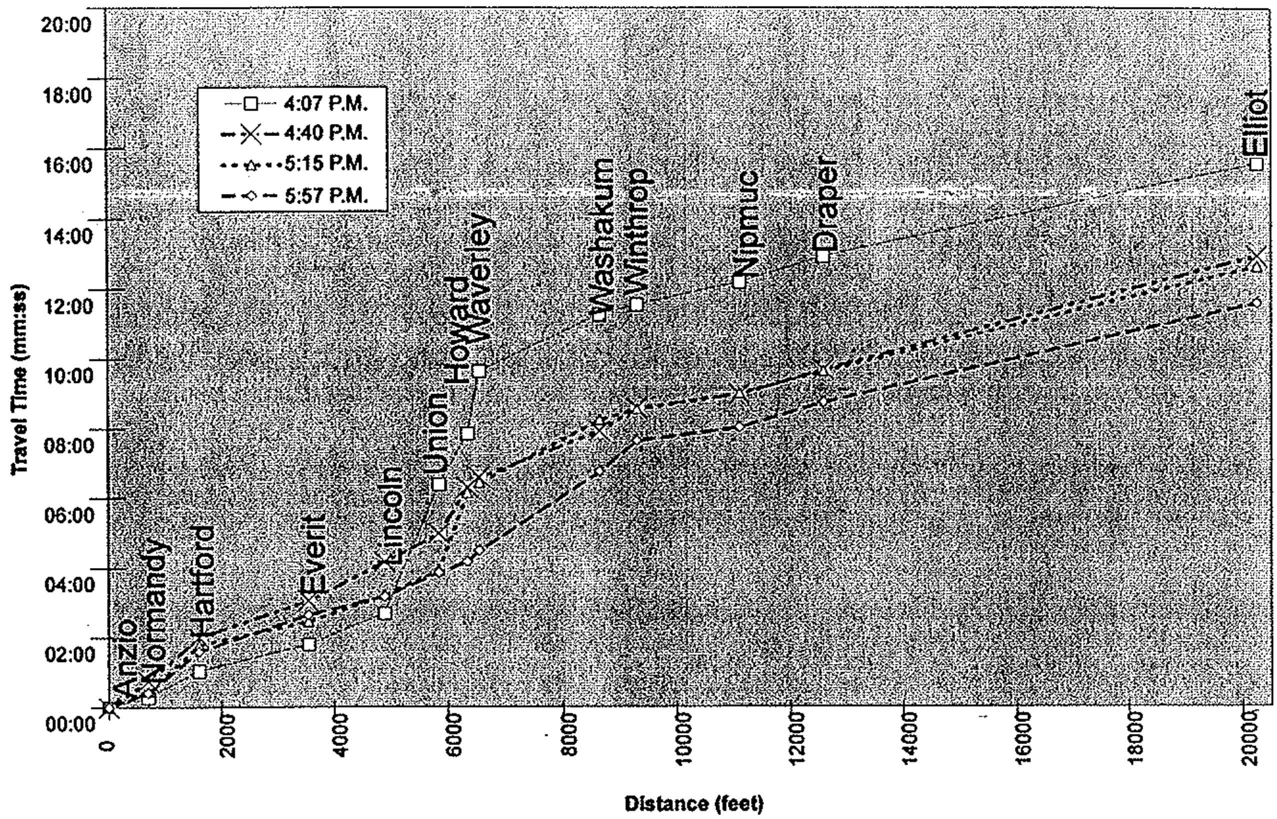
The Route 126 Corridor Study
Framingham, Massachusetts

Travel Time and Delay
Midday Peak Southbound

Figure
5



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The Route 126 Corridor Study
Framingham, Massachusetts

Travel Time and Delay
P.M. Peak Southbound

Figure
6

7:00 to 9:00 A.M. the northbound direction experienced a mean travel speed of approximately 14.5 miles per hour, while the southbound direction had a much higher mean vehicle speed of approximately 24.4 miles per hour.

During the midday period of 10:00 A.M. to 12:00 P.M. the mean travel speed northbound is approximately 24.1 miles per hour, and southbound is approximately 21.4 miles per hour. The near equality of traffic flow midday is typical of retail and general business traffic that does not exhibit the directionality associated with commuter trips to and from work.

During the afternoon peak period of 4:00 to 6:00 P.M. the northbound direction experiences a mean travel speed of approximately 15.1 miles per hour, while the southbound direction is slightly higher at approximately 18.6 miles per hour. These numbers do not correspond as significantly to the directionality of traffic volumes discussed earlier. The reason that the speeds may be higher in the southbound direction can be explained by the fact that vehicle travel and turning movements southbound tend to be limited to through and right turn movements. This is in part due to left turn restrictions on downtown streets (Kendall and Howard Streets) and also because of the layout of other intersecting streets such as Lincoln, Union, and Park Streets, which all have significant right turn maneuvers that do not experience the often longer waiting time associated with crossing opposing traffic flows.

Travel time and speed along the Route 126 corridor may be improved by the installation of a coordinated traffic signal system. These systems typically receive real traffic demand data through wire loops imbedded in the roadway. These loops sense traffic flow and transmit data to the signal controllers along the corridor, allowing traffic platoons to clear the intersection. In the downtown area such a system would also be coordinated with the railroad pre-emption system.

1.6 Bus Transportation

The LIFT bus (Local Inter Framingham Transportation) is a town-operated service with six routes that extend to the neighboring towns of Ashland, Hopkinton, Holliston, Natick, and Milford. This service is funded in part by the town of Framingham, the MBTA, and the MetroWest Chamber of Commerce. The LIFT routes provide access to major shopping and employment areas as well as to the Peter Pan Bus Terminal at Shoppers World on Route 9. The Massport Logan Airport express bus is also located at Shoppers World. Figure 7 depicts the LIFT bus routes. The downtown pick-up/drop-off point is at the intersection of Route 126 with Howard Street. This is an ideal location due to the proximity with the train service and downtown retail, restaurant, and business services.

Appendix A provides service data for the LIFT bus system. Route maps and schedules along with a summary of monthly and year end ridership information have been compiled. The LIFT service ridership for Routes 1, 2, 3, 5, and 6 totaled approximately 138,350 patrons in 1995. LIFT Route 4 is currently operated by the town of Natick, and ridership data is not available.

1.7 Rail Transportation

Route 126 (Concord Street) intersects the railroad tracks at grade in downtown Framingham approximately 50 feet north of its intersection with Route 135 (Waverly Street). In past years the crossing has been reduced to the present configuration of two mainline tracks crossing Route 126 at an approximate 90-degree angle. Three tracks also cross Waverly Street within the study area as discussed in greater detail in Section 1.7.2.

1.7.1 Passenger

The physical plant for the passenger trains consists of only the mainline tracks and a passenger station. The station, located just west of the Route 126 crossing, consists of two platforms, one on each side of the tracks. Passenger train operations are summarized below.

MBTA. MBTA commuter trains make a total of 34 scheduled daily (weekday) crossings of Route 126 as shown in Table 4. Of these, 14 terminate (and thus originate as inbound trains) in Framingham. This accounts for 28 of the crossings. The remaining six crossings are by commuter trains to and from Worcester that make stops at the Framingham station. The commuter train crossings are concentrated at the "rush hour" periods.

Table 4 **Main Line Passenger Trains Crossing Route 126**

Inbound		Outbound	
Train	**Time**	**Train**	**Time**
AM550	06:15	AM501	06:30
AM552	06:50	AM503	07:30
AM504	07:02	AM505	08:02
AM506	07:20	AM507	09:46
AM558	07:45	AM509	11:50
AM510	08:00	AM511	13:40
AM512	08:35	AM513	15:25
AM514	10:00	AM449 (Amtrak to Albany)	16:24
AM516	12:05	AM515	17:18
AM518	14:00	AM567	17:30
AM520	15:45	AM519	17:53
AM448 (Amtrak from Albany)	17:24	AM571	18:19
AM522	17:40	AM573	18:35
AM524	18:40	AM525	19:05
AM526	20:20	AM527	19:44
AM528	21:20	AM529	21:05
AM530	23:05	AM531	22:50
AM532	24:05	AM533	23:50

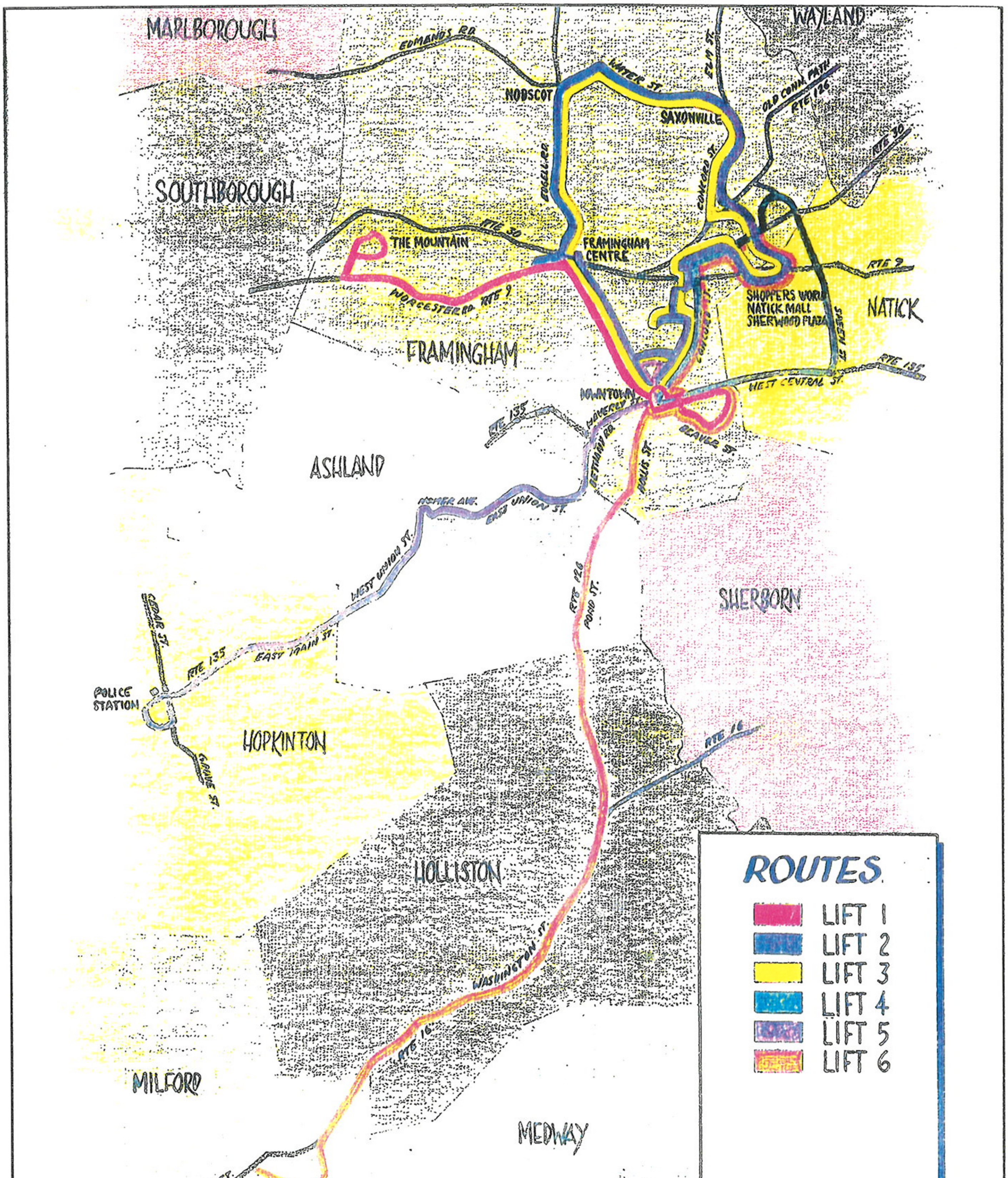
Source: Commuter Rail and Intercity Passenger Train Schedule, Effective April 15, 1996
1 Passenger trains all use Route 126 crossing
2 Schedule is generally accurate to within five minutes
3 All trains are MBTA commuter except as noted

Amtrak. Amtrak intercity passenger trains make two daily crossings of Route 126. The outbound train crosses in the late afternoon (scheduled at 4:24 P.M.), and the inbound train crosses one hour later (scheduled at 5:24 P.M.), both of which occur during peak afternoon rush hour.

1.7.2 Freight

In addition to the two mainline tracks, freight operations around the study area involve several other tracks and three railroad yards (see Figure 8). To the north of the mainline is North Yard. This yard comprises a lead track that branches out to approximately 20 tracks used to store railroad cars. These 20 tracks then reconnect to one track that becomes the Fitchburg Secondary. The Fitchburg Secondary proceeds north through Framingham Center to Fitchburg.

West of the Route 126 crossing is Nevins Yard. This yard, located directly adjacent and parallel to the mainline, consists of approximately 12 tracks. This yard is set up so that the mainline freight trains can drop



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Framingham, Massachusetts

Figure 7

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Source: Town of Framingham, MA Planning Department

Lift Bus Routes

off or pick up rail cars on the storage tracks rapidly, with the fewest number of movements.

At the south end of North Yard, the single lead track branches into three tracks in a "Y" configuration. This configuration is called a "WYE" in railroad terminology. Two of the WYE tracks connect directly to the mainline tracks, one each to the east and west. The other leg of the WYE is a lead track to Nevins Yard. This track allows freight traffic between the yards without the use of the mainline. The east leg of the WYE connects to the mainline immediately west of the Route 126 crossing. Any use of this leg to connect to the mainline requires the crossing of Route 126.

South of the mainline tracks are the CP Yard and the Holliston Branch. This yard is part of the former General Motors facility. To access this yard, trains use the south WYE from the mainline track. Both legs of the WYE are located west of the station area. The east leg of the WYE allows trains coming from or headed to the east to access the yard and Holliston Branch. It is rarely used. The majority of the traffic to the south uses the west leg of the WYE. The CP facility consists of approximately 28 total yard tracks and tapers to one track that services Holliston.

East of the Route 126 crossing and south of the mainline tracks is the Framingham Branch to Medfield Junction, Mansfield, and Walpole. This is a single track with numerous sidings. This track also provides a connection to the Bay Colony Railroad.

Operations

The North Yard is used to store railroad cars while they are waiting to be sent out as part of a train. The numerous tracks allow the trains to be assembled based on destination. Cars can originate from mainline trains that either terminate at Nevins Yard or simply stop on their way to or from Boston. From Nevins Yard the cars are brought to North Yard, where they are classified and, using yard locomotives, placed on the various tracks. Cars also arrive in North Yard from the various branch tracks. Trains may also be assembled at North Yard that are to be picked up by the mainline freight train. Once these are complete they are sent to Nevins Yard.

Nevins Yard, as discussed above, is used primarily as a pick-up and drop-off point for mainline freight trains. An eastbound or westbound mainline train would pull directly into Nevins Yard and drop off and/or pick up waiting cars. It would then depart toward either Boston or Albany. Some of the mainline freights originate and terminate at Framingham and do not go to Boston.

Operations at the CP Yard generally involve railroad cars carrying automobiles. These trains are taken directly into the yard from the mainline, using the west leg of the south WYE. Outbound trains are taken from the CP Yard to the mainline. Trains carrying cars to customers on the Holliston Branch would originate in North Yard, cross the mainline using the west leg of the north WYE or through Nevins Yard, and would then proceed down the Holliston Branch using the west leg of the south WYE. They would, on rare occasions, use the east leg of the north WYE to access the branch line and thus cross Route 126.

The Framingham Branch is used for three purposes. Trains going to and from Readville Yard use the branch, as do trains bringing cars for transfer to the Bay Colony Railroad and trains serving Conrail's local customers. Trains using the Framingham Branch may come from or go to either North Yard or Nevins Yard. They must all cross Route 126.

Two local freight trains from North Yard also use the mainline. The Natick local leaves North Yard using the east leg of the north WYE, crossing Route 126. The Westborough local uses the west leg of the north WYE and therefore does not cross Route 126.

Route 126 Impacts

Many of the operations at the three yards described above have, in general, no impact on the Route 126 crossing. Cars can be moved between any of the three yards by using the west legs of the two WYEs.

The impacts to Route 126 that are caused by freight operations are usually due to either mainline freight trains or freights going to or from the Framingham Branch. Table 5 provides a summary of schedule for through freight trains crossing Route 126.

The mainline freights, both eastbound and westbound, must use the Route 126 crossing. The impact that they have on the crossing varies

Table 5 **Main Line Freight Trains Crossing Route 126**

Inbound	Outbound
Freight Moves Across Route 126	
TV24 — 03:38 Hrs	TV13 — 00:16 Hrs
TV14 — 06:28 Hrs	TV99 — 05:26 Hrs
TV100 — 08:30 Hrs	TV5 — 20:30 Hrs
ML482 — 11:30 Hrs+	TV7 — 21:30 Hrs
TV10B — 11:52 Hrs	ML433 — 21:44 Hrs
TV6 — 15:26 Hrs	TV80W
SEBO	BOSE — 01:00 Hrs+
TV8W	WAFR35 — On duty 21:30 Hrs
WAFR35	WAFR3 — On duty 15:30 Hrs
WAFR3	
Other Freight Moves Not Crossing Route 126	
SEFR	FRSE
WAFR10	WAFR10
WAFR2	WAFR2

depending on several conditions. The biggest factors that would determine crossing impact are the length and speed of the train. A longer train would obviously take more time to cross than a shorter one. Mainline trains to and from Boston could vary from only locomotives to 100 cars or more.

The speed of the train is also a factor in the impact to the crossing. Mainline freight trains may or may not stop at Nevins Yard. If they are either stopping at Nevins Yard (westbound) or starting from Nevins Yard (eastbound), then their speed would be considerably less than the 30 mph limit of trains not using Nevins Yard. A slower train would take more time to cross Route 126 and thus have a greater impact.

In addition to the mainline freights, trains also use the Framingham Branch. These trains generally come from Framingham Yard and must cross Route 126. Their speed is low as they pass through the various turnouts. Observations at the crossing show that a train making this type of movement impacts the crossing for one to two minutes.

It is anticipated that in the near future, a substantial portion of the yards and branch lines in the Route 126 study area will be sold to a short line railroad. Although there will be a new owner, the interaction between them and Conrail will remain much the same and operation of the yards and branch lines should remain very similar to the present operations.

Because the operations will not drastically change, there should be little change in the freight impacts to the Route 126 crossing.

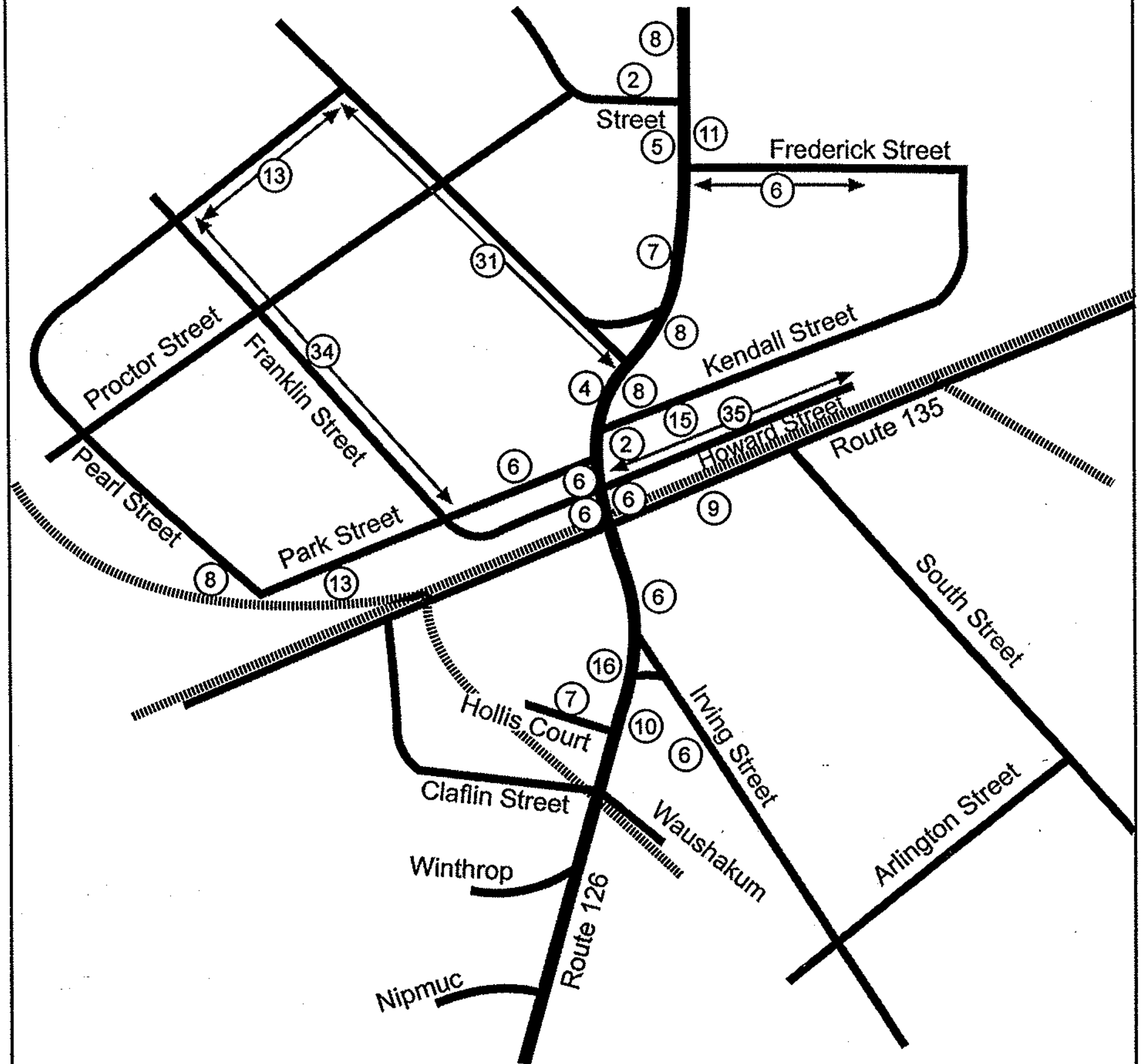
1.8 Parking Inventory

The Framingham Planning Department staff provided a summary of on- and off-street parking within the downtown Central Business District (CBD) area. Figure 9 provides a summary of on-street parking inventory in the downtown. Appendix A includes the inventories and summary graphics indicating both on-street and off-street parking locations surveyed.

As depicted, a total of 288 meters exist on the downtown area streets. The amount of off-street parking available equals approximately 2,825 spaces. These include private lots that are restricted to employees and/or residents of apartment buildings.

Numerous studies have been completed in the past related to a parking needs analysis of the CBD area. Although this report has not been specifically charged with assessing the downtown parking needs, it is evident through the field reconnaissance surveys that there is a need for better parking facilities in the CBD area. The MBTA project report also mentions that more parking is needed adjacent to the commuter rail station. Improvements to existing facilities may include the installation of curbing and pavement resurfacing along with replacing pavement markings and increasing signing of designated public parking lots, or possibly the construction of a parking structure to serve the entire downtown.

Parking for commuters is available in adjacent surface lots and parking structures. The MBTA currently has plans for providing additional spaces in the near future. The MBTA has also submitted a proposal to relocate the existing rail station approximately 700 feet to the west of the current station location. Mitigating measures for this project include the construction of an additional 95 parking spaces, and traffic signal upgrading/roadway improvements at the intersections of Route 126 with Route 135, as shown on Figure 10. The estimated construction cost is $290,000.



Total Metered Spaces = 288

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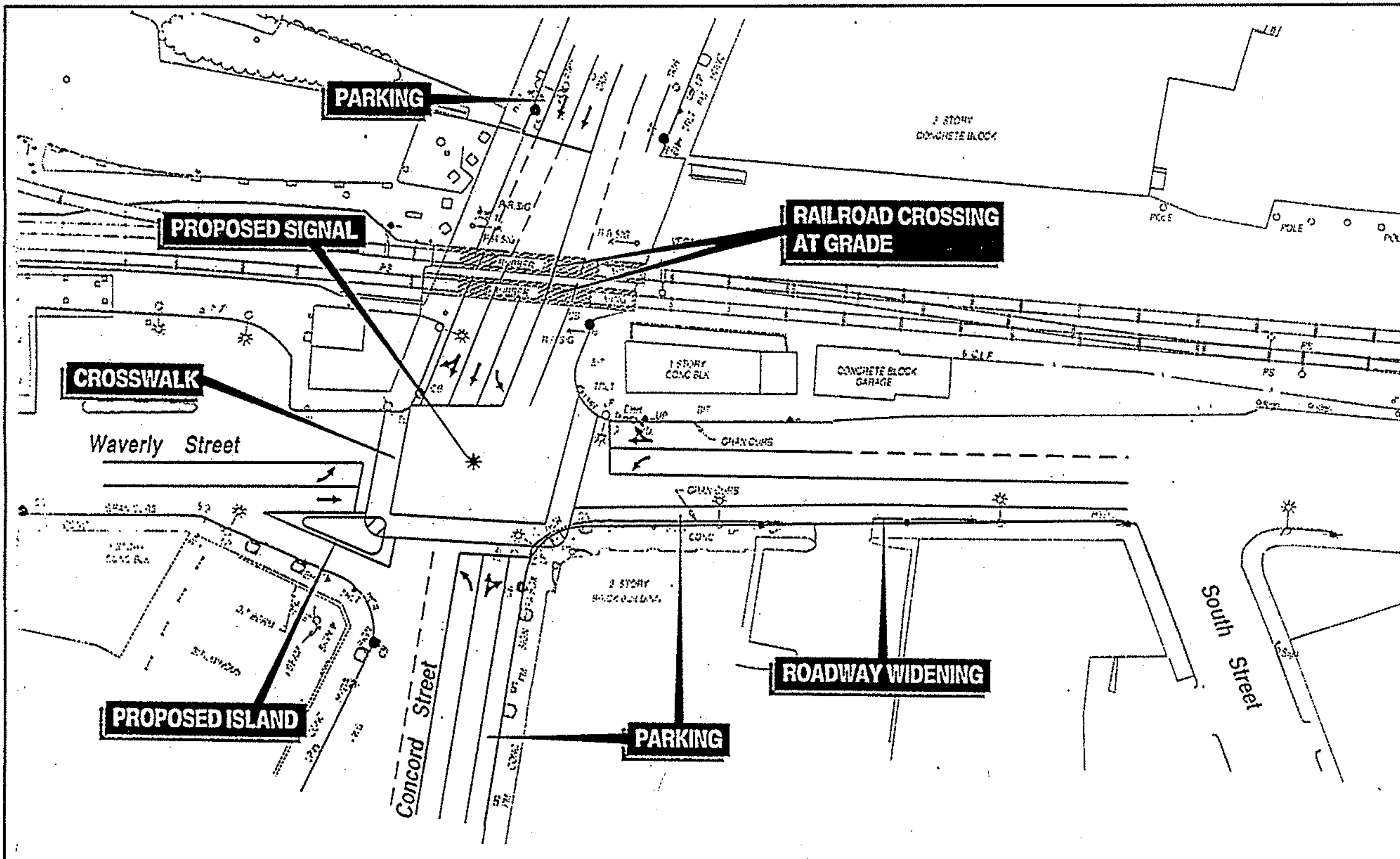
Downtown On-street Parking Inventory

Figure 9



Source: FEIR Worcester Commuter Rail Extension Project, FEIR

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Framingham, Massachusetts

Waverley Street and Concord Street Intersection Proposed Improvements Concept Plan

Figure 10

1.9 Traffic Accidents

Traffic accident data for twenty-eight intersections throughout the town was obtained from the Planning Department from the recently approved ADESA Auction Facility Traffic Impact Study. The data was compiled for that study by the Framingham Police Department and includes all reported accidents from January 1992 through December 1994.

Figure 11 illustrates the total number of accidents reported for the three-year study period for the key study intersections in the downtown area. As shown, the intersection of Route 126 and Route 135 experiences the greatest total number of accidents, averaging 23 per year. The intersections of Route 126 with Irving Street and Hartford Street both experience an average of 10 incidents each year. The next highest locations are Route 126 with Howard Street and Anzio/Gorman Road, which both experience 6 or more accidents each year.

The majority of the accidents were angle type collisions, with the exception of the intersection of Route 126 with Anzio/Gorman Road, which experiences greater than 50 percent rear end type collisions.

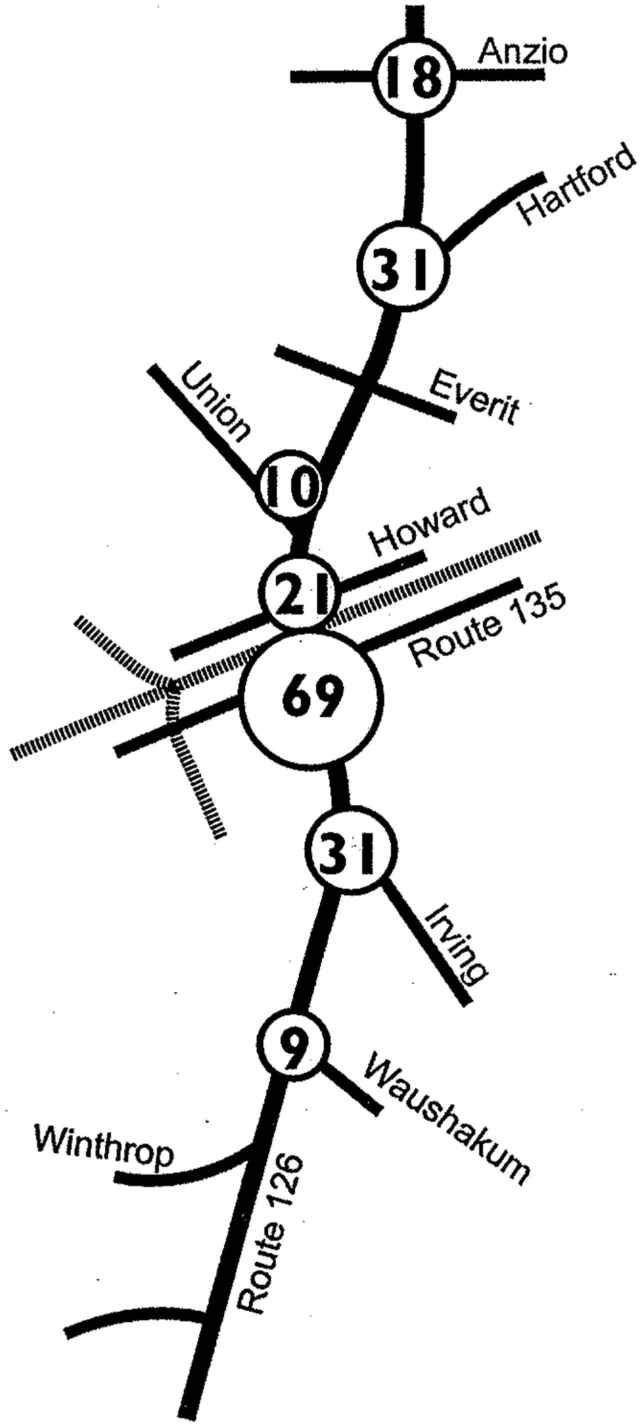
From the field reconnaissance survey it was apparent that the accidents associated with the congested areas of the corridor can be attributed to a number of factors. These include the lack of exclusive vehicle turn lanes, outdated traffic signal equipment, and confusing lane arrangements and traffic control devices. These factors typically cause increased confusion and delay for motorists, which creates hazards and promotes the occurrence of accidents.

1.10 Existing Operational Conditions

1.10.1 Methodology

The traffic flow efficiency of the study intersections was analyzed in terms of capacity and level of service operation. The analysis was performed in accordance with the guidelines of the *Highway Capacity Manual* (Transportation Research Board, Third Edition, 1994).

Level of service (LOS), an expression of the quality of driving conditions, is designated in a range from "A," which provides free flow



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Framingham, Massachusetts

Accident Inventory
3-Year Total

Figure
11

for nearly all vehicles and very low traffic delays (under five seconds per vehicle), to "F," which describes traffic conditions considered unacceptable by most drivers and is categorized by very long traffic delays (over 60 seconds per vehicle). LOS "C," a zone of stable flow characterized by average traffic delays, is a desirable condition for the design of new facilities; however, LOS "D," with somewhat greater delays, may be tolerated for short periods during peak travel times. LOS "D" is usually considered to be the boundary of acceptable operations during peak travel demand periods. LOS "E" represents a condition of capacity, or maximum possible flow, and is controlled by the alignment and cross-section design of a roadway or intersection.

Level of service for signalized intersections is defined in terms of the average stopped delay in seconds per vehicle approaching the intersection for the peak 15-minute analysis period of the peak hour.

Level of service for one- and two-way stop controlled unsignalized intersections is also based in terms of average delay. Level of service rankings are given to turning movements to and from minor cross street movements (major street through traffic experiences little or no delay as it passes through the intersection). The ranking is determined by calculating average delay for turning movements. Average delay is defined as the elapsed time between the arrival of a vehicle at the rear of the queue and the time the vehicle crosses the stop line.

Table 6 and Table 7 summarize the relationship between average total delay and level of service for unsignalized and signalized intersections, respectively.

Table 6

Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Total Delay (seconds) per vehicle
A	0.0 to 5.0
B	5.1 to 10.0
C	10.1 to 20.0
D	20.1 to 30.0
E	30.1 to 45.0
F	> 45.0

Source: *Highway Capacity Manual*, Special Report 209. Transportation Research Board 1994.

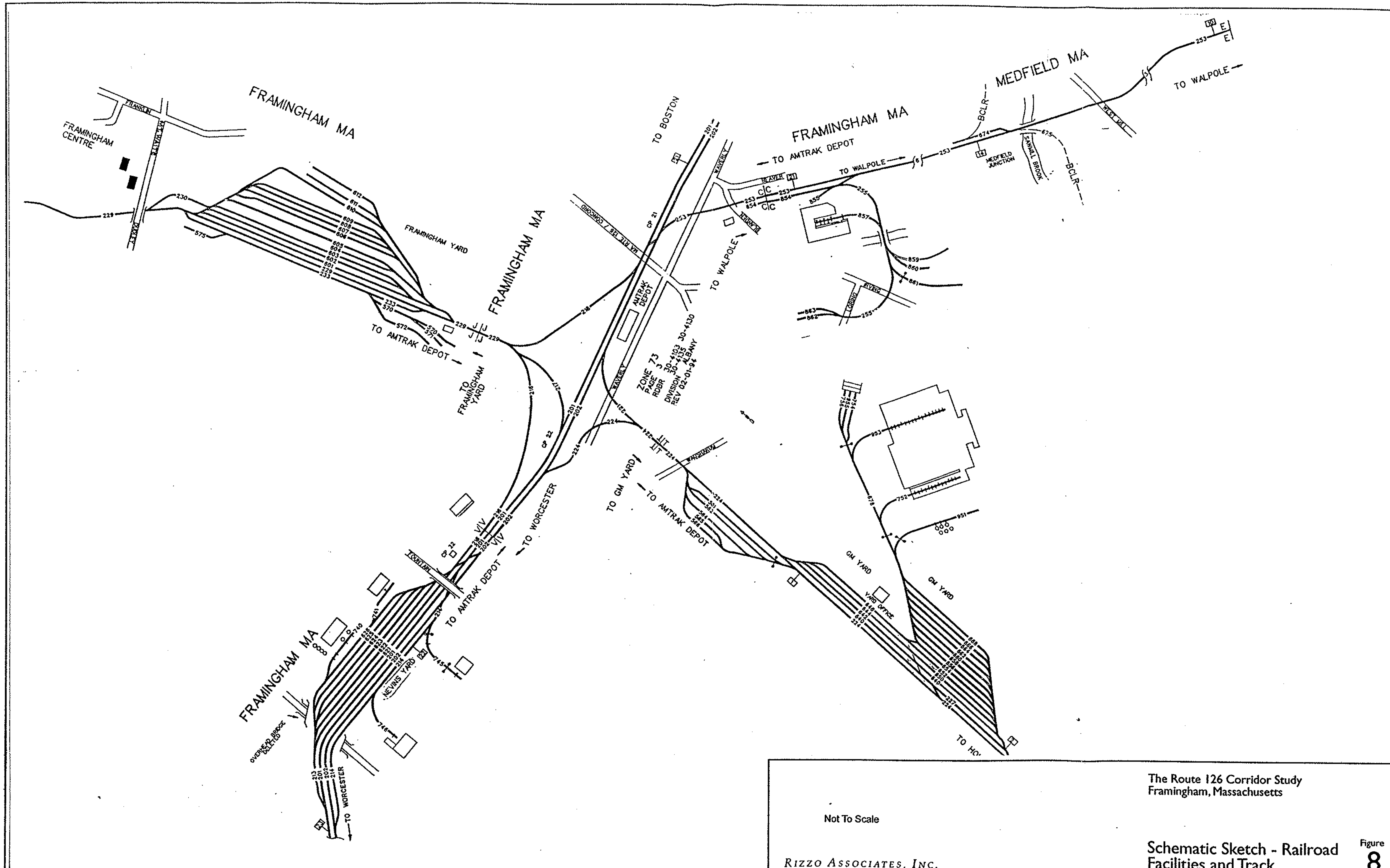
Table 7 Level of Service Criteria for Signalized Intersections

Level of Service (LOS)	Traffic Quality	Stopped Delay Per Vehicle[1] (sec)
A	LOS A occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths also contribute to low delay.	0 to 5.0
B	LOS B generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	5.1 to 15.0
C	LOS C has higher delays that may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.	15.1 to 25.0
D	At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity (V/C) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	25.1 to 40.0
E	LOS E is considered to be the limit of acceptable delay in heavily traveled roads and dense commercialized areas. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent.	40.1 to 60.0
F	LOS F is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high V/C ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes of such delays.	>60.0

1 Average stopped delay per vehicle for a 15-minute analysis period.
Source: *Highway Capacity Manual*, Special Report 209, Transportation Research Board (TRB), National Research Council, 1994.

1.10.2 Level of Service Results

Table 8 presents the intersection level of service analysis results for existing conditions. The results, depicted on Figure 12, show that the following two signalized intersections currently operate at acceptable conditions (LOS "D" or better) in both the morning and afternoon peak hours:



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Schematic Sketch - Railroad Facilities and Track

Figure 8

Table 8 **Intersection Level of Service Summary — Existing Conditions**

Signalized Intersections	AM Peak Hour Delay[1]	AM Peak Hour LOS[2]	PM Peak Hour Delay	PM Peak Hour LOS
Route 126/Waushakum Street	19	C	60+	F
Route 126/Route 135	60+	F	60+	F
Route 126/Howard Street	18	C	60+	F
Route 126/Lincoln Street	8	B	9	B
Route 126/Everit Avenue	60+	F	22	C
Route 126/Hartford Street	60+	F	60+	F
Route 126/Anzio Road	19	C	60+	F

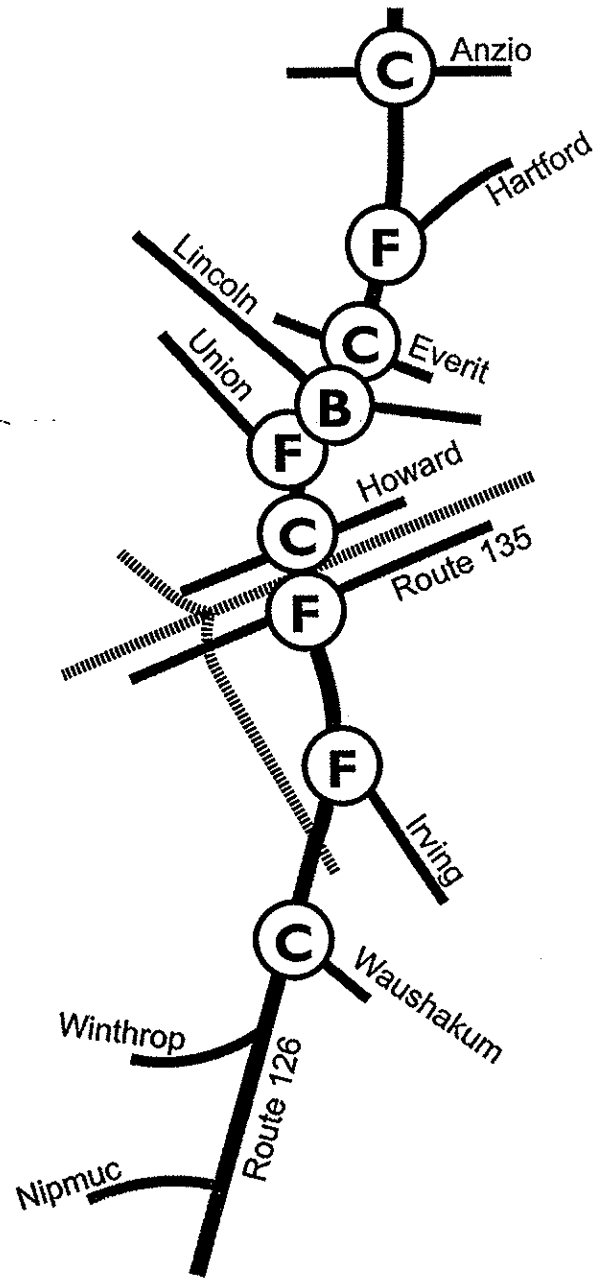
Unsignalized Intersections[3]	AM Peak Hour				PM Peak Hour			
	Delay		LOS		Delay		LOS	
	Major	Minor	Major	Minor	Major	Minor	Major	Minor
Route 126/Irving Street	7	60+	B	F	8	60+	B	F
Route 126/Union Avenue	20	60+	C	F	60+	60+	F	F

1 Average overall intersection delay in seconds, rounded to nearest second
2 Level of service
3 Delay and level of service shown for worst intersection movement for minor streets

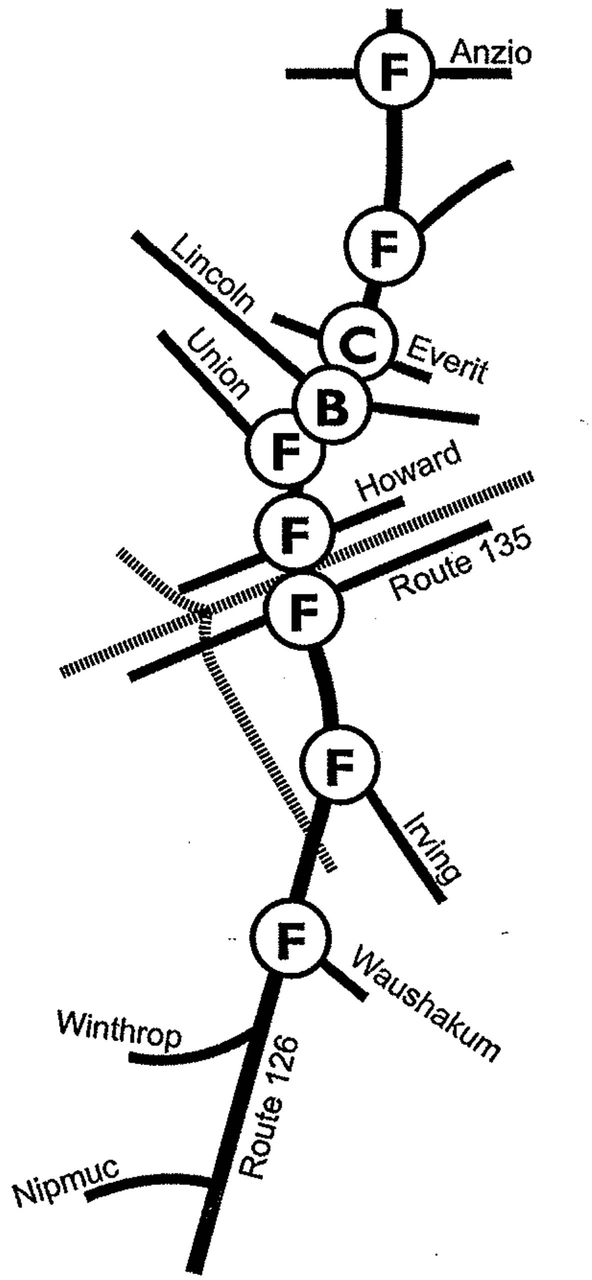
- Route 126/Lincoln Street
- Route 126/Everit Street

The remaining five signalized intersections operate at deficient conditions (LOS "F") in at least one peak hour (morning and/or afternoon). At the two unsignalized study intersections, minor street left-turn movements operate at LOS "F" conditions in both the morning and afternoon peak hours. All major street movements operate at acceptable conditions at these locations except at Route 126/Union Avenue, where

Morning Peak Hour



Afternoon Peak Hour



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Framingham, Massachusetts

Level-of-Service Summary
Existing Condition

Figure 12

the left-turn movement from the major street operates at LOS "F" during the afternoon peak hour.

Level of service calculations are provided in Appendix A.

2.0 Development and Assessment of Recommended Improvements

2.1 Introduction

Recommended improvements have been set forth in this study within two groups. The first, short-term improvements, comprises a program of enhancements to the Route 126 Corridor, principally aimed at eliminating intersection bottlenecks and achieving more efficient vehicle travel through the study area. It also addresses changes in rail procedures and equipment to reduce delay at the rail crossings. These intersection treatments are further intended to improve the environment for pedestrians and to increase safety for all users. Short-term improvements have a relatively lower construction cost and are intended to be implemented within a two- to four-year time frame.

It is estimated that the short-term improvements program will mitigate a significant number of the delays, hazards, and inefficiencies which currently occur within the Route 126 Corridor. With vehicular traffic growth as well as the likelihood for an increase in passenger train (and potentially freight train) activity in the future, however, a long-term solution will be necessary to provide lasting benefits to the corridor's operation. This solution will entail relatively greater impacts and construction cost. There will also be the need to acquire additional right-of-way. Funding for this long-term improvement will include the participation of state and/or federal agencies. The degree of community consensus and support for the proposed long-term solution will facilitate the town's process to achieve necessary funding. Nevertheless, it is reasonable to expect the improvement may have a completion horizon of 10 years or more. For traffic modeling and testing of alternatives, this study has assumed future volume conditions to the year 2020.

2.2 Short-term Improvements

Based on the analysis findings, the scale of traffic management improvements necessary to address existing operations and safety needs is identified. The procedure used to develop and evaluate the improvement programs is described in the following sections.

2.2.1 Improvement Strategies

The planning strategies developed to address improved travel along the Route 126 Corridor entailed a refinement and balance of the environment, urban design elements, and new technology available in intelligent transportation systems (ITS) operation. These measures helped to define the scope of the analysis by providing boundaries for the kinds of improvements that would be considered acceptable for short-term implementation. In total, 10 improvement strategies are recommended based on the principle of low to moderate implementation cost. The short-term project improvement strategies considered at study locations are as follows:

- Signal rephasing and/or retiming
- Adding signal heads and/or phases or special functions
- New signal installation and/or replacement of traffic control signal equipment
- Interconnecting and coordinating existing signals
- Separate pedestrian signal phases
- New warning and regulatory signs
- Painted channelization
- Lane striping
- Physical channelization
- Construction of wheelchair ramps

The actions that have been suggested for improving the physical and operational characteristics of the key individual intersections located in this corridor are summarized in Section 2.2.2. The improvement actions developed for each intersection are intended to take advantage of the opportunities for improving traffic flow as a means of creating greater vehicle access to the downtown.

The primary reason for improving the structure of traffic circulation through the town center at this time is the inefficiency of the system as it exists today. A more accessible town center could and should accommodate additional volumes of traffic in the downtown area. Increased local traffic demand will directly benefit merchants and contribute to an improved economic vitality overall. Increased local traffic volumes could, however, offset any resultant reductions in the amount of energy consumption and pollutant emissions. In order to address this issue, we have developed a systemwide traffic operational management through the corridor. The interconnection and coordination of traffic signals along this corridor will curtail the amount of "stop and go" operation and periodic delays experienced by motorists. This systemwide improvement will also maximize the effectiveness of improvements. As traffic flow becomes more orderly, travel times will be reduced at individual intersections, accessibility will be increased, and energy and pollution savings will be realized. The net effect of this systemwide coordination is discussed in Section 3.3, "Future Operating Conditions."

2.2.2 Improvement Actions

Project improvement actions are developed by location to establish a coordinated package of actions within the study corridor segments.

The procedure for developing improvement actions relies on traffic engineering analysis, design principles, and accepted practice. It is carried out as follows:

- Examine the deficiencies associated with each location in order to identify the underlying causes of the problems.
- Select and test alternative solutions to the deficiencies developed in response to findings of the Detailed Conditions Analysis. Testing and evaluation are at the project design level of analysis.
- Prepare the concept design drawings at pre-implementation level of detail, and estimate project costs.

Specific analysis, design techniques, and improvement actions vary by location throughout the corridor. The design thought process, however, makes use of low cost capital and management actions, and the level of detailing for short-term action planning.

Project detailing for the study corridor consists of two components: improvement concept design drawings and estimated construction costs.

Concept design drawings are prepared for each location at a relatively high level of detail, indicating the location and characteristics of proposed physical, operational, and management improvement actions.

The estimated improvement cost (exclusive of engineering design) for each location is developed using the 1995 statewide unit prices and the concept design drawings.

The project improvements for the corridor summarized in Table 9 and shown on Figure 13 through Figure 22 are examples of the type of low cost, readily implementable actions that are appropriate to achieve improved performance and to maintain the physical integrity of the Route 126 corridor.

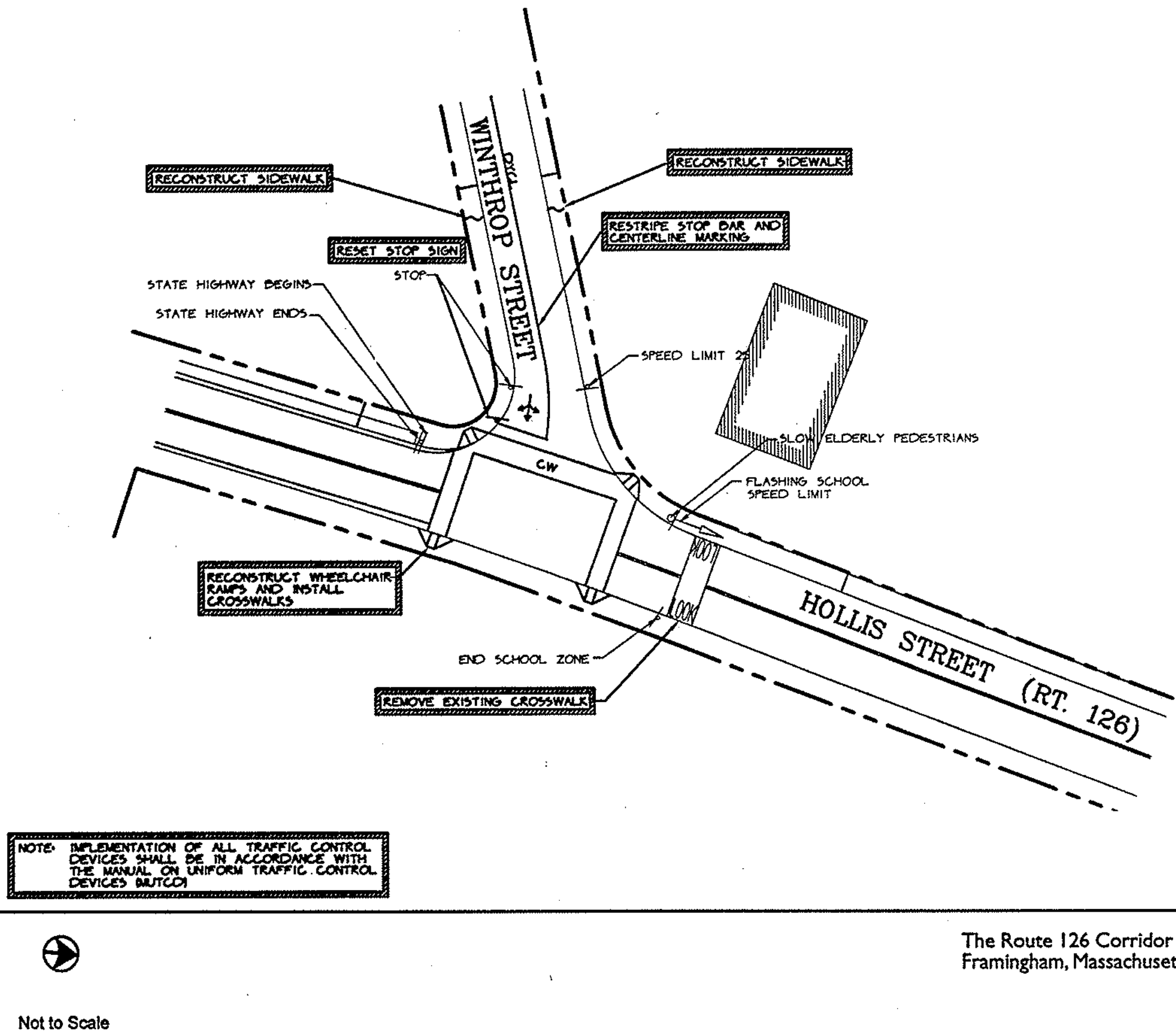
2.2.3 Intelligent Transportation Systems Applications

Other low-cost system improvements include the use of Intelligent Transportation Systems (ITS) technologies to improve safety and reduce delay at the at-grade railroad crossing. ITS applications include a wide variety of new communications technologies, monitoring equipment, and computer systems to operate transportation facilities. These technologies are gaining national and international acceptance as an important approach to improve the overall performance of transportation systems and would greatly benefit the users of the Route 126 Corridor.

The deployment of ITS improvements on the Route 126 Corridor would follow United States Department of Transportation (USDOT) guidance as described in the National ITS Architecture. The USDOT developed the National ITS Architecture to "provide a common structure for the design of intelligent transportation systems." (*ITS Architecture — Executive Summary*, Federal Highway Administration, June 1996). To facilitate this effort, the National ITS Architecture describes the characteristics of different ITS subsystems for thirty user service groups

Table 9 Recommended Short-term Improvement Program

Location	Recommended Actions	Estimated Cost
Route 126 at Winthrop Street (Figure 13)	■ Construct wheelchair ramps in all corners and paint crosswalks ■ Restripe lane markings ■ Reconstruct sidewalks	$ 15,000
Route 126 at Waushakum Street (Figure 14)	■ Install railroad-highway markings and warning signs ■ Upgrade pavement markings ■ Optimize signal timing ■ Construct wheelchair ramps and paint crosswalks ■ Install curbing and construct sidewalk on Avon Street	$ 25,000
Route 126 at Claflin Street (Figure 15)	■ Restripe lane markings ■ Construct wheelchair ramps and paint crosswalks ■ Install STOP sign and STOP line on Claflin Street approach ■ Reconstruct sidewalk along the east side on Route 126	$ 5,000
Route 126 at Irving Street (Figure 16)	■ Restripe lane markings ■ Remove traffic island	$ 3,000
Route 126 at Route 135 (Figure 17)	(Per MBTA Worcester Commuter Rail Extension project and the additional improvement measures) ■ Restripe lane markings ■ Reconstruct sidewalk on northeast and northwest corners ■ Construct wheelchair ramps and paint new crosswalks ■ Reconstruct traffic signal with a closed loop system, and interconnect/coordinate signals ■ Prohibit parking on Route 126 east side during morning (7:00 to 9:00 A.M.) peak period ■ Cold planning and resurfacing ■ Eliminate parking on Route 135 south side	$300,000
Route 126 at Howard/ Park Streets (Figure 18)	■ Reconstruct traffic signal system with a closed loop system, and interconnect/coordinate signals ■ Construct wheelchair ramps and paint crosswalks ■ Restripe lane markings ■ Reconstruct sidewalk along Howard Street ■ Adjust signal heads	$ 50,000
Route 126 at Union Avenue (Figure 19)	■ Remove traffic island and channelize intersection approaches ■ Install a fully actuated traffic signal under closed system, and interconnect/coordinate signals ■ Restripe lane markings and install regulatory/warning signs	$150,000
Route 126 at Lincoln Street (Figure 20)	■ Reconstruct traffic signal with a closed loop system, and interconnect/coordinate signals ■ Install pedestrian signal heads on all corners ■ Restripe crosswalks, lane markings, and install regulatory signs ■ Provide a channelized left turn lane on Route 126 northbound approach	$ 55,000
Route 126 at Everit Avenue (Figure 21)	■ Reconstruct traffic signal with a closed loop system, and interconnect/coordinate signals ■ Restripe crosswalk and lane line markings ■ Repair pedestrian buttons on all corners	$ 50,000
Route 126 at Hartford Street (Figure 22)	■ Construct wheelchair ramps on all corners and paint crosswalks ■ Reconstruct traffic signal with closed loop system, and interconnect/ coordinate signals ■ Restripe pavement markings and install regulatory signs	$135,000
Route 126 at Anzio/ Gorman Road	■ Reconstruct traffic signal with closed loop system, and interconnect/ coordinate signals	$ 35,000



The Route 126 Corridor Study
Framingham, Massachusetts

Concept Improvement Plan
Route 126 at Winthrop Street

Figure 13

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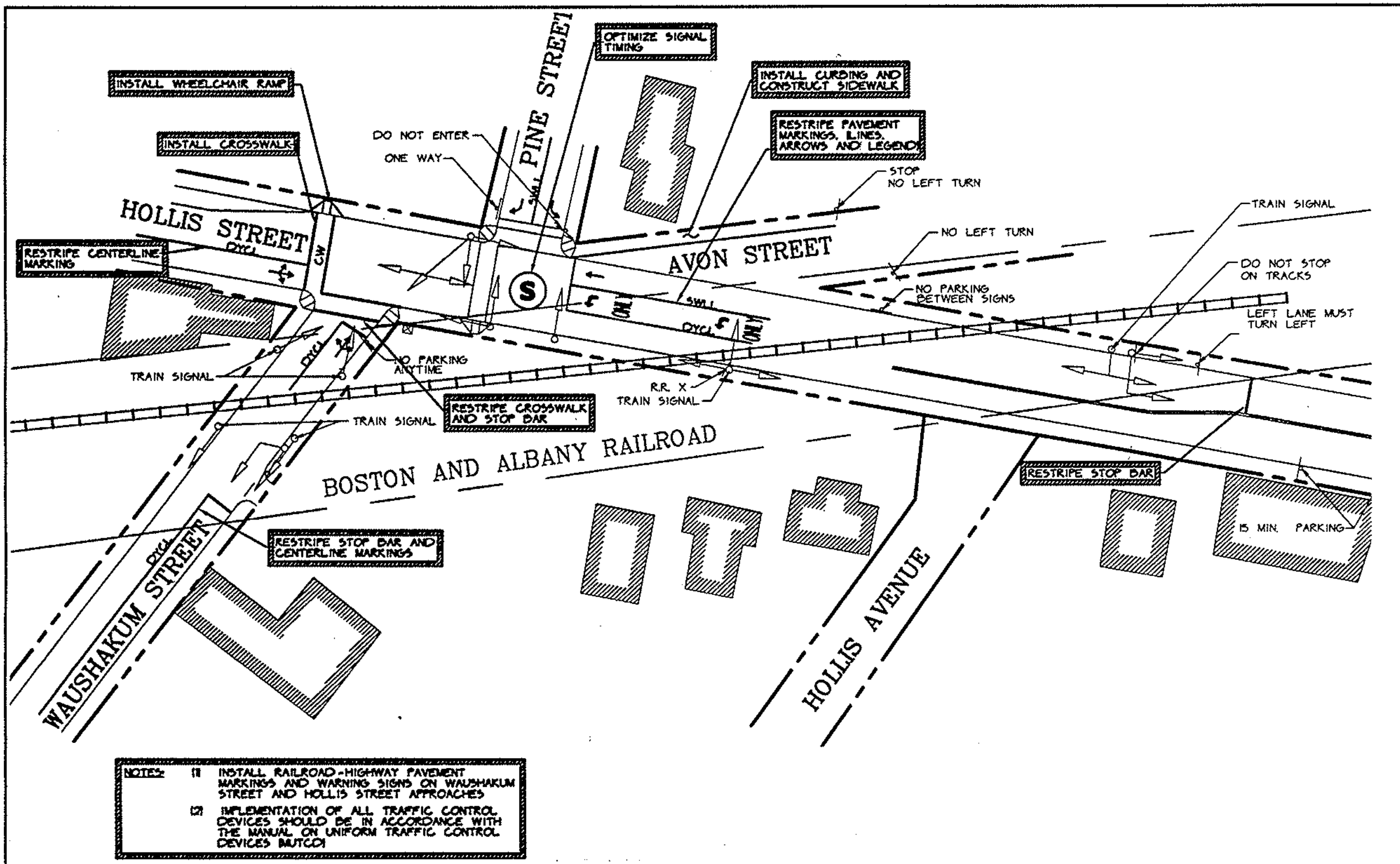

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The Route 126 Corridor Study
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Concept Improvement Plan
Route 126 at Waushakum Street

Figure 14

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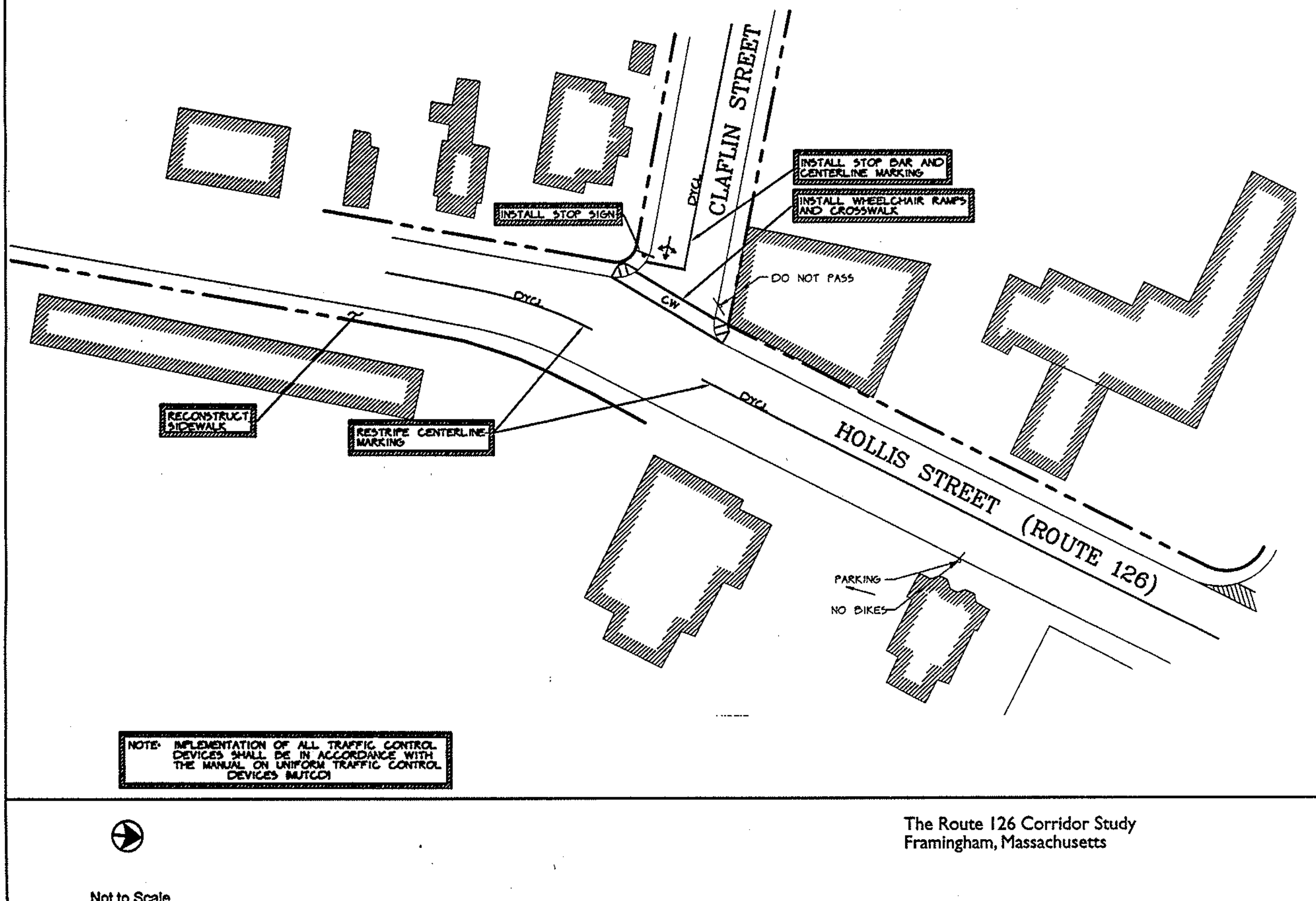

The Route 126 Corridor Study
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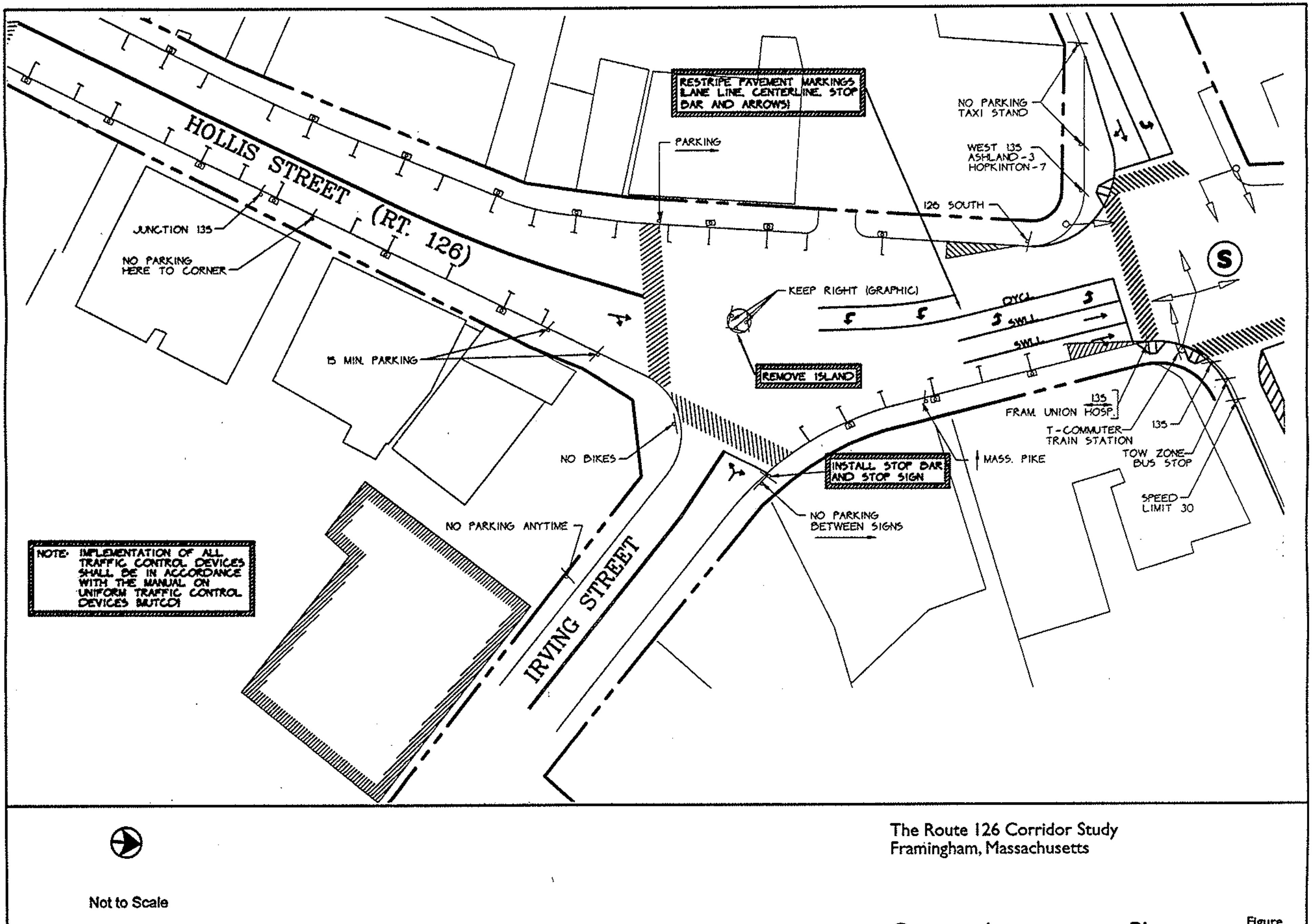
Concept Improvement Plan
Route 126 at Claflin Street

Figure 15

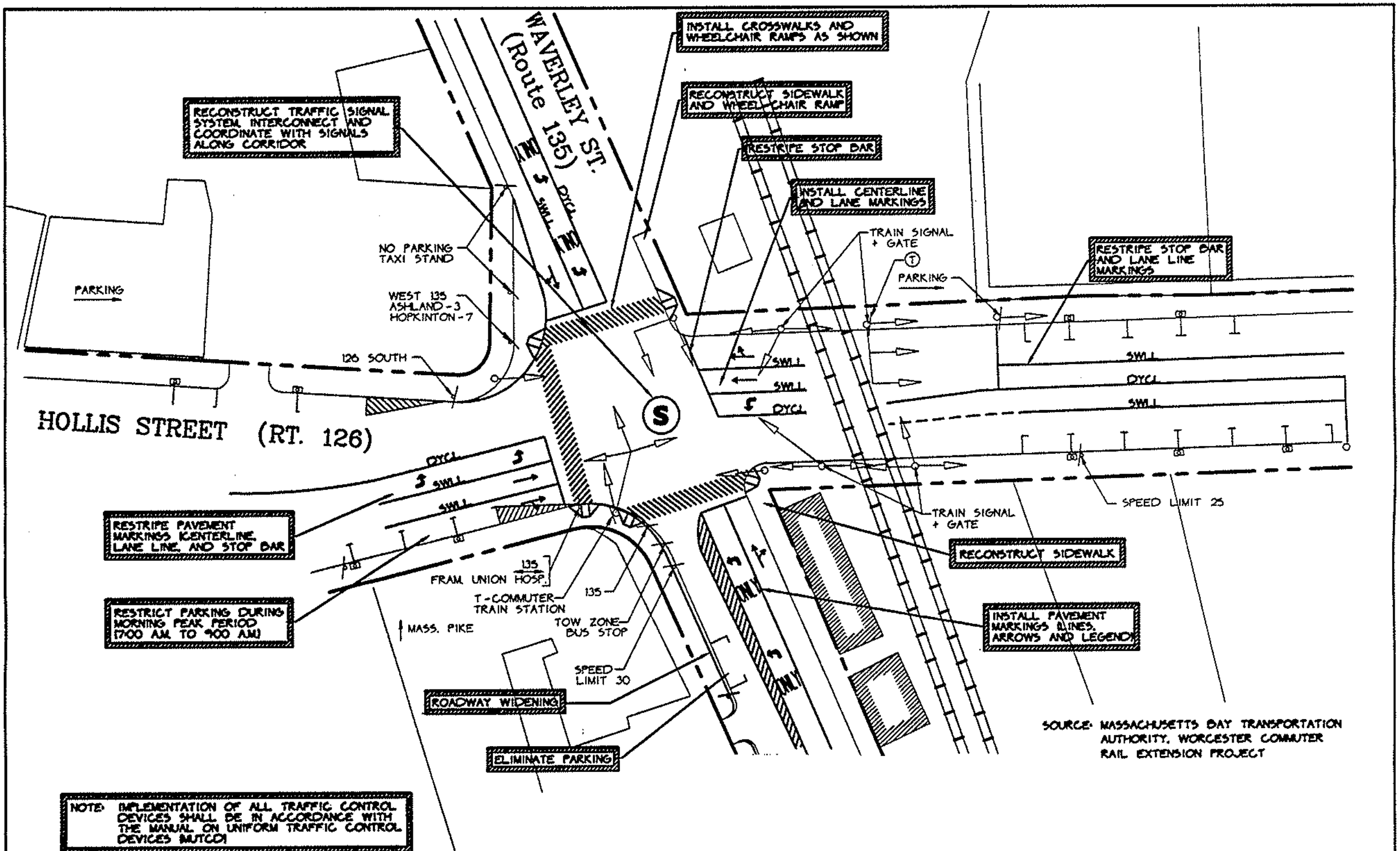


The Route 126 Corridor Study
Framingham, Massachusetts

Concept Improvement Plan
Route 126 at Irving Street

Figure 16

Rizzo Associates, Inc.



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The Route 126 Corridor Study
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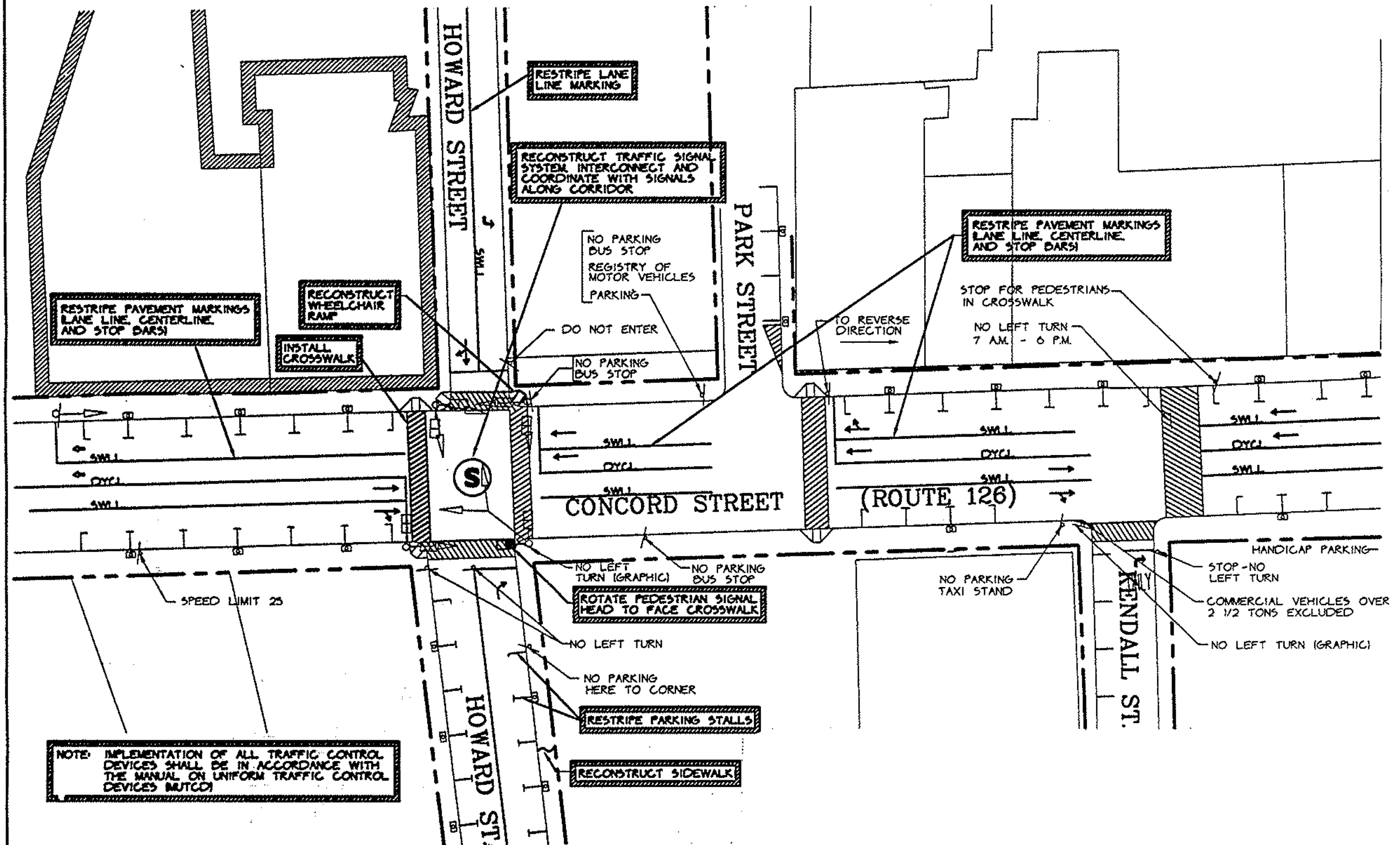
Concept Improvement Plan
Route 126 at Waverley Street

Figure 17



The Route 126 Corridor Study
Framingham, Massachusetts

Figure 18

Concept Improvement Plan
Route 126 at Howard Street

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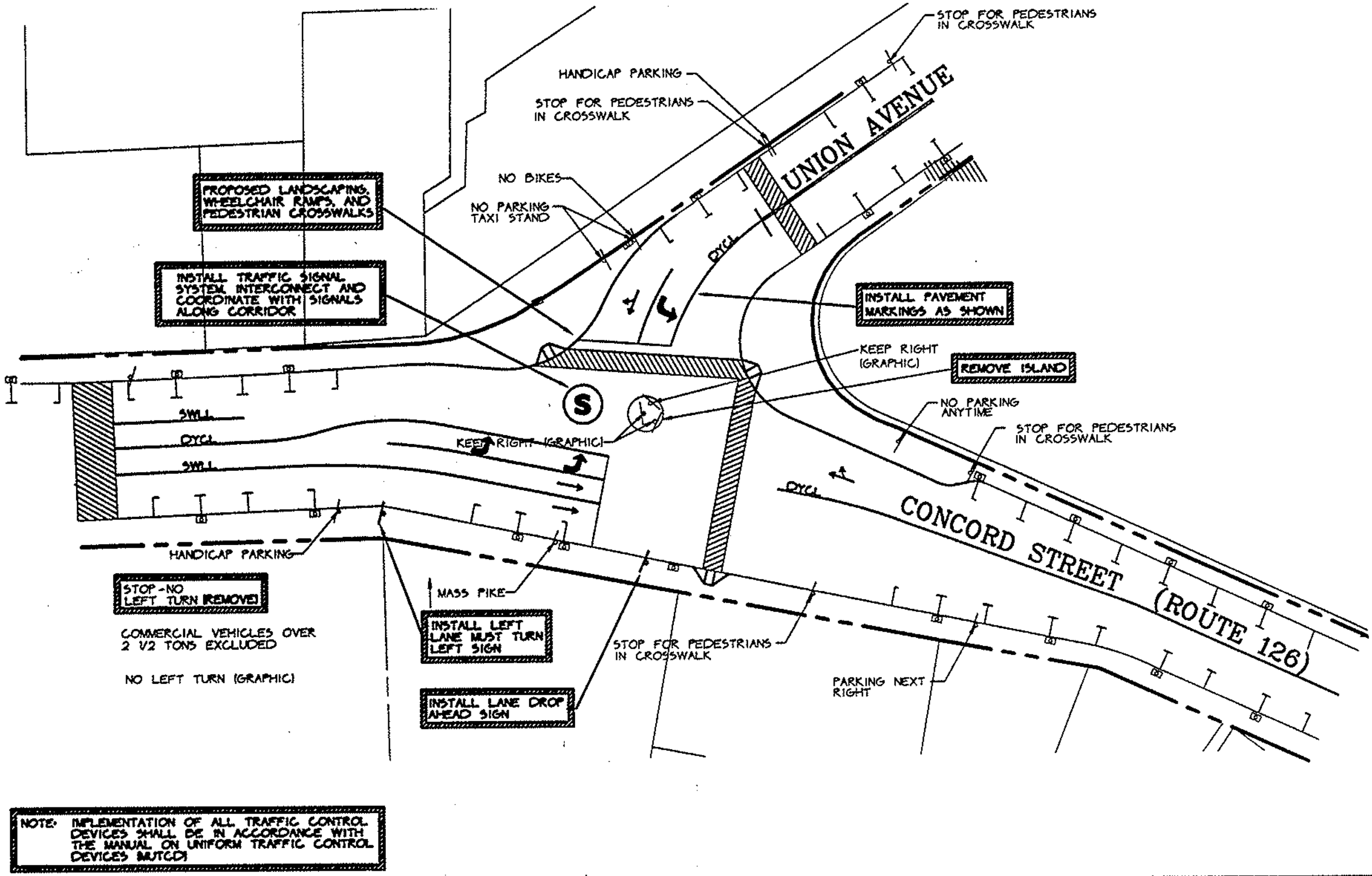

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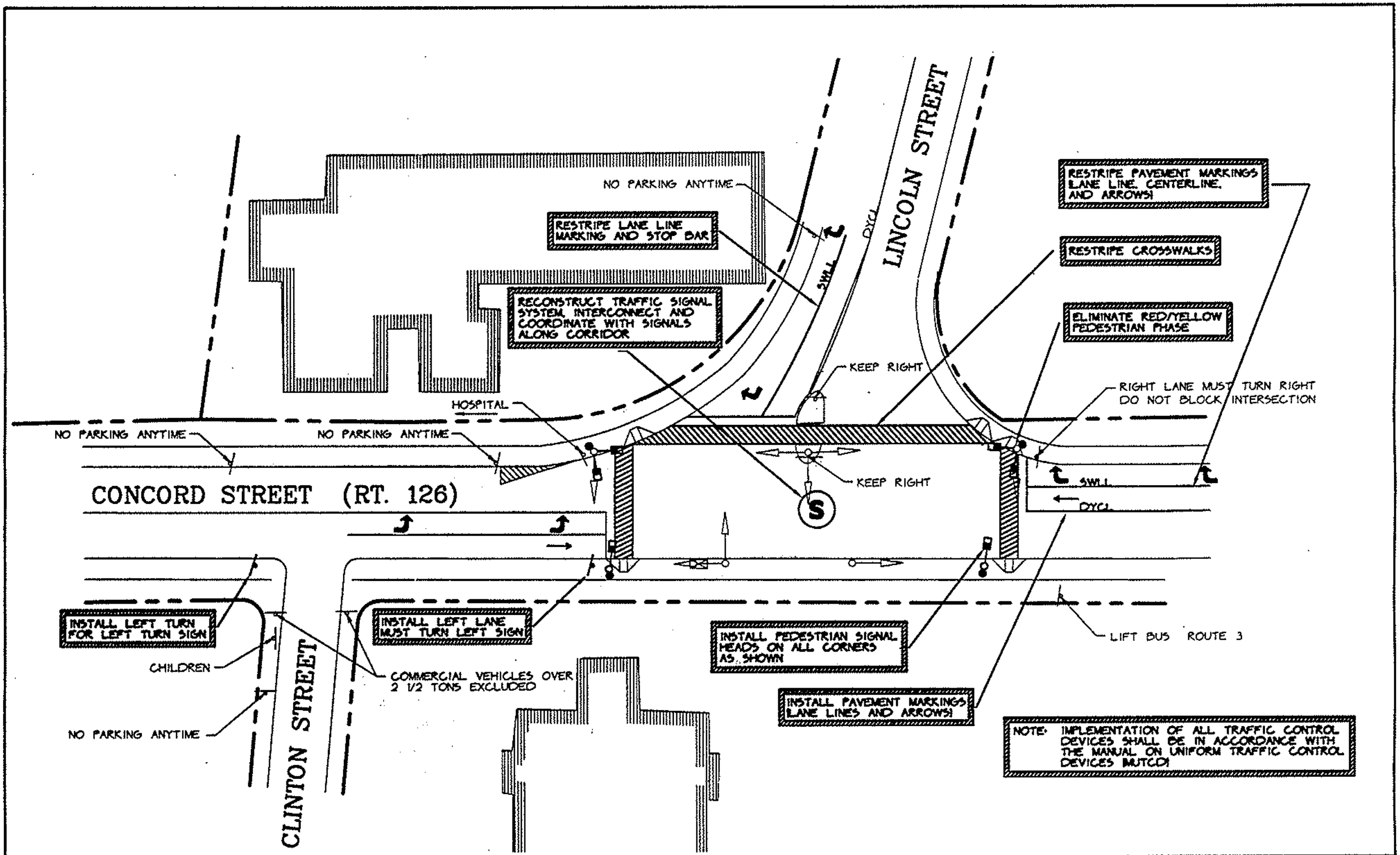
The Route 126 Corridor Study
Framingham, Massachusetts

Concept Improvement Plan
Route 126 at Union Avenue

Figure
19



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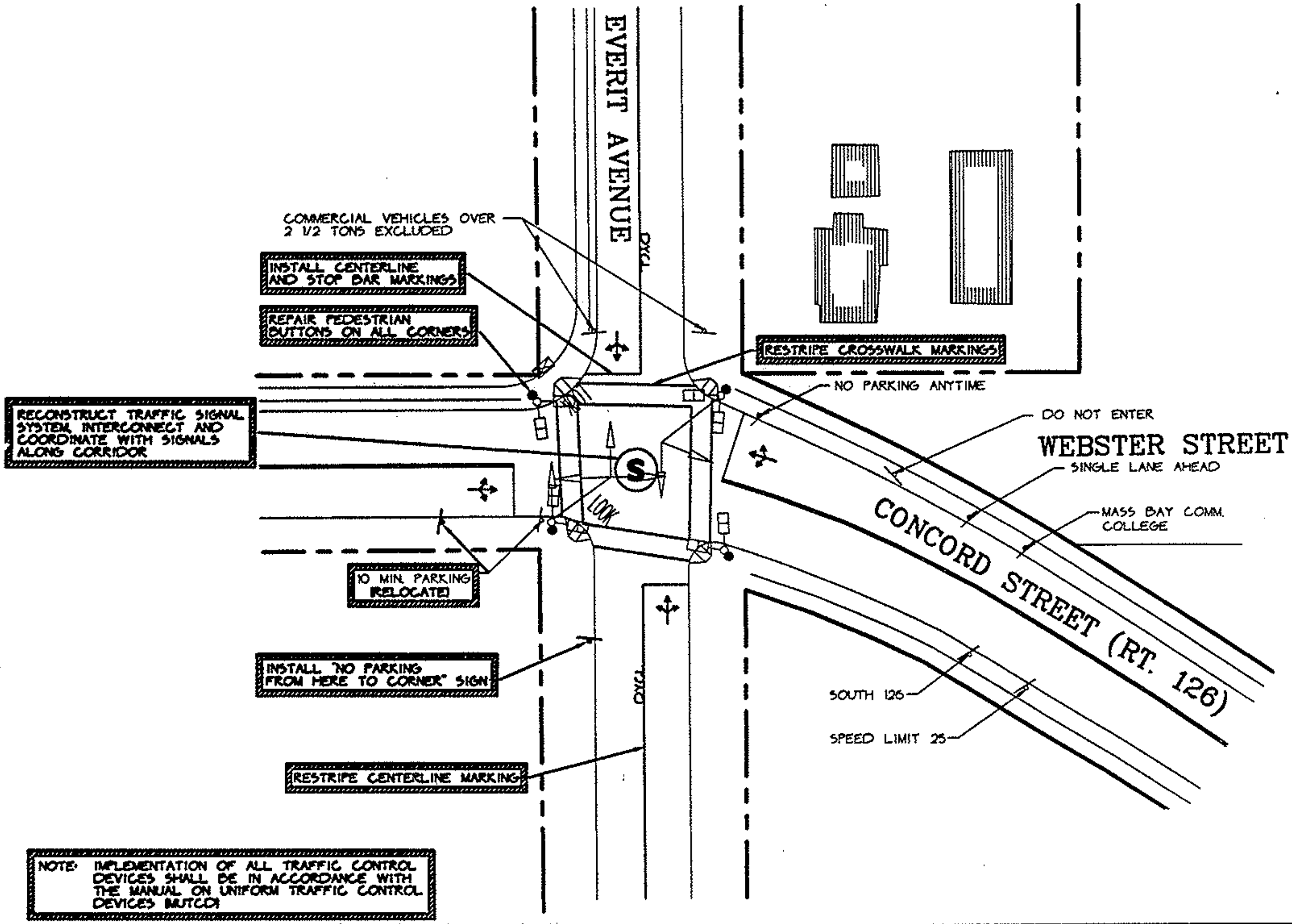
The Route 126 Corridor Study
Framingham, Massachusetts

Concept Improvement Plan
Route 126 at Lincoln Street

Figure
20



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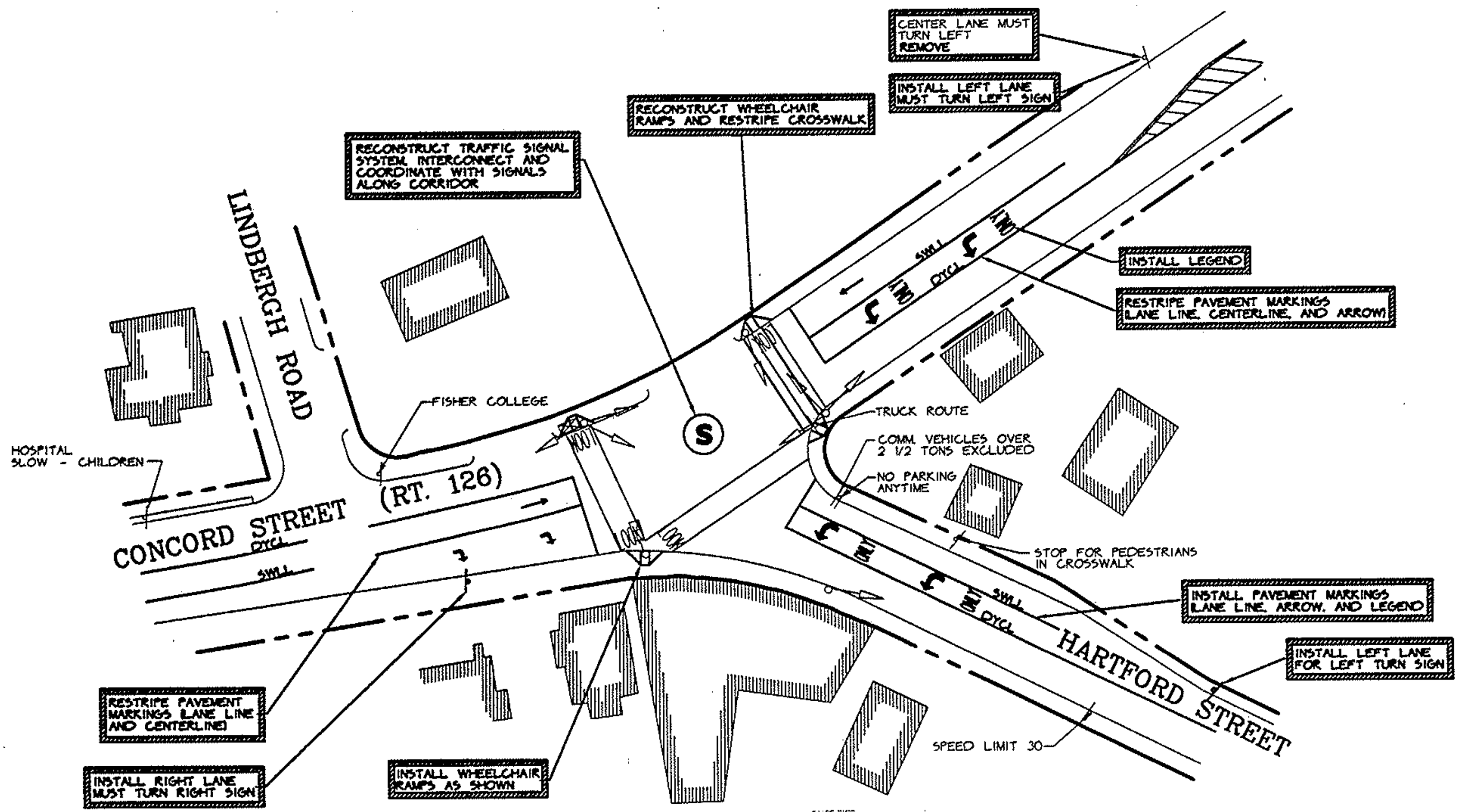
The Route 126 Corridor Study
Framingham, Massachusetts

Concept Improvement Plan
Route 126 at Everit Avenue

Figure
21



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The Route 126 Corridor Study
Framingham, Massachusetts

Concept Improvement Plan
Route 126 at Hartford Street

Figure
22

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presented in Table 10. The focus of the improvements for this project is the Highway–Railroad Intersection and Traffic Control user services. The recommended ITS improvements for near-term implementation are drawn from these categories.

Table 10 **ITS User Services**

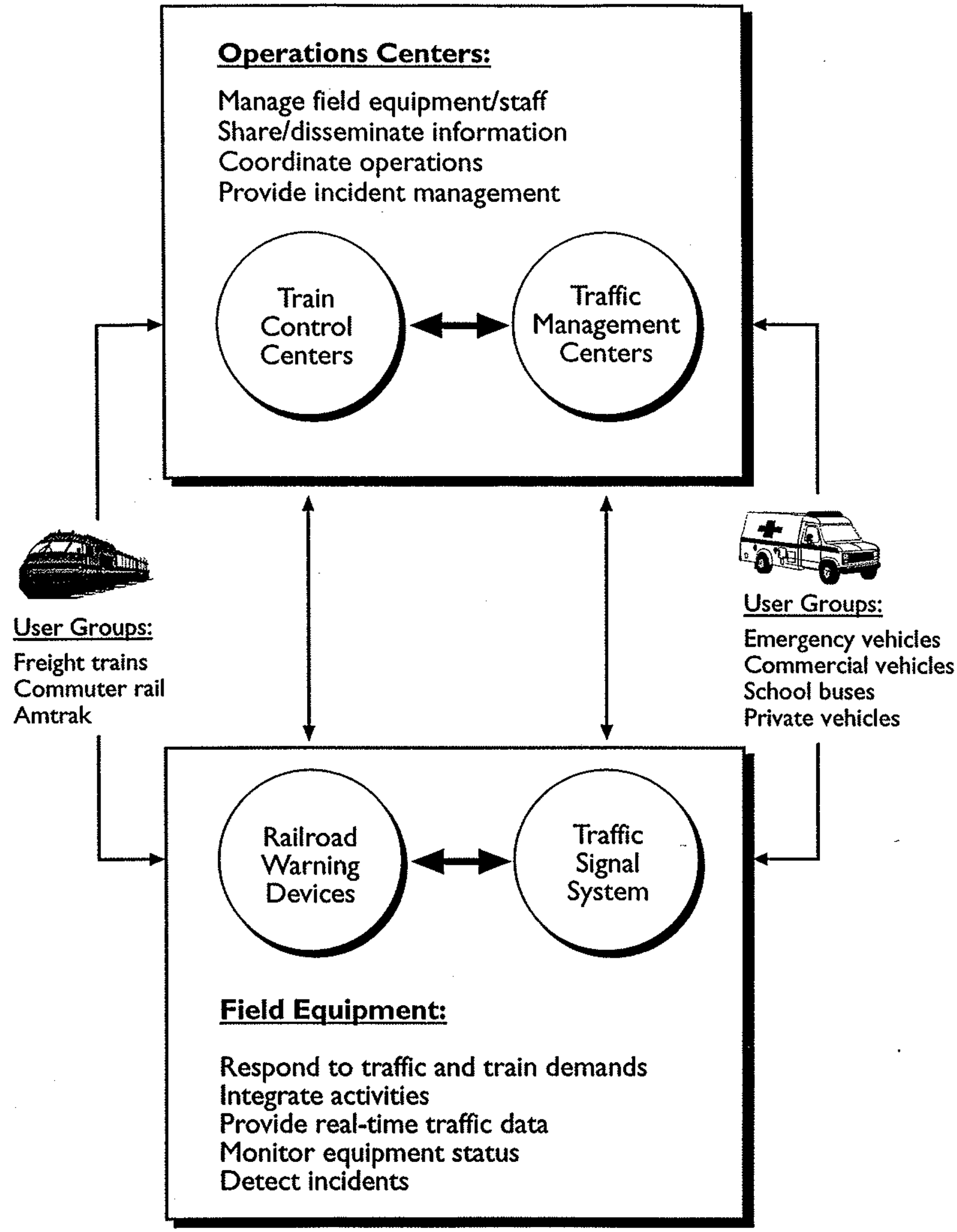
User Services Bundle	User Services
Travel and Transportation Management	■ En Route Driver Information ■ Route Guidance ■ Traveler Services Information ■ Traffic Control ■ Incident Management ■ Emissions Testing and Mitigation ■ Demand Management and Operations ■ Pre-trip Travel Information ■ Ride Matching and Reservation
Public Transportation Operations	■ Public Transportation Management ■ En Route Transit Information ■ Personalized Public Transit ■ Public Travel Security
Electronic Payment	■ Electronic Payment Services
Commercial Vehicle Operations	■ Commercial Vehicle Electronic Clearance ■ Automated Roadside Safety Inspection ■ On-board Safety Monitoring ■ Commercial Vehicle Administration Processes ■ Hazardous Materials Incident Response ■ Freight Mobility
Emergency Management	■ Emergency Notification and Personal Security ■ Emergency Vehicle Management
Advanced Vehicle Control and Safety Systems	■ Longitudinal Collision Avoidance ■ Lateral Collision Avoidance ■ Intersection Collision Avoidance ■ Vision Enhancement for Crash Avoidance ■ Safety Readiness ■ Pre-Crash Restraint Deployment ■ Automated Highway System
Highway-Railroad Intersection	■ Highway-Railroad Intersection Services

The Highway–Railroad Intersection user service provides the context for identifying and developing ITS applications to improve the operation of the Route 126 at-grade railroad crossing. Elements of this user service would be complemented by elements of the Traffic Control user service, such as traffic signal systems. The initial deployment of ITS measures would focus on roadside and trackside subsystems, operation center improvements, and communications networks. Future long-range improvements would build upon the proposed improvements and could include in-vehicle ITS systems to notify emergency vehicles about the status of the railroad gates at the intersection.

Figure 23 describes a long-range system architecture for a fully integrated system of field equipment, vehicles, and operations centers. This model provides the long-range vision to guide the deployment of near-term ITS improvements at the Route 126 railroad crossing and along the Route 126 corridor. Under the proposed system architecture, new roadside and trackside equipment would be deployed to provide real time information about equipment status and system operations. Train control and traffic management centers would be integrated with each other to share information and, as needed, to provide operational support. The operations centers would provide real time information to trains and vehicular traffic operating along the Route 126 corridor.

Several recommendations are made to deploy ITS elements along the Route 126 corridor. These improvements would address existing operational concerns, would improve conditions along the corridor until the proposed underpass is constructed, and would build a foundation for future ITS deployment. The recommendations recognize that certain elements are already either in place, such as train control centers, or planned, such as a regional traffic management center. The recommended actions would provide local ITS components that specifically address the needs of the Route 126 corridor, but are planned within a larger regional context that is illustrated on Figure 23. The recommended ITS improvements for the Route 126 corridor are discussed below.

Railroad Warning Devices. The railroad warning devices include flashing lights and gates. These devices are activated when an approaching train breaks a relay switch before entering the intersection. The proposed improvements would interconnect the controller for the railroad warning device with the controller for the new closed loop traffic signal system. With this configuration, traffic signal patterns could be adjusted to accommodate the train crossing. In addition, the warning devices would be upgraded to include systems to monitor the equipment status and to provide automatic notification of equipment malfunction to the train control center. This system would also be used to monitor when gates are lowered and no train crosses the intersection.



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The Route 126 Corridor Study
Framingham, Massachusetts

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Figure 23
ITS Deployment Framework

The cost associated with implementation of these devices is estimated at $10,000.

Traffic Signal System. As described earlier in this report, a new closed loop traffic signal system would be implemented throughout the Route 126 corridor to improve traffic operations. The proposed system would include the capability for designated personnel to access and operate the traffic signal system over phone lines. This would allow more effective monitoring of system status, as well as provide the ability to make adjustments to traffic signal timing patterns from remote locations. In addition, at the Route 126 railroad intersection, the traffic signal system would be integrated with the railroad warning device system to improve traffic operations when the railroad gates are lowered for passing trains.

Closed Circuit TV Cameras. The installation of two closed circuit television (CCTV) cameras is recommended to monitor conditions and to verify system status. The cameras would be operated at one of the control centers, but the images would be available on an as needed basis at each of the train control centers and traffic management centers described below. The CCTV cameras would use the same communications backbone as the traffic signal system. The cameras would provide real time data to confirm the occurrence of incidents, equipment malfunction, and other operational issues. CCTV cameras have been successfully used in North Carolina to monitor the implementation of improvements to at-grade railroad crossings. The Route 126 railroad crossing provides an excellent opportunity to implement this technology, particularly to assess the effectiveness of proposed physical improvements to the crossing such as median dividers and long-arm gates. The cost to implement these CCTV cameras is estimated at $100,000.

Communications. The communication network is the backbone of the system that allows one piece of field equipment to communicate with another piece of field equipment and allows the control centers to communicate with each other and with the field equipment. Improvements to the communication network would allow the traffic management centers and train control centers to monitor system status and to make adjustments as necessary. It is envisioned that dedicated communication lines would link field equipment to master control units. The master control units would be linked to each other with a dedicated communication lines and would communicate with the control centers over shared phone lines. To ensure future compatibility, the system would be developed to be consistent with the National Transportation Communications for ITS Protocol. The exact configuration and operating costs would be evaluated as part of the future design of the systems. The costs to deploy the communication system are spread over the different elements described in Table 10.

Train Control Centers. Two train control centers manage train operations in the vicinity of Route 126. Conrail controls the railroad equipment at the intersection and train operations on the Framingham branch between Back Bay and Worcester. Amtrak manages the track operations east of Back Bay and along the other branches on the southside commuter rail service and operates MBTA railroad intercity service on the corridor. The ITS program for the Route 126 Corridor would provide the train centers with real time information about the operation of at-grade crossings that would assist in overall system management. Traffic information along the corridor could also be provided to the train control center through the traffic management center. With the availability of data from trackside monitoring equipment and CCTV cameras, the capabilities of the centers would be expanded to include the dissemination of real time information to train crews about the status of the Route 126 railroad intersection. Communication protocols would also be established to disseminate railroad-related information to the traffic management centers.

Traffic Management Centers. The Route 126 ITS program would add a new traffic management center at a town of Framingham facility. The center would allow the town to manage the traffic control system and would provide communication capabilities with other operation and emergency dispatch centers. The town of Framingham center would have the capability to share information with the regional traffic management center that the Massachusetts Highway Department is constructing in Framingham at the State Police bunker. Communications and operations protocols would be established to ensure timely dissemination of information and response to incidents.

The implementation of the Route 126 ITS program would improve operation of the intersection by providing more reliable service and by reducing the effects of equipment failure. These improvements would complement the proposed construction of a grade-separated roadway underpass under the railroad tracks. In addition, the proposed ITS improvements would provide a core infrastructure that would facilitate the incorporation of new ITS technologies that will be available in the future.

For example, developments of in-vehicle communications systems could provide future opportunities to notify motorists directly about the status of the Route 126 intersection. This information would also assist emergency dispatch centers and emergency vehicles by providing real time traffic information that could be used to adjust routes or change vehicle dispatch decisions. Other opportunities exist to provide direct communication between trains and trackside communication beacons. This type of technology is being tested in Connecticut as part of the National High Speed Ground Transportation Demonstration Program. It is possible that, in the long run, this program could yield improvements for other types of corridors, such as the Framingham branch, which do not support high speed rail service.

The Route 126 ITS program would use existing components, such as the available operation centers, and add key elements to upgrade field equipment and to integrate new and proposed systems. Within the proposed long-range framework for the deployment of ITS, this approach would realize important near-term benefits while preserving the opportunity for adding new ITS technologies.

2.3 Long-term Improvements

During the early stages of this study, meetings were held with the Technical Subcommittee, Neighborhood/Business Subcommittee, and the Citizen Advisory Committee to help identify the Corridor characteristics, to identify travel patterns, and to develop concept alternative plans to address the railroad grade crossing issue and future travel demand associated with economic development along the Corridor. Specifically, an initial listing of specific concept alternative plans was developed and evaluated in a preliminary manner to better define the reasonable and practical alternatives available to the town for consideration. Criteria used in this preliminary screening are as follows:

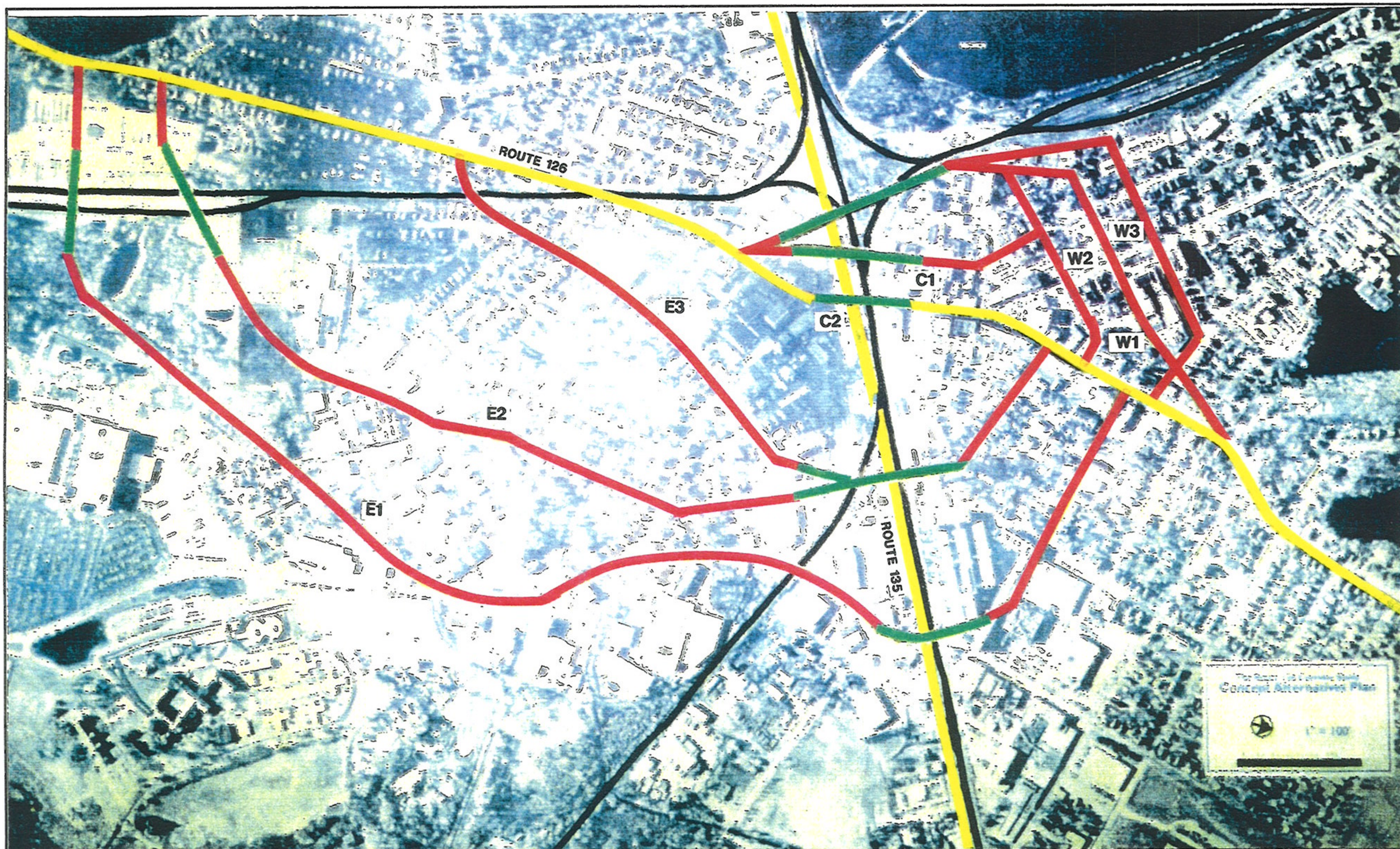
- **Criteria A — Downtown Access.** Improve accessibility to downtown Framingham; do not close vehicular access through downtown.

- **Criteria B — Neighborhood Protection and Environmental Impact.** Minimize adverse impacts on the quality of life of residential neighborhoods and other environmentally sensitive areas.
- **Criteria C — Economic Revitalization.** Provide redevelopment opportunities for the downtown area and improve its attractiveness.
- **Criteria D — Traffic Capacity and Safety.** Minimize conflicts between rail operations and vehicles, reduce vehicular congestion in downtown, and improve pedestrian access and safety.
- **Criteria E — Cost.** Consider cost as a function of the project's feasibility for construction.

An initial review was performed of alternatives described in previous studies, including proposals dating back to the 1950s. All relevant concepts were overviewed in the context of existing conditions and used as a basis for developing twelve concept plans, reflecting both previous ideas and new analysis. These concepts, graphically shown on Figure 24, can be generally grouped within four "families" of alternative solutions:

- **East Bypass (E1, E2, E3).** These concepts provide an alternate route for through traffic (no downtown origin or destination) on Concord Street located east of Route 126.
- **West Bypass (W1, W2, W3, Rail Alignment/Farm Pond, and Dudley Road).** These concepts provide an alternate route for through traffic on Concord Street located west of Route 126.
- **Concord Street (C1, C2).** These concepts provide underpass of the railroad on one or more streets in the immediate downtown area.
- **Railroad (R1, R2).** These concepts provide for depression of the rail tracks.

Two of the alternatives, Rail Alignment/Farm Pond and Dudley Road, were the result of previous proposals entailing substantially new bypass routes connecting to Route 9 (west of Framingham Center) and around the east or west side of Farm Pond. The substantial negative environmental and neighborhood impacts of these far-reaching schemes resulted in their early screening from further consideration by the Technical Subcommittee. The remaining ten concept alternatives are described below.



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The Route 126 Corridor Study
Framingham, Massachusetts

Concept Alternatives Plan

Figure 24

2.3.1 East Bypass (Outer) — E1

Description: From the south, intersecting Route 126 opposite Waushakum Pond, underpass of the rail yard, new roadway to Loring Drive and Irving Street, crossing at-grade rail spur, continuing on Blandin Avenue, underpass of Route 135 and rail mainline, continuing on Clinton Street to Route 126. Total length = 8,500 feet.

Preliminary Cost (excluding right-of-way acquisition): $25 to 30 million

Advantages:

- Bypasses substantial segment (1.13 miles) of Route 126
- Abuts fewest residential properties
- Reduction of vehicle conflicts with pedestrians in downtown area

Disadvantages:

- Right-of-way requirements and environmental impacts for new roadway construction north of GM Plant
- Right-of-way requirements and building demolition at Dennison
- Major intersection reconstruction at Loring Drive/Western Avenue and at Irving Street/Blandin Avenue
- Maintains two at-grade freight line crossings
- Circuitous, indirect, and lengthy alignment will reduce attractiveness for use by through traffic
- Clinton Street alignment passes through residential area; increase in vehicle conflicts with pedestrians
- Requires prohibition of on-street parking

2.3.2 East Bypass (Middle) — E2

Description: From the south intersecting opposite Nipmuc Road, underpass of the rail yard, continues to Summit Street, underpass of the rail spur line and mainline/Route 135, continues on Frederick Street to Route 126. Total length = 6,500 feet.

Preliminary Cost (excluding right-of-way acquisition): $25 to 30 million

Advantages:

- All grade-separated active rail crossings
- Bypasses substantial segment (0.97 mile) of Route 126
- Reduction of vehicle conflicts with pedestrians in downtown area

Disadvantages:

- Right-of-way requirements, commercial property taking, and environmental impacts for new roadway construction north of GM Plant
- Summit Street alignment passes through single-family residential neighborhood
- Major intersection reconstruction at Summit Street/Irving Street/ Phipps Street
- Major grade separation structure to underpass both railroad mainline/ Route 135 and nearby spur line
- Frederick Street alignment passes through multi-family residential area
- Increase in vehicle conflicts with pedestrians through residential areas
- Requires prohibition of on-street parking

2.3.3 East Bypass (Inner) — E3

Description: From the south, intersecting opposite Winthrop Street (Haven Street), crossing at-grade rail spur, continues on Arlington Street, underpass of the rail spur line and mainline/Route 135, continues on Frederick Street to Route 126. Total length = 4,500 feet.

Preliminary Cost (excluding right-of-way acquisition): $20 to 25 million

Advantages:

- Shortest deviation from Route 126 alignment will encourage greater use by through traffic
- Reduction of vehicle conflicts with pedestrians in downtown area

Disadvantages:

- Maintains one at-grade freight line crossing at south end
- Connection to Arlington Street requires taking of three to four single-family residences
- Arlington Street alignment passes through single-family residential neighborhood
- Major grade separation structure to underpass both railroad mainline/ Route 135 and nearby spur line
- Frederick Street alignment passes through multi-family residential area
- Increase in vehicle conflicts with pedestrians through residential areas
- Requires prohibition of on-street parking

2.3.4 Downtown One-way Pair — C1

Description:

Concord Street one-way northbound only from Hollis Court (opposite Fire Station) to Sanger Street (with underpass of rail mainline/ Route 135); all southbound traffic via Sanger Street, Proctor Street, and Franklin Street with underpass of rail mainline/Route 135, continuing on Hollis Court to Route 126.

Preliminary Cost (excluding right-of-way acquisition): $25 to 30 million

Advantages:

- One-way underpass on Concord Street has narrower right-of-way requirement and property taking (approximately four businesses along west side of Route 126) than Alternative C-2
- Better separation of conflicting vehicle turning movements in one-way operation
- Entry/exit intersections at Route 126 for southbound volumes entail non-conflicting right turn movements only
- Provides opportunity for economic redevelopment, in conjunction with roadway reconstruction, for wider area of downtown
- Reduces Concord Street traffic volume by approximately 50 percent; reduces pedestrian/vehicle conflicts

Disadvantages:

- One-way operation will make access more circuitous for vehicles from the north to downtown Concord Street
- Requires two underpass structures of the railroad mainline/Route 135
- Loss of on-street parking (approximately 30 spaces) in the underpass segments
- Right-of-way requirement and commercial property taking south of Route 135 for connection to Hollis Court
- Proctor Street upgrading will displace two rows (approximately 50 spaces) of parking in Town Hall lot
- New intersection signal at Proctor Street/Union Avenue
- Eliminates on-street parking on one side of Franklin Street

2.3.5 Route 126 Underpass — C2

Description: Route 126 through traffic in underpass tunnel at rail mainline/ Route 135. Length of tunnel and cut section approximately 700 feet. Local traffic movements at-grade. Howard Street through traffic relocated to Route 135.

Preliminary Cost (excluding right-of-way acquisition): $20 to 25 million

Advantages:

- Maintains all Route 126 traffic in the same corridor, facilitating clarity for users
- Restricts the area of project impact to the shortest roadway length of all alternatives
- Keeps through traffic out of surrounding neighborhoods
- Eliminates need for new major intersections on Route 126 to accommodate turning vehicles at entry/exit points for bypass routes
- Provides opportunity for downtown redevelopment in conjunction with roadway reconstruction

Disadvantages:

- Right-of-way requirements and commercial property taking (approximately ten businesses) north and south of Route 135
- No reduction in Concord Street traffic volumes

- Loss of on-street parking (approximately 30 spaces) in the underpass segment
- Restricted pedestrian crossing of Route 126 in the underpass cut sections
- No direct vehicle connection on Howard Street eastbound across Route 126
- Restricted access between southbound Route 126 and Irving Street

2.3.6 West Bypass — Pearl Street — W1

Description: From the south, two-way connection at Route 126 at Hollis Court (opposite Fire Station), crossing railroad mainline/Route 135 and spur line in tunnel or overpass, continuing on Pearl Street to Lincoln Street, continuing on Lincoln Street to Route 126 (or new connection opposite Pearl Street directly to Route 126).

Preliminary Cost (excluding right-of-way acquisition): $20 to 25 million ($15 to 20 million for overpass alternative)

Advantages:

- Through traffic impacts restricted to one street (Pearl Street)
- Requires construction of only one structure (tunnel or overpass) in nonresidential area

Disadvantages:

- Direct connection on north end between Route 126 and Pearl Street would require taking of four commercial and one residential properties
- Requires intersection/signal upgrading at four locations (Route 126 at both ends, Pearl Street/Lincoln Street, Pearl Street/Union Avenue)
- Eliminates on-street parking on both sides of Pearl Street
- Right-of-way requirement and commercial property taking south of Route 135 for connection to Hollis Court
- Requires taking of Registry of Motor Vehicles (RMV) building

2.3.7 West Bypass — Proctor Street and Pearl Street — W2

Description: Same as Alternative W1, except Pearl Street (southbound) and Proctor Street/Sanger Street (northbound) operate as a one-way pair between the RMV and north to Route 126.

Preliminary Cost (excluding right-of-way acquisition): $20 to 25 million ($15 to 20 million for overpass alternative)

Advantages:

- Requires construction of only one structure (tunnel or overpass) in nonresidential area
- Better separation of conflicting vehicle turning movements in one-way operation
- Traffic impact of through volume dispersed between two streets
- Parking restriction on only one side of Pearl Street (instead of both sides in Alternative W1)

Disadvantages:

- Requires intersection/signal upgrading at six locations (Route 126 at Hollis Court, Sanger Street, and Lincoln Street; Pearl Street/ Lincoln Street; Union Avenue at Proctor Street and Pearl Street)
- Right-of-way requirement and commercial property taking south of Route 135 for connection to Hollis Court
- Proctor Street upgrading will displace two rows (approximately 50 spaces) of parking in Town Hall lot
- Requires taking of RMV building
- Proctor Street and Sanger Street have substantial commercial vehicle activity and parking interfering with bypass traffic efficiency

2.3.8 West Bypass — Pearl Street and Lexington Street — W3

Description: Southerly half same as Alternative W1 until Pearl Street Pearl Street (northbound) and Lexington Street (southbound) with two-way Lincoln Street connection to Route 126. New construction for connection from Lexington Street

Preliminary Cost (excluding right-of-way acquisition): $20 to 25 million ($15 to 20 million for overpass alternative)

Advantages:

- Requires construction of only one structure (tunnel or overpass) in nonresidential area
- Better separation of conflicting vehicle turning movements in one-way operation
- Traffic impact of through volume dispersed between two streets
- Parking restriction on only one side of Pearl Street (instead of both sides in Alternative W1)

Disadvantages:

- Requires intersection/signal upgrading at five locations (Route 126 at Hollis Court and Lincoln Street; Pearl Street at Lincoln Street and Union Avenue; Lexington Street/Union Avenue)
- Right-of-way requirement and commercial property taking south of Route 135 for connection to Hollis Court
- Right-of-way requirement and RMV, commercial property taking for Lexington Street connection

2.3.9 Full Rail Depression — R1

Description:

Depression of the MBTA's mainline and Conrail's connecting branch lines in the vicinity of the Route 126 at-grade crossing. The connecting branch lines that will also have to be depressed are the Framingham Branch, Fitchburg Branch, and Holliston Branch with their associated tracks. To provide for continued operations during the proposed construction the affected yards would be relocated to an acceptable site. This would mean that the North Yard and Nevins Yard would most probably be combined and relocated to a site to be determined in the future. The Framingham MBTA commuter rail station would have to be rebuilt and depressed underground. The maximum grade used for the depression of tracks is 1 percent descending and ascending. The underground Commuter Rail Passenger Station will be built on an anticipated ascending grade of 0.2 percent.

Preliminary Cost (excluding right-of-way acquisition): $500 to 550 million

Advantages:

- Eliminates all of the existing 36 scheduled passenger train conflicts at Route 126
- Eliminates all of the existing 19 scheduled freight train conflicts at Route 126

Disadvantages:

- Requires that the currently proposed at-grade MBTA Framingham commuter rail passenger station be reconstructed and depressed
- Requires that the MWRA place the Sudbury Aqueduct on surplus status after the anticipated completion of the MetroWest Water Supply Tunnel in the year 2006. This may require legislative action to effectuate abandonment of the Sudbury Aqueduct to meet an anticipated project schedule.

2.3.10 Mainline Rail Depression — R2

Description:

Depression of the MBTA's double track mainline from approximately Mile Post 20.4 on the east (just east of the Framingham/Natick town line) to Mile Post 22.4 (Winter Street) on the west. The proposed depression of the mainline will provide 27 feet of vertical grade separation (top of rail to profile grade line) at both Route 126 and Bishop Street The maximum grade used for the depression of tracks is 1 percent descending and ascending. An underground commuter rail passenger station will be required on an anticipated ascending grade of 0.2 percent.

The physical plant required for the freight operations of Conrail will remain at grade. This will require that a single-track at-grade crossing of Route 126 and Bishop Street for freight operations only. Connections to the single-line freight track will be made for the Holliston Branch and Framingham Branch to the south of the existing double-track mainline, and the WYE tracks to the North Yard and Fitchburg Branch.

Preliminary Cost (excluding right-of-way acquisition): $100 to 150 million

Advantages:

- Eliminates all of the existing 36 scheduled passenger train conflicts at Route 126

- Eliminates 13 (through freights) of the existing 19 scheduled freight train conflicts at Route 126

Disadvantages:

- Leaves 6 scheduled freight train conflicts at Route 126
- Requires that the currently proposed at-grade MBTA Framingham commuter rail passenger station be reconstructed and depressed
- Requires that the MWRA place the Sudbury Aqueduct on surplus status (for the purpose of abandonment) after the anticipated completion of the MetroWest Water Supply Tunnel in the year 2006. This may require legislative action to effectuate abandonment of the Sudbury Aqueduct to meet an anticipated project schedule.

Based on the established criteria and further discussions with the CAC, Table 11 provides a summary of the overall rating associated with each concept alternative plan.

As demonstrated, three of the twelve alternatives have received an overall medium to high rating, representing further consideration for development. In the following section, each of these alternatives is further evaluated in terms of future travel demands associated with both economic development and the railroad/commuter rail services.

The concept alternatives were each evaluated in terms of the relative degree to which they achieve each of the five evaluation criteria. A low rating (L) indicates that the criterion is not well met. Intermediate ratings such as L/M indicate the degree to which the criterion is partially achieved.

The overall rating, summarized in the right hand column of Table 11, demonstrates the highest ranking for three alternatives:

- W-3 — West Bypass — Pearl Street and Lexington Street
- C-2 — Route 126 underpass
- R-2 — Mainline Rail Depression

These concepts were further refined and discussed at a series of meetings with local neighborhood residents and downtown business representatives. Based on the significant concerns with potential adverse impacts on sensitive land uses, particularly along Pearl Street and

Table 11 Concept Evaluation Matrix

Concept Alternative	Evaluation Criteria[1] A	B	C	D	E	Overall Rating[2]
E-1 — East Bypass (Outer)	L/M	L	L	M	M/H	L
E-2 — East Bypass (Middle)	L/M	L	L	H	M/H	L
E-3 — East Bypass (Inner)	L/M	L	L	M	H	L
W-1 — West Bypass — Pearl Street	M/H	L	L/M	L/M	M	L/M
W-2 — West Bypass — Proctor Street and Pearl Street	M/H	L/M	M	L	M/H	M
W-3 — West Bypass — Pearl Street and Lexington Street	M/H	L/M	L/M	M/H	M/H	M/H
C-1 — Downtown One-way Pair	L	H	M	M	H	M
C-2 — Route 126 Underpass	H	H	H	H	M/H	H
R-1 — Full Rail Depression	H	H	L	M/H	L	M
R-2 — Mainline Rail Depression	H	H	L	M	L	M/H
West Bypass — Rail Alignment/Farm Pond[4]						L
West Bypass — Dudley Road[4]						L

1 Criteria is based on five elements discussed earlier
2 Ratings L = Low, M = Medium, H = High based on Technical Committee meeting on June 17, 1996 and Citizens Advisory Committee meeting on June 19, 1996
4 West Bypass Farm Pond/Dudley Road discussed with no further evaluation

Lexington Street, the Technical Subcommittee eliminated further consideration of Alternative W-3. Based on subsequent meetings with the representatives from MHD, EOTC, FTA, and the technical committee, Alternative R-2 was also eliminated from further consideration due to its significant cost.

Accordingly, the Future Conditions analysis, including modeling of design year traffic volumes, was applied to the preferred alternative C-2 and compared to the No-Build condition.

3.0 Future Conditions

3.1 Method of Analysis

Summarized below is the transportation modeling methodology used to evaluate relevant impacts associated with the preferred Route 126 underpass concept plan. The modeling process applied to this corridor concept plan entails a four-step process, including trip generation, trip distribution, mode split, and assignment. The first two steps produced a trip table containing existing and year 2020 No-Build and Build vehicle trips. This was accomplished by using 1990 census data, employee data for both retail and non-retail land uses, traffic volume counts at external zones, socioeconomic data from the Metropolitan Area Planning Council (MAPC) forecast, and land use projection data from the Framingham Planning Department. The model makes its assignment of vehicle trips based on the minimum time path between the trip's origin and destination.

Table 12 provides a summary of the population and employment projected by MAPC Data Center for the area. As noted, both the town of Framingham and the region are projected to experience approximately 13 to 14 percent growth in employment by the year 2020. This growth rate and other factors (i.e., population, dwelling units, land use) provided the basis for developing the future volume network for the study area.

Table 12 **Population and Employment Forecasts**

	Town of Framingham	MetroWest Region	MAPC Region
Population			
1990	64,989	194,695	2,922,934
2000	65,749	203,860	3,009,577
2020	65,818	211,340	3,074,480
% change (1990–2020)	1.28	8.55	5.18
Employment			
1990	39,500	—	1,716,700
2000	40,100	—	1,737,900
2020	44,600	—	1,967,900
% change (1990–2020)	12.9	—	14.6

Source: Metropolitan Area Planning Council (MAPC), Population and Employment Forecasts Report, March 1996

3.2 Travel Demand Forecasting

The QRS II travel model is a computer program used to forecast traffic volumes on study area roadways by combining mathematical representations of the transportation network, land use and demographic patterns, and motorists' travel behavior. The model consists of three key sets of data:

- Transportation network and zone system
- Land use and demographic assumptions
- Travel behavior assumptions

These data are used to generate travel forecasts using the traditional four-step transportation planning process:

- Trip generation
- Trip distribution
- Mode choice
- Trip assignment

Brief descriptions of the key data sets and assumptions used in the model are provided below.

3.2.1 Transportation Network and Zone System

This is a computerized description of the roadway network in the study area. It includes characteristics such as free flow speeds, number of lanes, and capacity. Within the study area, the travel network includes all highways and arterial streets, and many collector streets. Local streets are not included, but are represented as load points to the major street system.

The study area is also split into traffic analysis zones (TAZs) that represent the travel demand for a specific geographical area. Each TAZ is represented on the model network as a special node referred to as a "centroid." The connection of each of these nodes to the surrounding roadway network is called a "centroid connector."

3.2.2 Land Use and Demographic Assumptions

The travel demand in a specific zone is related to the amount of activity in that zone. In this model, activity is measured by the number of residential dwelling units and the amount of retail and non-retail employment. Demographic factors such as household income and autos per household are also used as input to the trip generation models (described below). For this project, autos per household data was used.

3.2.3 Trip Generation

The trip generation portion of the model estimates the amount of different types of travel (in auto or person trips) expected to be generated by different land uses. The trip types include the following:

- Home-based work
- Home-based non-work
- Home-based other
- Non-home-based

The trip generation process involves estimating the number of daily trip productions (autos or persons) and the number of daily trip attractions. Typically, trip productions refer to the home end of a trip, and trip attractions refer to the non-home end of a trip. After initial productions and attractions are estimated, adjustments are made to balance productions and attractions for each trip purpose. The home-based other trip type can be used to represent special trip types, such as to and from a college or university. For this project, the home-based other trip type was not used.

3.2.4 Trip Distribution

A "gravity" model is used to estimate the interaction of travel between different TAZs. Two such TAZs are referred to as an O-D pair (origin-destination). The gravity model calculates trip distribution iteratively by calculating the attractiveness of every TAZ to each other in terms of productions, attractions, and travel time impedance between the zones. For this model, the travel time impedance between two zones is referred to as a friction factor. Different friction factors are used for each trip purpose.

3.2.5 Mode Choice

When transit ridership forecasts are needed, a mode choice split operation is used to determine the number of transit and auto person trips for each O-D pair. Transit forecasts were not performed for this corridor project.

3.2.6 Trip Assignment

If person trips are used as the basis for forecasting traffic volumes, 24-hour person trips must be converted to peak hour auto trips in O-D format before they can be assigned to the roadway network. Auto occupancy factors are then used to convert auto person trips to auto vehicle trips. For this project, vehicle trips were used as input to the model so the conversion from person trips to auto trips was not necessary.

Trip assignments are then performed based on an equilibrium method. This method involves repeating trip assignments until differences in travel time from one iteration to the next are insignificant, at which time equilibrium is said to be achieved.

3.3 Future Operating Conditions

Based on data analysis of historic traffic growth and projected socioeconomic data, the interim improvement measures were tested against traffic conditions in the year 2000. The factor applied to the base year traffic results in a four-year (1996 to 2000) growth of 6.0 percent.

3.3.1 Methodology

To evaluate potential traffic progression improvements along the Route 126 corridor, seven intersections were analyzed with respect to traffic signal system and geometric improvements. A 2000 No-Build condition was also evaluated (assuming isolated intersection operation) to establish a base case for comparison. The intersections considered as part of the Route 126 coordinated signal system are the following: Route 135 (Waverly Street), Howard Street, Union Avenue (unsignalized), Lincoln Street, Everit Street, Hartford Street, and Anzio Road.

The traffic signal system (2000 Build condition) was analyzed using the PASSER IV-94 software package, which is an advanced traffic signal timing optimization program that allows optimization of signal systems along an arterial. The program output provides several measures of effectiveness (MOEs) including total corridor delay, level of service and average delay at each intersection, system efficiency, and attainability.

The 2000 No-Build condition was analyzed using the Highway Capacity Software (HCS) package and the CINCH program. Those study intersections found to operate at level of service (LOS) "E" or better were analyzed using the HCS. Those intersection that were found to experience over-saturated conditions (volume to capacity ratio greater than 1.0) were analyzed using CINCH to estimate overall intersection vehicle delay. Under the No-Build condition, the studied intersections were assumed to operate as isolated locations.

In an effort to accurately represent traffic conditions along the Route 126 Corridor, a methodology to incorporate the delay associated with the at-grade railroad crossing was developed. For the purposes of the analysis, the railroad crossing was assumed to contribute some delay to the corridor during each studied peak hour. Data gathered as part of the corridor study indicates that the railroad gates close Concord Street to through traffic a total of five times during every peak hour (A.M. and P.M.) for a duration of approximately 90 seconds per "event." Hence, 450 seconds of delay can be expected to be contributed by the railroad crossing during peak hour. A saturation flow rate reduction was assessed to each approach observed to experience delay at the time of gate closures.

3.3.2 Analysis Results

Table 13 presents the results of the Route 126 Corridor analysis in terms of average intersection stopped delay per vehicle and level of service under the No-Build and Build (with interim improvements) conditions. Under No-Build condition, the operating deficiencies are evident at most intersections along Route 126 corridor during peak hours. The most severe problems are shown to occur at the Route 126 intersections with Route 135, Union Avenue, and Hartford Street. The implementation of short-term improvement measures can result in improved capacity and safety for vehicles and pedestrians. As noted, the overall delay reduction at many intersections has resulted in an improved level of service. At the Route 126/Union Avenue intersection, additional capacity improvements (i.e., peak hour restriction or removal of on-street parking on the Route 126 west side to provide a second southbound lane) can result in LOS "C/D."

Table 13 Future Level of Service Summary

	Future No-Build (Without Improvements)		Future Build (With Short-Term Improvements)		
Route 126 at	Delay (sec)	LOS	Delay (sec)	LOS	% Reduction Delay
AM Peak Hour					
Waverly Street	168	F[1]	28	D	83
Howard Street	17	C[2]	11	B	35
Union Avenue	260	F[1]	48	E (C)[3]	82
Lincoln Street	13	B[2]	6	B	54
Everit Street	44	E[2]	5	A	89
Hartford Street	120	F[1]	19	C	84
Anzio Road	21	C[2]	8	B	62
PM Peak Hour					
Waverly Street	267	F[1]	86	F	68
Howard Street	122	F[1]	18	C	85
Union Avenue	*	F[1]	265	F (D)[3]	100+
Lincoln Street	14	B[1]	12	B	12
Everit Street	52	E[1]	6	B	88
Hartford Street	*	F[1]	29	D	100+
Anzio Road	64	F[1]	14	B	78

1 CINCH based on 1985 HCM
2 Highway capacity software based on 1994 HCM
3 (LOS) with additional southbound lane on Route 126
* Delay is meaningless when v/c is greater than 1.20

Overall, the analysis indicates that implementation of a closed loop coordinated signal system can provide significant reductions in overall delay within the study corridor over the No-Build condition.

3.4 Route 126 Underpass Concept Plan

The recommended alternative is the Route 126 underpass beneath the rail crossing and Route 135. This concept was adopted unanimously by the Corridor Advisory Committee at its September 12, 1996 public meeting. Subsequent work encompassed detailed traffic modeling (with year 2020 socioeconomic and land use projections from the town and MAPC), and schematic/preliminary engineering studies and design with perspective renderings (refer to Figure 25, Figure 26, and Figure 27).

The key functional elements of the recommended alternative include a below-grade underpass (one travel lane in each direction) on Route 126 starting on the north at Park Street and on the south near Irving Street. The entire underpass will have a length of approximately 700 feet. The majority of the underpass will consist of ascending/descending ramp, which will be constructed with an open roof (referred to as "boat section"). Approximately 135 feet of the underpass, beneath the rail tracks and the Route 135 intersection, will be enclosed.

Travel lanes will also be maintained at grade on Route 126 to intersect (with all permitted turns) at Route 135 (with upgraded signalization). Each approach to this intersection will have at least two lanes, with a three-lane approach on westbound Route 135.

Additional right-of-way will be required on both sides of Concord Street north of Route 135, on the west side of Concord Street south of Route 135, and on the north side of Route 135.

On the north side of Route 135, required right-of-way will affect the West Coast Video and Salvation Army buildings in the block south of Howard Street. Economic study during Phase II will identify potential redevelopment opportunities for these sites.

Along the north side of Route 135, required right-of-way will necessitate removal of two small buildings on the northeast corner between the railroad and Waverly Street.

South of Route 135, additional right-of-way will be limited to the west side of Route 126 at the corner (Store 24 parking lot) and at the Beaumont Building at 23–25 Hollis Street. It is anticipated that a small shift in the facade of this structure will be feasible to minimize project impact through this designated Irving Square Historic District.

Approximately 30 on-street parking spaces will be eliminated; suitable off-street replacement parking will need to be identified during Phase II assessment and design. The plan will include new crosswalks, widened sidewalks, and landscaping amenities.

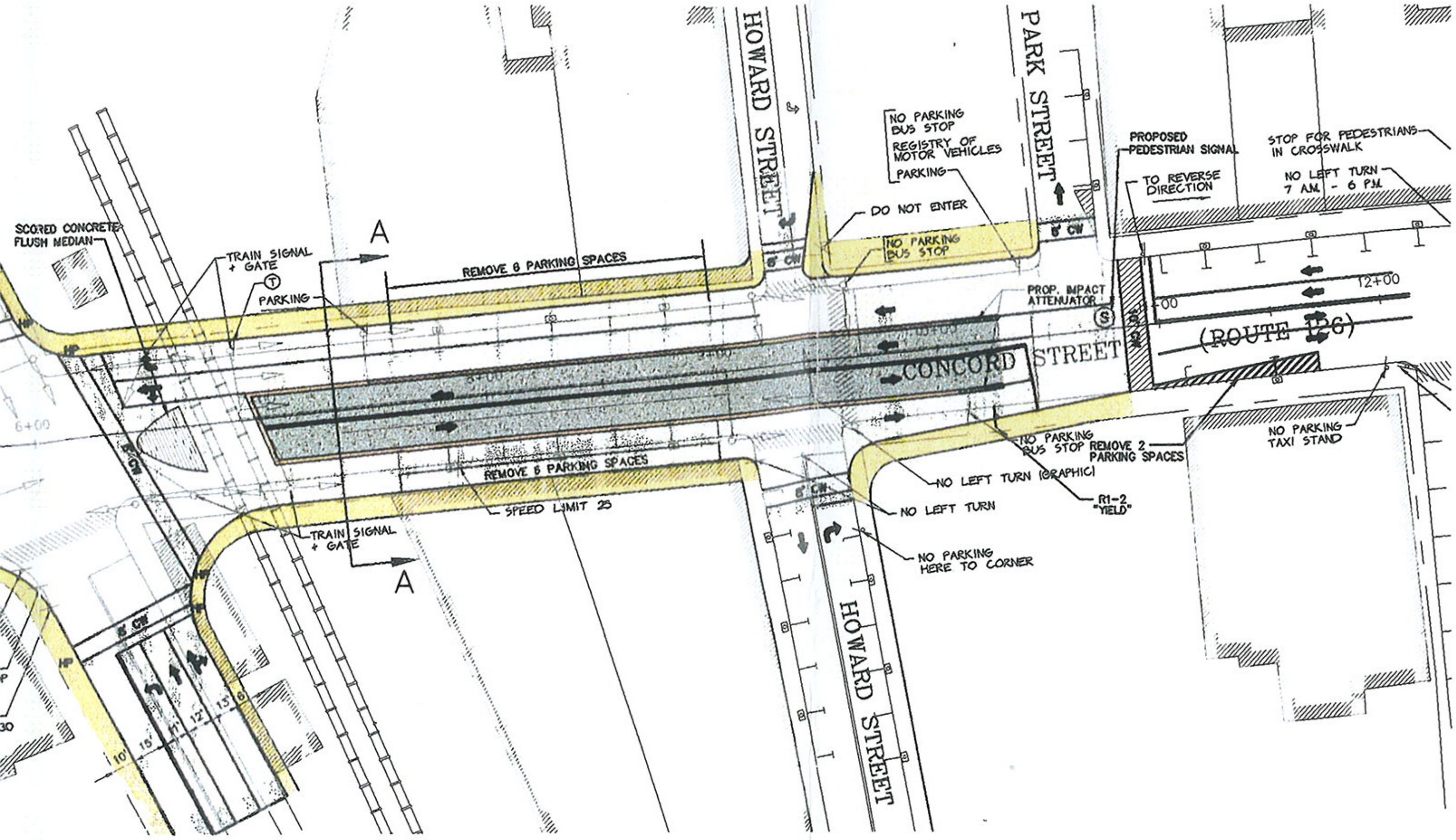
The underpass will also result in a redistribution of certain traffic movements in downtown Framingham. On the north side, eastbound Howard Street traffic will no longer be able to travel directly across Concord Street. The majority of this traffic will instead turn right and use the intersection at Route 135. The Route 126/Route 135 intersection will be designed to permit U-turns from southbound to northbound for the benefit of these motorists and others who want to access businesses along the east side of Concord Street.

On the south side of Route 135, left turns will be prohibited between Route 126 and Irving Street. Alternative routes for southbound access will include the Route 135 intersection, with connections to Irving Street via South Street or other roadways further east. Other alternatives are also possible, and their feasibility will be studied as part of Phase II work. They include a potential new roadway connection for ADESA traffic directly with Route 126 further south.

The underpass is projected to serve approximately 50 to 60 percent of total traffic on Route 126. The Route 126/Route 135 intersection will achieve acceptable levels of operation for vehicular traffic and improved safety for pedestrians. A No-Build analysis was also performed, which demonstrates that significant increases in congestion, queuing, and delay will be experienced in downtown Framingham during the next 20 years if no improvements are implemented.

4.0 Economic Development Benefits

A number of factors contribute to the existing slow rate of economic development in downtown Framingham. Among these is traffic congestion on Concord Street (Route 126), resulting in lengthy delays.



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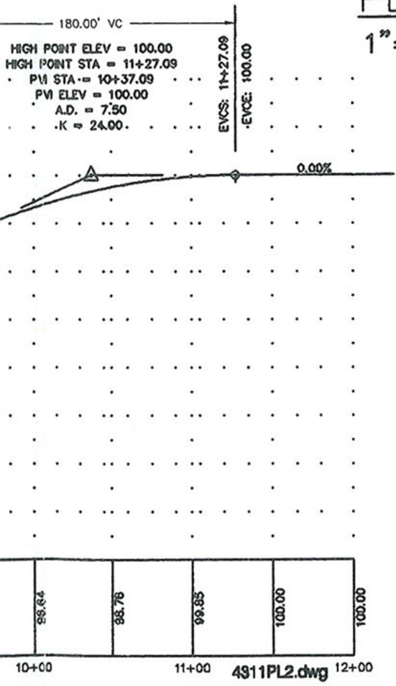
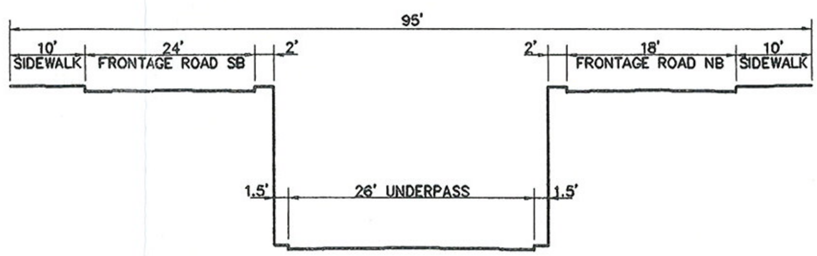




SECTION A–A

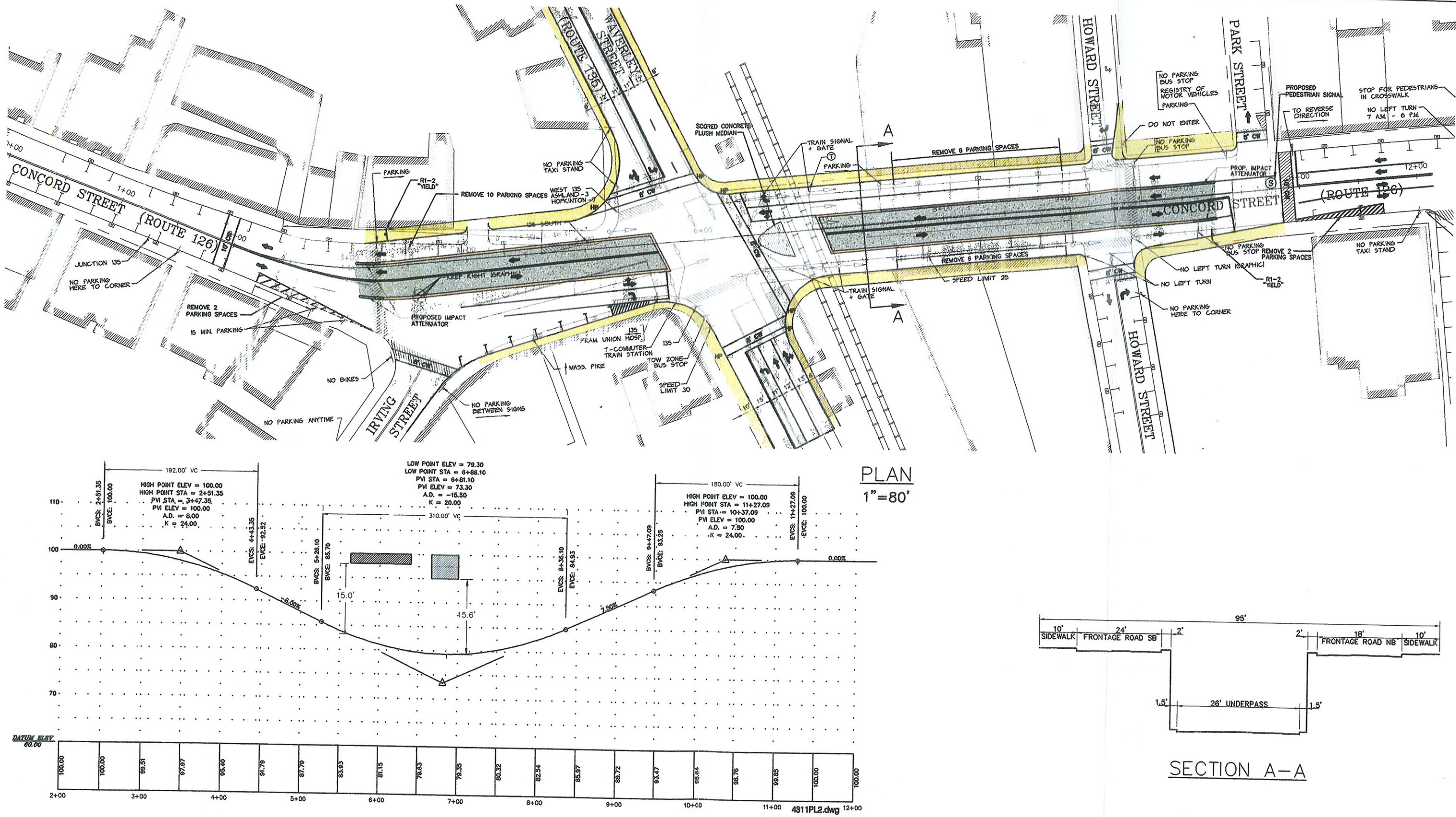
0 80 Feet

RIZZO ASSOCIATES, INC.

The Route 126 Corridor Study
Framingham, Massachusetts

Route 126 Underpass
Concept Plan

Figure
25



The Route 126 Corridor Study
Framingham, Massachusetts

0 80 Feet

RIZZO ASSOCIATES, INC.

Route 126 Underpass
Concept Plan

Figure
25

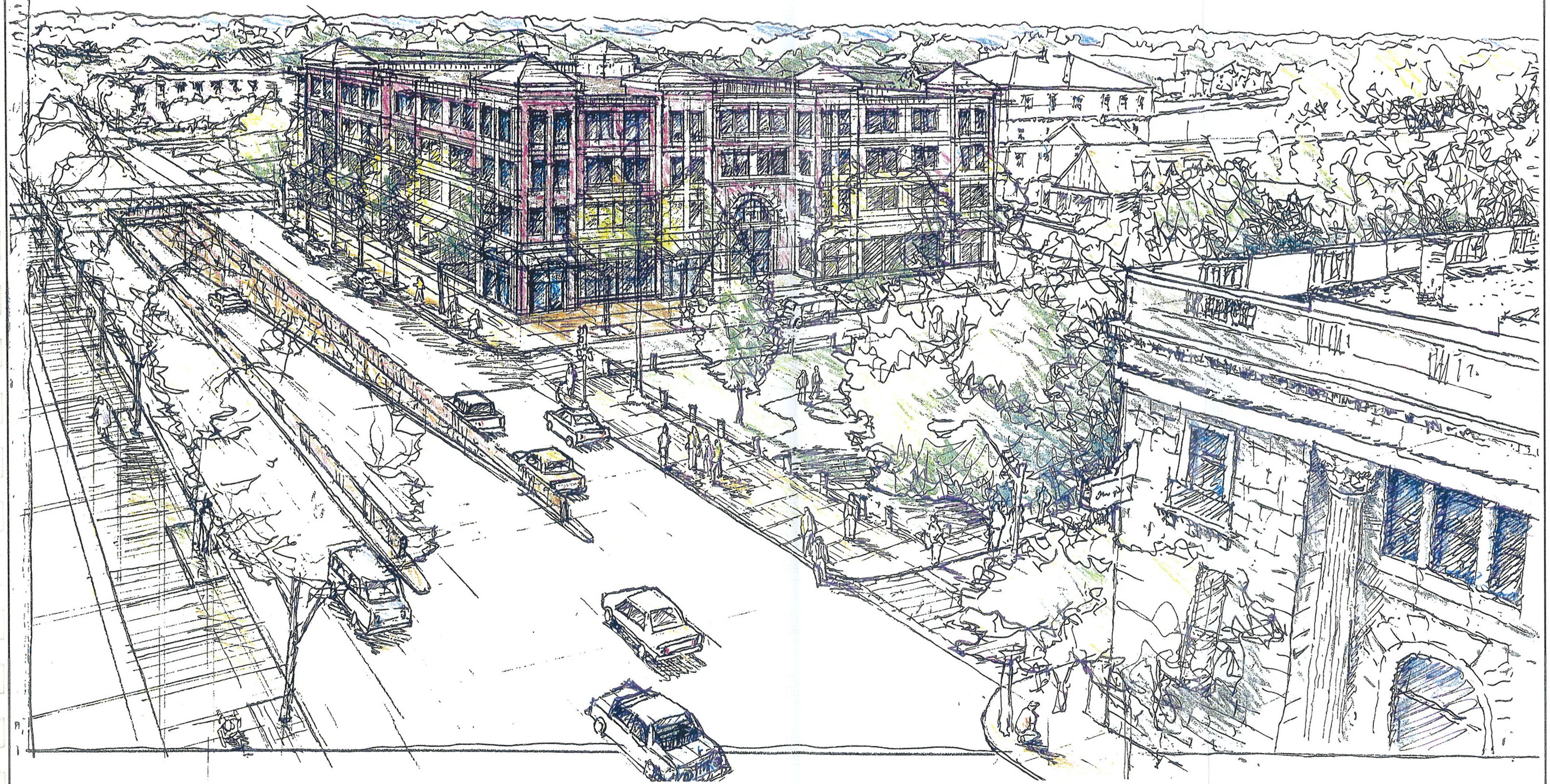
The Route 126 Corridor Study
Framingham, Massachusetts

Route 126 Underpass
Sketch Plan
North of Route 135

Figure
26

RIZZO ASSOCIATES, INC.

Source: Wallace Floyd Associates, Inc.



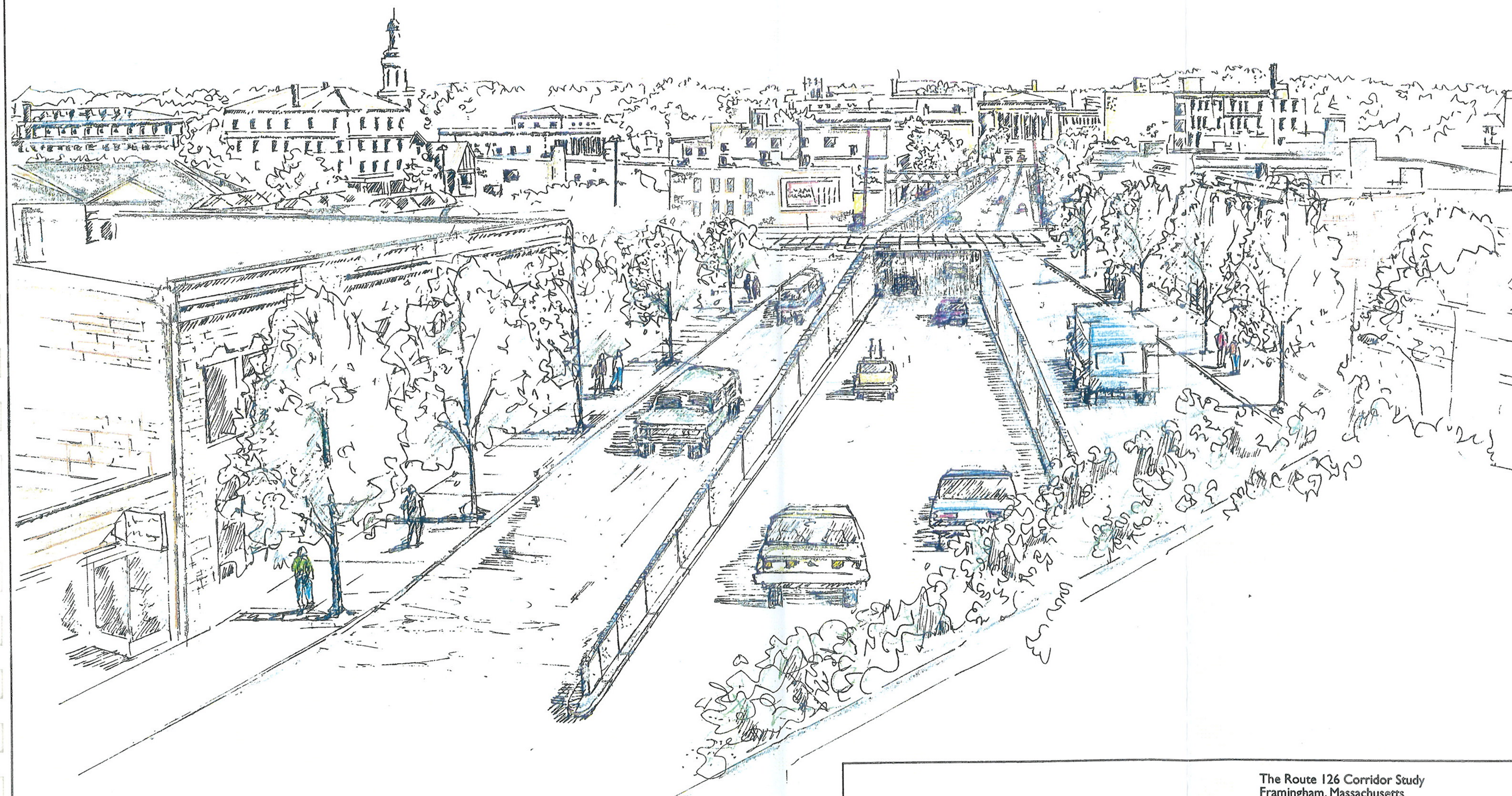
The Route 126 Corridor Study
Framingham, Massachusetts

Route 126 Underpass
Sketch Plan
North of Route 135

Figure
26

RIZZO ASSOCIATES, INC.

Source: Wallace Floyd Associates, Inc.



The Route 126 Corridor Study
Framingham, Massachusetts

Route 126 Underpass
Sketch Plan
South of Route 135

Figure
27

RIZZO ASSOCIATES, INC.

Source: Wallace Floyd Associates, Inc.

The traffic queues are also unpleasant for pedestrians along Route 126 who must walk by, smelling the exhaust fumes from idling cars and hearing the honking of impatient drivers. The great distance between buildings on the north and south sides of the Route 35/railroad crossing of Route 126 creates a physical and aesthetic barrier between the north and south sides. Finally, the small floor plates of many of the existing buildings limit their reuse options.

The Route 126 Underpass Project will eliminate or mitigate these factors. The traffic improvements resulting from the underpass will improve circulation in downtown Framingham, eliminating one major concern for potential patrons or tenants of newly developed/redeveloped properties. In addition, because of the traffic improvements, the long queues at the railroad crossing will not develop, eliminating the noise, air quality, and visual impacts to pedestrians along Route 126.

The underpass would help to create a narrower, more intimate feel for pedestrians along the Concord Street surface lanes parallel to the underpass and, combined with attractively designed streetscape amenities such as paving, lighting, benches, and street trees, would help to create a more attractive and pleasant pedestrian environment.

The widening of Route 126 required to accommodate the underpass will necessitate taking both the West Coast Video building on the west side and the Salvation Army building on the east side. The resulting parcels will be available for redevelopment, allowing for the introduction of two new buildings with larger, more flexible floor plates. These buildings would be suitable for retail and office space, as well as for use by public agencies. On the West Coast Video site, the new building, as shown in the perspective drawing, could be designed to face the Framingham Common, complementing the two beautiful and stately bank buildings and the traditional New England white clapboard church already facing the common.

The development of these two parcels would bring development closer to the intersection and, along with the potential redevelopment of the Store 24 parcel, would help to "close the gap" caused by the railroad crossing and Route 135. Three of the four corners at this important intersection would then have new development. In effect, a new development district flanking both sides of the railroad tracks would be created. Development of these parcels would help to encourage redevelopment or rehabilitation of adjacent parcels. Creating a theme and design motif for this district (see Section 4.2, "Design of Streetscape Amenities") will also encourage economic development.

4.1 Strategy

The Route 126 Underpass Project is one essential step in a larger strategy for economic development in downtown Framingham.

Building the underpass accomplishes three major goals:

- Alleviates traffic congestion.
- Creates a new pedestrian-friendly streetscape.
- Develops a framework for consolidation of several parcels on Concord Street, and creates larger redevelopment parcels in three key locations.

These actions should be done in concert with other actions in the immediate project area and with an overall redevelopment strategy for all of downtown Framingham. Development of a comprehensive economic revitalization strategy for downtown should be jointly sponsored by the town and the business community. The components of the strategy include the following:

- A program for public investment in streetscape improvements similar to those described for the Route 126 Underpass Project
- A retail and commercial office space market analysis
- A reuse strategy for existing underutilized buildings
- A parking supply analysis and strategy (ongoing)
- A redevelopment strategy for vacant or underutilized parcels
- A marketing plan and program for attracting investors, developers and tenants
- An ongoing institutional structure and implementation program for carrying out the economic development strategy over the long-term

This comprehensive approach parallels successful redevelopment efforts by other towns and cities. Major transportation investment has been a component of, or catalyst for, downtown economic revitalization in countless other cities and towns. Beginning in the 1970s with state and federal programs, most notably the TOPICS program, examples include cities such as Newburyport and Salem, Massachusetts, and Providence, Rhode Island. Davis and Union Squares in Somerville and Central Square in Cambridge are more recent examples of redeveloped older commercial centers. All of these examples represent areas where state and federal transportation funds were leveraged to support other (economic development) goals. The emphasis of these programs was on funding bricks, trees, pedestrian lighting, and other streetscape amenities.

Similar to Framingham, these programs addressed the needs of through traffic versus local traffic through channelization of existing street networks and through streetscape improvements. The success of these programs in terms of economic development was ensured by carrying out the channelization and streetscape improvements in concert with reuse studies, facade improvement programs, and active marketing campaigns. In all of these cases, there was a dual emphasis on the following:

- Improved traffic efficiency and safety
- Economic development
- An improved pedestrian environment

Medford, Massachusetts, like many other cities at the time, originally used federal money to develop an exclusive downtown pedestrian mall and bypass road in the 1980s. Business suffered as a result of the loss of traffic; turnover was high and lower end retail and restaurants moved in. The town decided to tear up the pedestrian mall and bring traffic back to Main Street, in effect creating a balance of vehicular and pedestrian circulation. This project was recently carried out; street trees, new sidewalks, benches, and lighting were added and a facade improvement project was initiated. The project was done solely for economic development purposes and has in fact resulted in reinvestment in the area. Main Street is changing — new businesses are moving in and vacant storefronts are disappearing.

More recent examples of downtown revitalization in which the focus has shifted more heavily toward economic development include Corning, New York and Lee, Massachusetts. In these cases, the economic revitalization was based around a particular target market, specifically tourism.

A third category of recent revitalization activity includes the areas around heavily used commuter rail stations. There have been many recent efforts nationwide to upgrade retail areas adjacent to major commuter rail stations. Most notably, New Jersey Transit has instituted a systemwide program to refurbish and upgrade rail-related retail districts. Recent successful revitalizations of both Davis Square and Central Square have been related to the introduction of, or improvements to, MBTA Red Line service.

All of the successful cases cited above incorporated a combination of actions. The Framingham Route 126 Underpass Project makes a major investment at the juncture of an important downtown corner and a major commuter rail station. It can serve as a catalyst not only for other pieces of an economic revitalization program but also for reuniting the north and south sides of Concord Street, reconfiguring parcels and improving pathways around the Framingham commuter rail station, and capitalizing on the high patronage levels at the station, historically the station with the system's second highest patronage levels.

A guiding force in the destiny of all great cities is defined by the phrase "A city that cares about itself." In the simplest sense, it refers to cities that invest in themselves — invest in projects that improve the quality of life of its citizens and attract investors and new business. This project, a bold public works initiative, has the potential to attract attention from the investment, business, and real estate communities — and to send the message that Framingham is a town that cares about and invests in the economic health and well being of its downtown.

4.2 Design of Streetscape Amenities

A number of streetscape amenities will be included in the design of the Route 126 Underpass Project. The thoughtful design of these amenities will be critical to the success of economic development initiatives in the area.

Widened sidewalks on Concord Street blocks parallel to the underpass will be paved with decorative materials, and elements such as street trees, lighting, and benches will help to create an attractive pedestrian environment. The magnificent Framingham H.H. Richardson train station is a prominent element in this area and could be used as focal point for its revitalization. Naming the area "Station Square" would provide a theme for the design of the streetscape elements, and help to create an identify for the area. Light poles and stanchions, tree grates, manhole covers, and benches could all be designed in wrought iron with a locomotive motif to reflect the Station Square name. Banners hung from the light poles could also reflect this theme and the excitement of a new, revitalized downtown Framingham. Special paving materials used for sidewalks could be carried through crosswalks and the new underpass to help tie all of the elements, and the north and south sides, together. Similarly, the underpass balustrade and lighting should be complementary elements within the new district.

Finally, south of the intersection, retaining the Beede Building by turning the facade will help to maintain the scale and intimacy of the square. Redeveloping the adjacent Store 24 parcel will enhance this feeling.

5.0 Funding and Next Steps

The state transportation network is financed through a variety of funding sources which may be broken down into federal, state, and direct income funds. Although several funding sources are available at the federal and state levels, the source offering the highest potential for project funding is at the federal level under two categories:

- Surface Transportation Program (STP)
- National Highway System (NHS)

5.1 Federal Funding Process

The first step in the federal funding process is authorization of funding for transportation projects through federal legislation. For highways and public transportation facilities the most recent authorization is the Intermodal Surface Transportation Efficiency Act (ISTEA), which will end in federal fiscal year 1997. Overall, the Commonwealth's federal fiscal year 1997 apportionment of $730 million for the two funding categories identified above is approximately $78 million. As with many large transportation improvement projects, the state has in the past financed most of its share of the capital improvement program, including transportation facilities, through bond sales. Debt service on these loans is then paid off over time through the general fund and highway fund, both of which are partially financed from gas and other highway user fees. In order to borrow from these funds, the Executive Office of Transportation and Construction (EOTC) must prepare a Transportation Bond Bill (TBB) and submit it to the state legislature for approval. This TBB is prepared approximately every two years. Once approved by the state legislature and signed by the Governor, the agencies are then authorized to borrow funds, subject to program and project limits set forth in the TBB.

5.2 Next Steps

The feasibility of project funding is dependent on building a broad base of support for the concept plan. This process has already begun. The concept must also be further developed and evaluated in terms of neighborhood impact, economic impact and construction impacts, and be progressed by the town through discussions with the State Highway Department in order to establish the programming of funds to accomplish the construction.

Prior to the design, it will need to be determined to what extent federal and state environmental planning processes are required. The Massachusetts Highway Department (MHD) will determine the appropriate action required to advance the project through the Department's project development phase. At the time of their determination, filing with the State Executive Office of Environmental Affairs through its MEPA Unit will also be necessary.

The town will also be responsible for conducting any environmental assessments or studies which may be required by either the state (MEPA–EIR) or federal (assessment–EIS) statutes. It will be necessary to file an Environmental Notification Form which will determine which studies are required. Once the MHD has approved the project, and the environmental studies have been completed, the engineering design can be undertaken.

To begin the process, it is suggested that the town of Framingham officially apply through their Board of Selectmen for federal and state funding of a corridor improvement project for Route 126. This application should include evidence of support and endorsement of the project through letters from all sectors of the community (i.e., local and state officials, abutters, neighborhood groups, other citizen groups, business community, and planning agency).