



DEDHAM STREET CORRIDOR STUDY



Prepared For:



Town of
Dover, Massachusetts

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CORRIDOR STUDY

DEDHAM STREET/CENTRE STREET/CROSS STREET
DOVER, MASSACHUSETTS

Prepared for:

TOWN OF DOVER
Dover, Massachusetts

December 2011

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PREFACE

Vanasse & Associates, Inc. (VAI) was retained by the Town of Dover to conduct a comprehensive study of the Dedham Street corridor with respect to: i) traffic operations (motorist delay and vehicle queuing); ii) pedestrian and bicycle accommodations, iii) safety; and iv) neighborhood impacts. The purpose of the study was to assess these elements under current (2011) conditions; project future conditions based on available information concerning potential future projects (including the potential future expansion and renovation of Caryl Park) and historic traffic growth; and, after careful review of the collected data and analysis, develop a series of suggested measures, both short and long-term, that are designed to : 1) address existing safety and operational deficiencies; 2) accommodate future traffic demands; 3) reduce impacts to adjacent residential areas; and 4) facilitate pedestrian and bicycle travel in a safe manner.

This document and its associated recommendations are a product of a comprehensive transportation planning effort undertaken in consultation with the Town of Dover and its residents, and with input and information provided by the Massachusetts Department of Transportation (MassDOT) Highway Division and the Massachusetts Bay Transportation Authority (MBTA).

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has completed a study of the Dedham Street/Centre Street/Cross Street area located within the Town of Dover, Massachusetts. This study was commissioned by the Town in an effort to develop a comprehensive planning assessment of the transportation infrastructure serving the Dedham Street corridor area, both at present and with anticipated future development in the area, including the Caryl Park Field Renovations. A series of recommendations have been developed as a result of this study that are designed to address: i) roadway and intersection capacity; ii) safety; iii) neighborhood impacts; and iv) pedestrian and bicycle accommodations. This study reviews the following areas as they relate to the study roadways:

- Determination of existing and projected future traffic volumes;
- Assessment of motor vehicle crash history and safety;
- Inventory of existing and proposed pedestrian and bicycle facilities and public transportation services;
- Assessment of operating conditions (motorist delays and vehicle queuing) under existing and anticipated future conditions; and
- Development of both short and long-term improvement strategies to address deficiencies identified with regard to roadway/intersection capacity, safety, neighborhood impacts, and pedestrian and bicycle accommodations.

This effort was completed as a cooperative venture with the Town of Dover and was conducted in consultation with the Massachusetts Department of Transportation (MassDOT) and with input received from the Board of Selectmen and the public. This document represents the coalescence of this cooperative planning effort and has been structured to serve as a planning tool for the implementation of improvements to the Dedham Street/Centre Street/Cross Street area.

EXISTING CONDITIONS

A comprehensive field inventory of traffic conditions on the study area roadways was conducted in May, June and July 2011. The field investigation consisted of an inventory of existing roadway geometrics; traffic volumes; vehicle travel speeds; pedestrian and bicycle facilities; public transportation services; and operating characteristics; as well as posted speed limits and land use information within the study area. The study area is depicted on Figure 1 and consisted of the Dedham Street/Centre Street/Cross Street corridors, as well as the six major intersections located within this defined area:

1. Dedham Street at Centre Street
2. Dedham Street at Haven Street
3. Dedham Street at Willow Street
4. Dedham Street at Cross Street
5. Centre Street at Haven Street
6. Centre Street at Cross Street

The following describes the study area roadways and intersections.

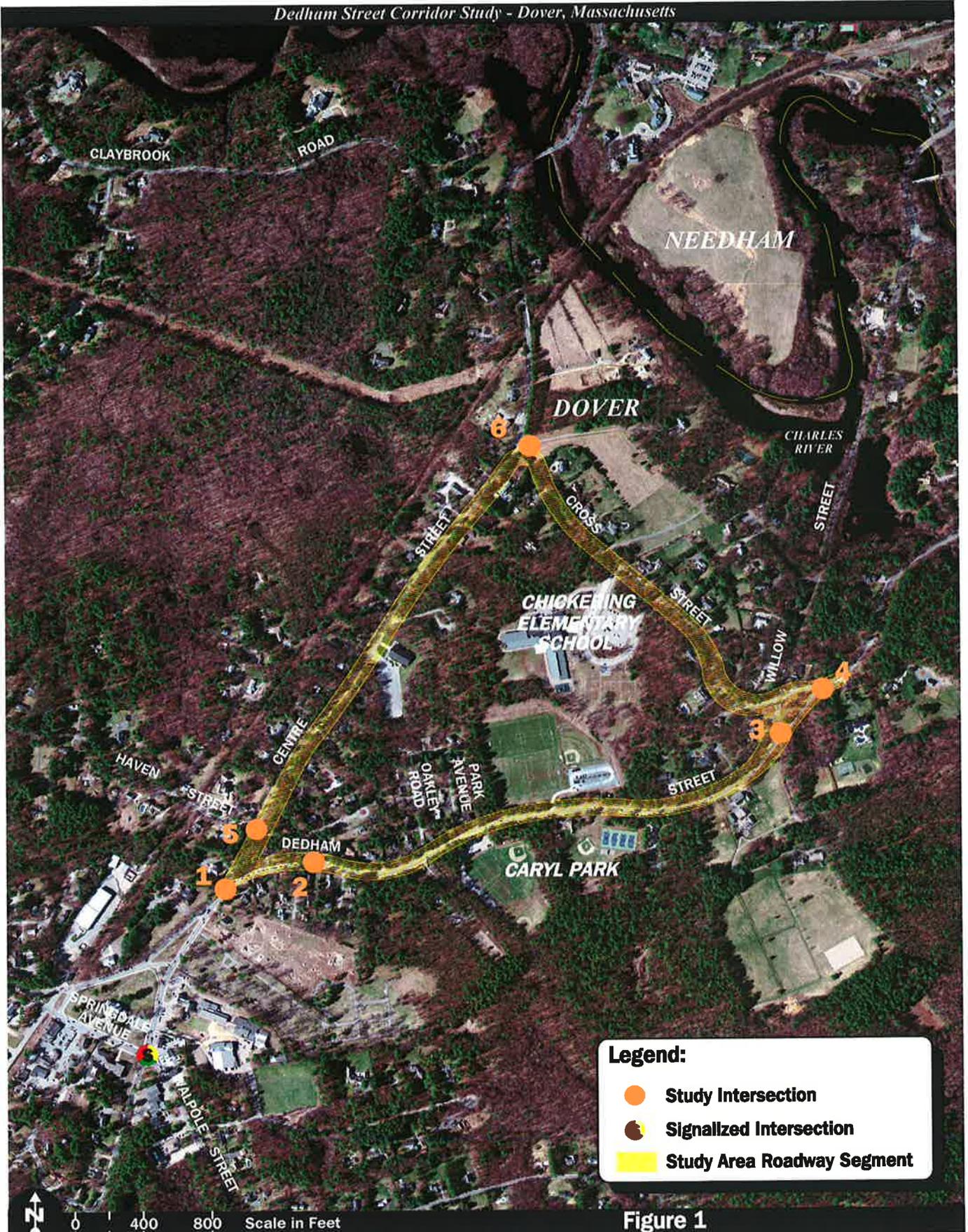
GEOMETRY

Roadways

Dedham Street



Dedham Street is a two-lane urban minor arterial roadway that is under Town jurisdiction and traverses a general east-west direction between Chestnut Street, Centre Street and Springdale Avenue. Dedham Street is a designated “scenic roadway” as a result of the unique character and features of the roadway, elements that are to be



Legend:

- Study Intersection
- Signalized Intersection
- ▬ Study Area Roadway Segment

Figure 1
Study Area Map



enhanced and preserved.¹ Within the study area, Dedham Street provides two 11 to 14-foot wide travel lanes separated by a double-yellow centerline with a 1 to 5-foot wide marked shoulder provided. The posted speed limit along Dedham Street is 40 miles per hour (mph). Portions of Dedham Street have been designated by signs as a “thickly settled” residential area, indicating a “prima facie” speed limit of 30 mph per MGL Chapter 90 § 17;² however, the density of development along the subject segment of the Dedham Street corridor does not meet the definition of “thickly settled” as specified in MGL Chapter 90 § 17³ and, therefore, the 40 mph posted speed limit constitutes the legally enforceable speed along the roadway per MGL Chapter 90 § 18. Sidewalks are provided along the north side of Dedham Street between Centre Street and the Chickering Fields, and along the south side between Centre Street and Park Avenue. Marked crosswalks are provided for crossing Dedham Street at Centre Street, Park Avenue, and between the Chickering School Path and the Caryl Park tennis courts. The crossings at Park Avenue and between the Chickering School Path and the Caryl Park tennis courts are designed as raised crosswalks and serve as a traffic calming device to slow vehicle travel speeds along Dedham Street in the vicinity of Caryl Park and the Chickering Fields. Land use along Dedham Street consists of the Swain Museum, Caryl Park, the Chickering Fields, the Caryl House and grounds (a designated historic property), residential and institutional uses, and areas of open and wooded space.

Centre Street



Centre Street is a two-lane urban minor arterial roadway that is under Town jurisdiction and traverses a general north-south direction between the Needham and Medfield Town Lines. Similar to Dedham Street, Centre Street has been designated “scenic roadway”. Within the study area, Centre Street provides two 11 to 16-foot wide travel lanes separated by a double-yellow centerline with a 1 to 2-foot wide marked shoulder provided. The posted speed limit along Centre Street within the study area is 30 mph north of Haven Street and 25 mph to the south. Sidewalks are provided along

the east side of Centre Street between Cross Street and Walpole Street, and along the west side between Dedham Street and Springdale Avenue. Marked crosswalks are provided for crossing Centre Street at Dedham Street and at Walpole Street/Springdale Avenue (signalized intersection). Land use along Centre Street within the study area consists of the Dover Public Library, Dover Town Hall, residential and institutional uses, and areas of open and wooded space.

¹Section 245 of the Dover Town Code establishes the procedures for a roadway to be designated as a “Scenic Road” per MGL Chapter 40 § 15C which states “Upon recommendation or request of the Planning Board, Conservation Commission or Historical Commission of any city or Town, such city or Town may designate any road in said city or town other than a numbered route or state highway, as a scenic road.” Section 245-4 defines the procedure to designate a road as a “Scenic Road”, including public notice, hearings and required vote of Town Meeting.

²The “prima facie” speed limit is defined in Chapter 90 § 17 of the Massachusetts General Laws as that rate of speed greater than which is considered reasonable or proper to operate motor vehicle under a defined roadway type and abutting land use.

³“Thickly Settled” is defined as “the territory contiguous to any way which is built up with structures devoted to business, or the territory contiguous to any way where dwelling houses are situated at such distances as will average less than two hundred feet between them for a distance of a quarter of a mile or over.”

Cross Street



Cross Street is a two-lane collector roadway that is under Town jurisdiction and traverses the study area in a general northwest-southeast direction between Dedham Street and Centre Street. Similar to Dedham Street and Centre Street, Cross Street is a designated “scenic road”. Within the study area, Cross Street provides two 11 to 12-foot wide travel lanes separated by a single-yellow centerline with a 1 to 2-foot wide marked shoulder provided. A 20 mph School Zone is present in the vicinity of the Chickering Elementary School. Outside of this defined area, a posted speed limit is not provided

along Cross Street; however, the “prima facie” speed limit would be 30 mph.⁴ Sidewalks are not provided along Cross Street. Land use along Cross Street consists of the Chickering Elementary School, residential properties, and areas of open and wooded space.

Intersections

Dedham Street at Centre Street



Dedham Street intersects Centre Street from the east to form this three-legged, “T”-type, unsignalized intersection under STOP-sign control. The Centre Street north and southbound approaches consist of an 11 to 16-foot wide general purpose travel lane with 1 to 2-foot wide marked shoulders provided. Right-turn movements from the Centre Street northbound approach exit prior to the intersection by way of a 15-foot wide (13-foot wide travel lane with 1-foot wide marked shoulders along both sides), channelized, right-turn slip-ramp. The directions of travel along Centre Street are separated

by a double-yellow centerline. The Dedham Street westbound approach consists of a 12-foot wide general purpose travel lane with a 5-foot wide marked shoulder provided and vehicles approaching Centre Street under STOP-sign control. The directions of travel along Dedham Street are separated by a raised island at the intersection and by way of a double-yellow centerline to the east. Sidewalks are provided along the east side of Centre Street north of the intersection, along both sides of Centre Street south of the intersection, and along both sides of Dedham Street. Crosswalks are provided across the north leg of Centre Street and across Dedham Street. Land use in the vicinity of the intersection consists of the Dover Public Library, institutional and residential uses, and areas of open and wooded space.

⁴Ibid 2.

Dedham Street at Haven Street



Haven Street intersects Dedham Street from the northwest to form this three-legged, “T”-type, unsignalized intersection under STOP-sign control. The Dedham Street east and westbound approaches consist of a 12 to 13.5-foot wide general purpose travel lane with 2.5 to 4-foot wide marked shoulders provided. The directions of travel along Dedham Street are separated by a double-yellow centerline. The Haven Street southeastbound approach consists of a 9-foot wide general purpose travel lane with a 1-foot wide marked shoulder provided and vehicles approaching Dedham Street

under STOP-sign control. The directions of travel along Haven Street are separated by a single-yellow centerline. Sidewalks are provided along both sides of Dedham Street with a crosswalk provided across Haven Street. Land use in the vicinity of the intersection consists of the Swain Museum, residential properties, and areas of open and wooded space.

Dedham Street at Willow Street and Cross Street (south)



Willow Street and Cross Street intersect Dedham Street from the north and northwest, respectively, to form two three-legged, unsignalized intersections, one being “Y”-type and the other being “T”-type, under STOP-sign control. The Dedham Street northeast and southwestbound approaches consist of 11-foot wide general purpose travel lanes with 1 to 3-foot wide marked shoulders provided. The directions of travel along Dedham Street are separated by a double-yellow centerline. The Willow Street southbound approach consists of a 10-foot wide general purpose travel lane

with a 1-foot wide marked shoulder provided. The directions of travel along Willow Street are separated by a single-yellow centerline. Cross Street consists of a 24-foot wide paved roadway that accommodates two-way travel with no marked centerline approaching Dedham Street and 1 to 3-foot wide marked shoulders provided. Vehicles approaching Dedham Street from Cross Street are under STOP-sign control. Sidewalks and crosswalks are not provided at the intersections. Land use in the vicinity of the intersection consists of residential properties and areas of open and wooded space.

Dedham Street at Cross Street (north)



Cross Street intersects Dedham Street from the west to form this three-legged, “Y”-type intersection, with Cross Street departing from Dedham Street as a one-way northwestbound roadway. The Dedham Street approaches to the intersection consist of 11-foot wide general purpose travel lanes with 1 to 3-foot wide marked shoulders provided. The directions of travel along Dedham Street are separated by a double-yellow centerline. The Cross Street departure leg of the intersection consists of an 18.5-foot wide roadway with 1-foot wide marked shoulders provided along both sides. Cross Street is under STOP-sign

control at its intersection with Willow Street immediately west of Dedham Street. Sidewalks and crosswalks are not provided at this intersection. Land use in the vicinity of the intersection consists of residential properties and areas of open and wooded space.

Centre Street at Haven Street



Haven Street intersects Centre Street from the east and west to form this four-legged intersection under STOP-sign control. The Centre Street north and southbound approaches consist of a 10.5 to 12-foot wide general purpose travel lane with 1 to 2-foot wide marked shoulders provided. The directions of travel along Centre Street are separated by a double-yellow centerline. The Haven Street approaches consist of a 9.5 to 10-foot wide general purpose travel lane with a 1-foot wide marked shoulder provided and vehicles approaching Centre Street under STOP-sign control. Left turns

are prohibited from Haven Street westbound between 4 PM and 6 PM. The directions of travel along Haven Street are separated by a single-yellow centerline. A sidewalk is provided along the east side of Centre Street with a crosswalk provided across the Haven Street east leg of the intersection. Land use in the vicinity of the intersection consists of residential properties and areas of open and wooded space.

Centre Street at Cross Street



Cross Street intersects Centre Street from the southeast to form this three-legged, T-type, unsignalized intersection under STOP-sign control. The Centre Street north and southbound approaches consists of a 10 to 11-foot wide general purpose travel lane with 1 to 2-foot wide marked shoulders provided. The directions of travel along Centre Street are separated by a double-yellow centerline. The Cross Street approach consists of a 10.5-foot wide general purpose travel lane with a 1-foot wide marked shoulder provided and vehicles

approaching Centre Street under STOP-sign control. The directions of travel along Cross Street are separated by a single-yellow centerline. A sidewalk is provided along the east side of Centre Street south of the intersection. Land use in the vicinity of the intersection consists of residential properties and areas of open and wooded space.

EXISTING TRAFFIC VOLUMES

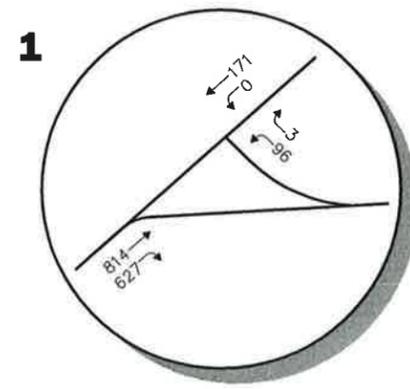
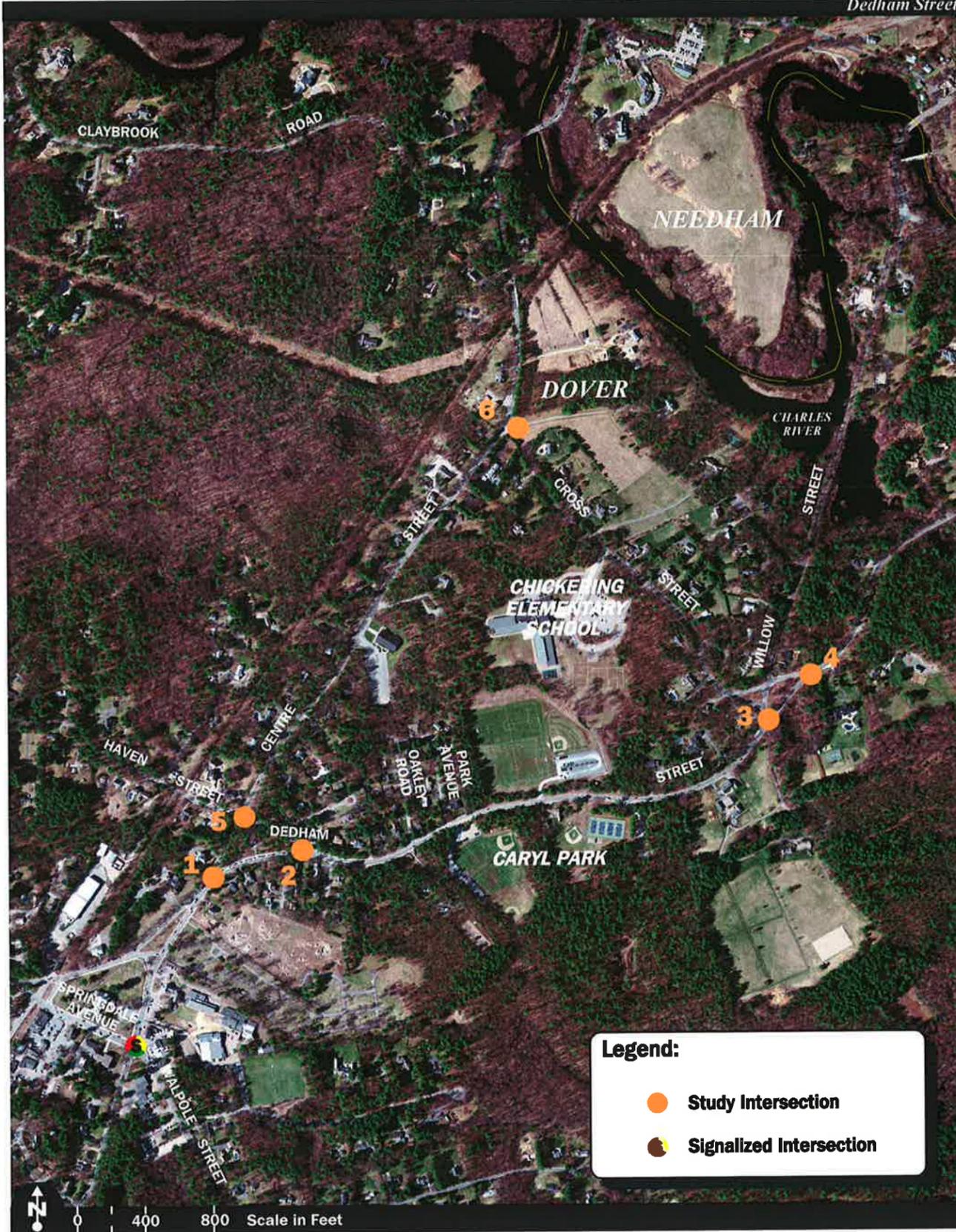
In order to establish existing traffic-volume demands and flow patterns within the study area, automatic traffic recorder (ATR) counts, manual turning movement counts (TMCs), and vehicle classification counts were conducted in May and June 2011. The TMCs were conducted during the weekday morning (6:30 to 9:30 AM) and evening (3:30 to 6:30 PM) peak periods at the six study area intersections. Daily traffic volumes were collected at two locations along Dedham Street: in the vicinity of Caryl Park and west of Cross Street; by means of ATR counts over a continuous 14-day period between May 31 (partial day) and June 14 (partial day), 2011, in order to record weekday daily traffic conditions along Dedham Street over an extended period.

Based on discussions with the Dover Parks and Recreation Department, the following activities were scheduled at Caryl Park and the Chickering Fields on the days that the traffic counts that form the basis of this assessment were completed: baseball/softball (5:00 to 8:00 PM weekdays and 9:00 to 10:30 AM on Saturday), soccer (3:30 to 8:00 PM weekdays, 8:30 AM to 6:00 PM Saturday and 9:00 to 10:30 AM Sunday), and lacrosse (3:30 to 8:00 PM weekdays, 8:30 AM to 6:00 PM Saturday, and 11:00 AM to 6:00 PM Sunday). Traffic volumes and pedestrian and bicycle activity associated with these scheduled activities were explicitly included in the traffic volume data in addition to that resulting from the use of the other amenities and recreational opportunities that exist within Caryl Park and the immediate vicinity.

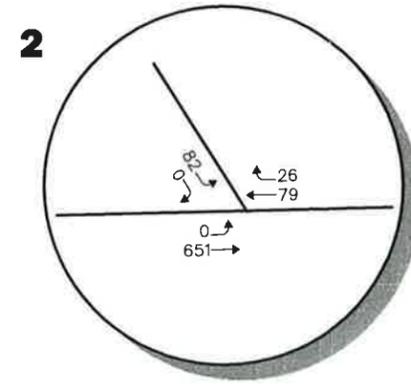
Seasonal Adjustments

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, MassDOT weekday seasonal factors for Group 6 roadways (urban arterials, collectors and rural arterials, the MassDOT functional classification for Dedham Street and Centre Street) were reviewed.⁵ Based on a review of this data, it was determined that traffic volumes for the months of May and June are approximately 9 and 10 percent above average-month conditions, respectively, and, therefore, were not adjusted downward in order to provide a conservative (above-average) analysis condition. The 2011 Existing average weekday and weekday morning and evening peak-hour traffic volumes along Dedham Street at Caryl Park and at a point west of Cross Street are summarized in Table 1, with Figures 2 and 3 graphically depicting the weekday morning and evening peak hour traffic volumes at the study intersections, respectively.

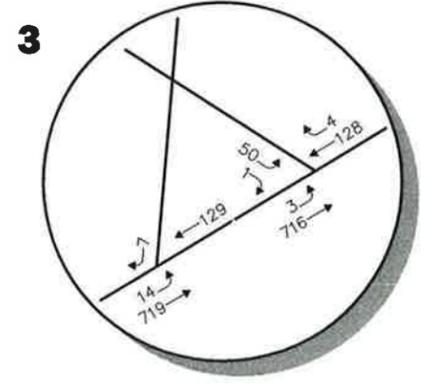
⁵MassDOT Traffic Volumes for the Commonwealth of Massachusetts; 2007 Weekday Seasonal Factors, Group 6 – Urban Arterials, Collectors and Rural Arterials.



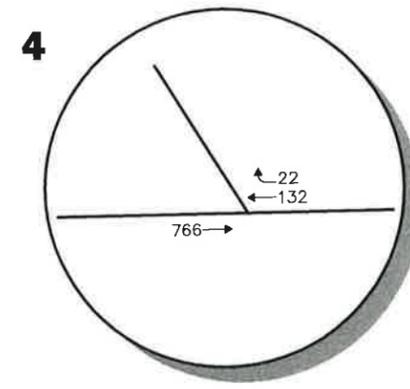
DEDHAM STREET/ CENTRE STREET



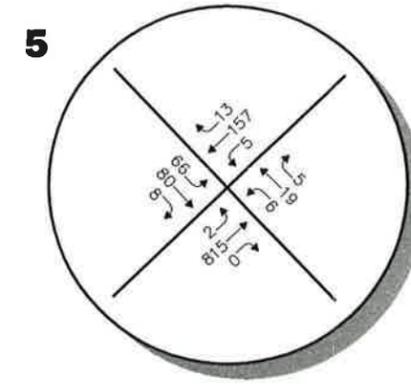
DEDHAM STREET/HAVEN STREET



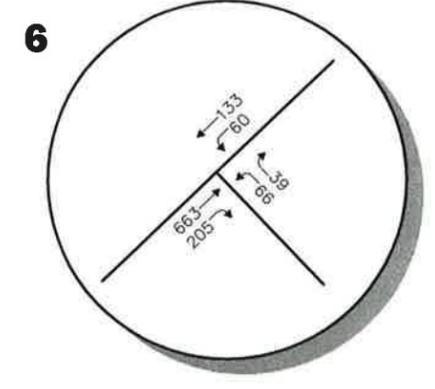
DEDHAM STREET/WILLOW STREET



DEDHAM STREET/ CROSS STREET



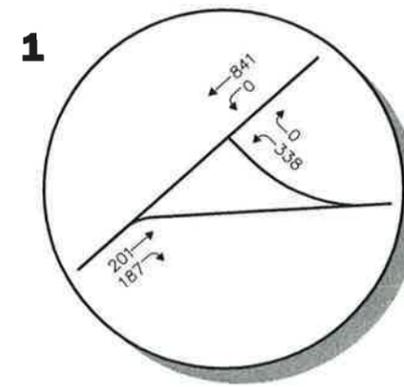
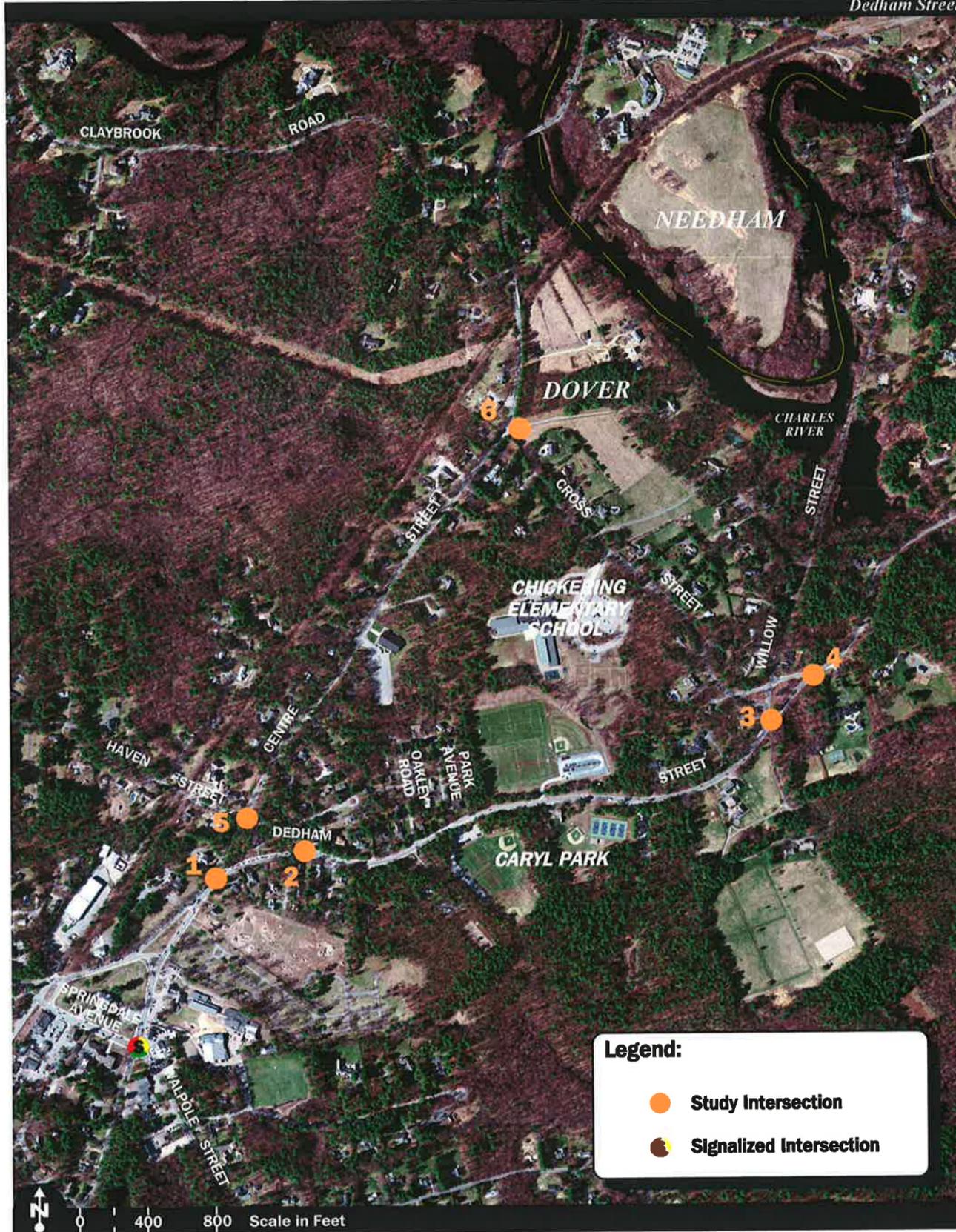
CENTRE STREET/HAVEN STREET



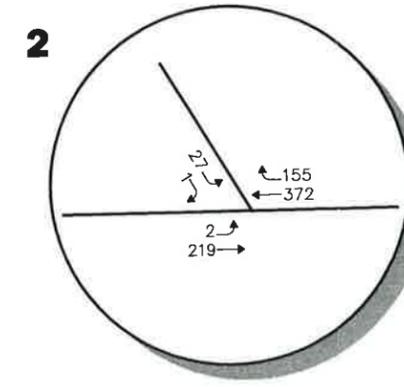
CENTRE STREET/CROSS STREET

Figure 2

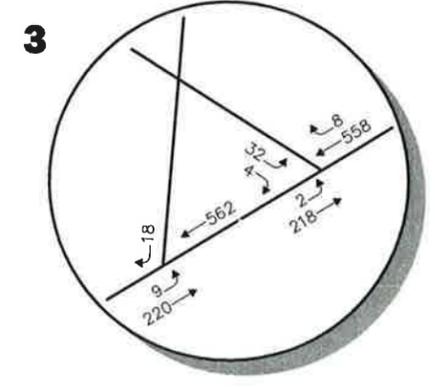
2011 Existing
Weekday Morning
Peak Hour Traffic Volumes



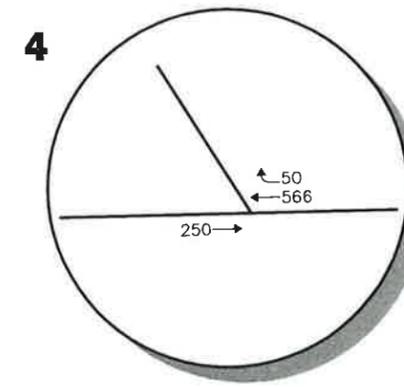
DEDHAM STREET/ CENTRE STREET



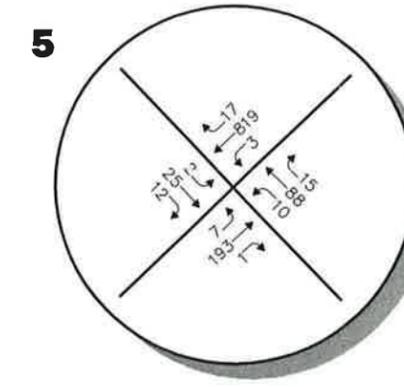
DEDHAM STREET/HAVEN STREET



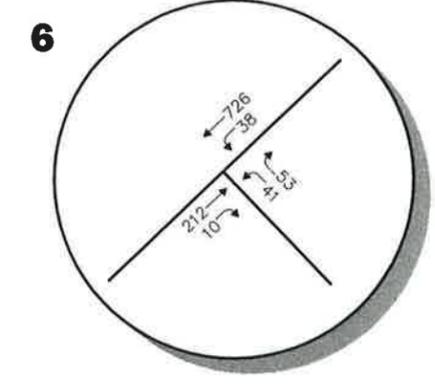
DEDHAM STREET/WILLOW STREET



DEDHAM STREET/ CROSS STREET



CENTRE STREET/HAVEN STREET



CENTRE STREET/CROSS STREET

Figure 3

2011 Existing
Weekday Evening
Peak Hour Traffic Volumes

Table 1
2011 EXISTING TRAFFIC VOLUMES

Location	AWT ^a	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		VPH ^b	K Factor ^c	Directional Distribution ^d	VPH	K Factor	Directional Distribution
Dedham Street at Caryl Park	7,165	869	12.1	84.3% EB	809	11.3	71.7% WB
Dedham Street, west of Cross Street	7,045	920	13.1	83.3% EB	866	12.3	71.1% WB

^aAverage weekday traffic in vehicles per day.

^bVehicles per hour.

^cPercent of daily traffic occurring during the peak hour.

^dPercent traveling in peak direction.

NB = northbound; SB = southbound; WB = westbound; EB = eastbound.

As can be seen in Table 1, Dedham Street in the vicinity of Caryl Park was found to accommodate approximately 7,165 vehicles per day (vpd) on an average weekday, with approximately 869 vehicles per hour (vph) during the weekday morning peak-hour and 809 vph during the weekday evening peak-hour. Dedham Street, west of Cross Street, was found to accommodate approximately 7,045 vpd on an average weekday, with approximately 920 vph during the weekday morning peak-hour and 866 vph during the weekday evening peak-hour.

A review of the peak-period traffic counts indicates that the weekday morning peak-hour generally occurs between 8:00 and 9:00 AM, with the weekday evening peak-hour generally occurring between 5:00 and 6:00 PM.

SPOT SPEED MEASUREMENTS

Vehicle travel speed measurements were performed on Dedham Street in the vicinity of Caryl Park and on Dedham Street west of Cross Street in conjunction with the ATR counts. Table 2 summarizes the vehicle travel speed measurements along Dedham Street.

Table 2
VEHICLE TRAVEL SPEED MEASUREMENTS

	Dedham Street at Caryl Park		Dedham Street West of Cross Street	
	Westbound	Eastbound	Westbound	Eastbound
Mean Travel Speed (mph)	39	37	37	37
85 th Percentile Speed (mph)	45	42	40	41
Posted Speed Limit (mph)	40	40	40	40

As can be seen in Table 2, the mean (average) vehicle travel speed along Dedham Street in the vicinity of Caryl Park was found to be approximately 38 mph. The average measured 85th percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be approximately 44 mph, or 4 mph above the posted speed limit of 40 mph. The 85th percentile speed is used as the basis of engineering design and in the evaluation of sight distances, and is often used in establishing posted speed limits.

The mean vehicle travel speed along Dedham Street west of Cross Street was found to be approximately 37 mph, with the average measured 85th percentile vehicle travel speed found to be approximately 40 mph, consistent with the posted speed limit (40 mph).

A review of the measured travel speeds in the vicinity of Caryl Park indicates that the raised crosswalks are not producing the desired speed reduction (a 30 to 35 mph operating speed would be expected). A 2-day speed study (Friday through Saturday) conducted in March 2010 along Dedham Street in the vicinity of Caryl Park indicated an average measured vehicle travel speed of approximately 32 mph and an 85th percentile vehicle travel speed of approximately 37 mph.⁶ The disparity in the speed data reported can be attributed in part to the extended time period for which the most recent data was collected (14 days vs. 2 days) and motorists becoming more familiar (and less inclined to slow in the absence of pedestrians) with the raised crosswalks. That said, the raised crossings and the associated signs and pavement markings improve the visibility of the crosswalks and alert motorists of the potential for pedestrians to be crossing the roadway.

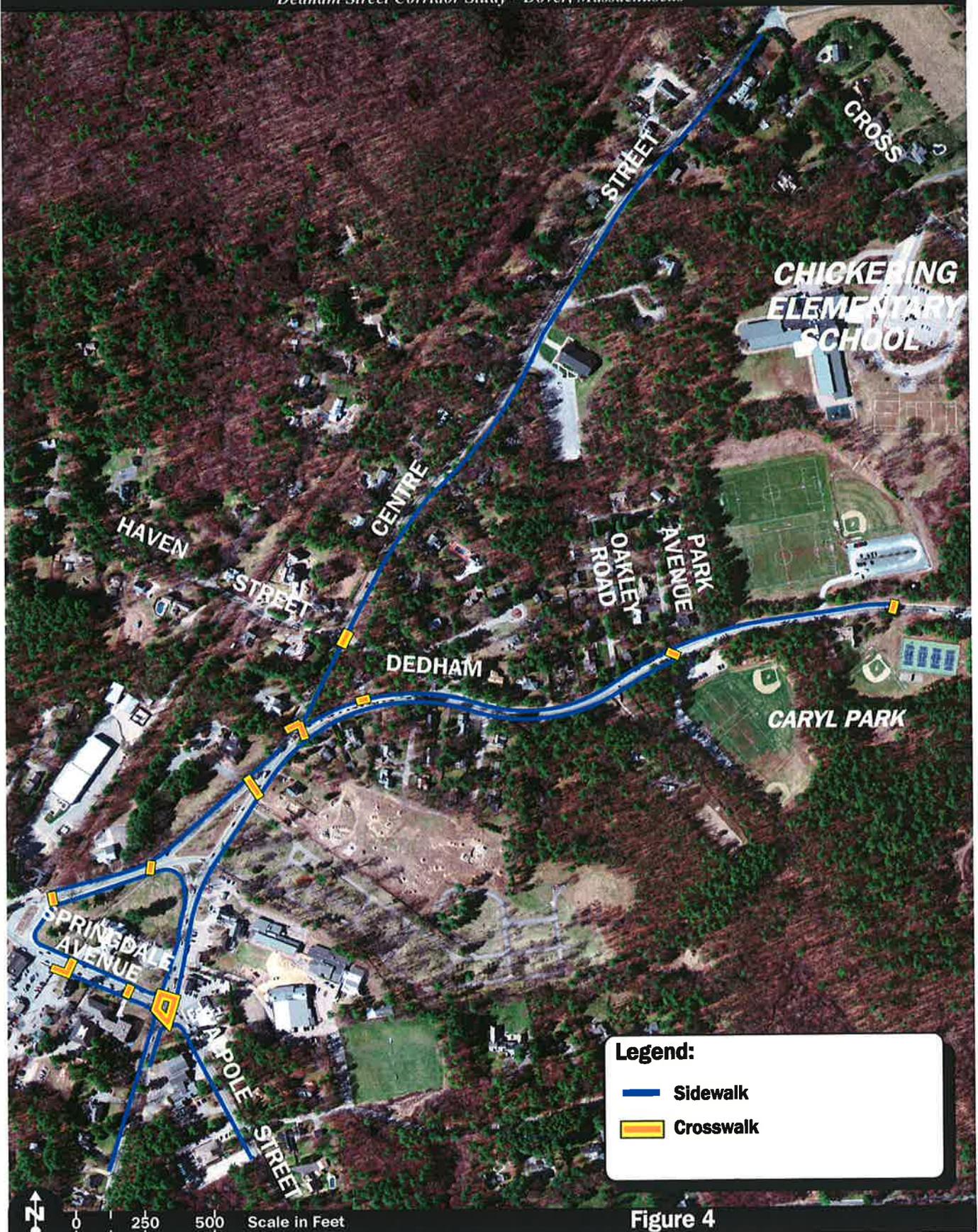
PEDESTRIAN AND BICYCLE FACILITIES

An inventory of pedestrian and bicycle facilities within the study area was undertaken in May and June 2011. The inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections evaluated in conjunction with this assessment, as well as the location of existing and planned future bicycle facilities within the study area.

Figure 4 depicts the location of sidewalks and crosswalks within the study area. Currently, sidewalks are provided along both sides of Dedham Street between Centre Street and Park Avenue; along the north side of Dedham Street between Park Avenue and the Chickering Fields; along both sides of Centre Street between Dedham Street and Springdale Avenue/Walpole Street; and along the east side of Centre Street between Dedham Street and Cross Street. Marked crosswalks are provided at the following intersections: Dedham Street/Centre Street (across Dedham Street and the Centre Street north leg); Dedham Street/Haven Street (across Haven Street); Dedham Street/Park Avenue (across Dedham Street); Dedham Street/Chickering Fields (across Dedham Street); Centre Street/Haven Street (across Haven Street); Centre Street/Springdale Avenue/Walpole Street (across all legs of the intersection).

At present, there are no formal bicycle accommodations provided within the study area; however, portions of Dedham Street and Centre Street provide sufficient width (combined travel lane and shoulder) to support bicycle travel in a shared travelled-way configuration.

⁶*Traffic Impact Assessment, Caryl Park Field Renovations, Dedham Street, Dover, Massachusetts; VAI; March 17, 2010.*



PUBLIC TRANSPORTATION

At present, the Town of Dover is not served by regularly scheduled public transportation services. The most proximate access to public transportation is located in the Town of Needham, where the Massachusetts Bay Transportation Authority (MBTA) provides Commuter Rail service to South Station in Boston by way of the Needham Line. The closest Commuter Rail stations to the Town of Dover are the Needham Junction station which is located off Chestnut Street, Needham Center station which is located off Great Plain Avenue, and the Needham Heights station which is located off West Street. MBTA Commuter Rail service on the Needham Line operates on weekdays between 6:10 AM and 11:09 PM, and on Saturday between 7:10 AM and 11:57 PM; no service on Sunday. The MBTA Commuter Rail fare from the Needham stations to South Station (Zone 2) is \$4.75 (one-way). The MBTA service schedule and fare information are provided in the Appendix.

MOTOR VEHICLE CRASH DATA

Motor vehicle crash information for the study area intersections was provided by the Massachusetts Department of Transportation (MassDOT) for the most recent three-year period available (2007 through 2009, inclusive) in order to examine motor vehicle crash trends occurring within the study area. This data was supplemented with information provided by the Dover Police Department for years 2006 through 2011. The data is summarized by intersection, type, severity, and day of occurrence, and presented in Table 3. Note that the crash data includes all intersections along the Dedham Street corridor within the study area; however, crash rates are only calculated at the study intersections where traffic volume data was collected.⁷ Based on a review of this data, we have noted the following:

- A total of 44 motor vehicle crashes were reported along the Dedham Street corridor between Centre Street and Cross Street over the three-year review period, 23 of which were reported at specific intersections along the corridor.
- The majority of the collisions occurring along Dedham Street resulted in property damage only, occurred on a weekday, during daylight, under clear weather conditions.
- No fatal motor vehicle crashes were reported within the study area over the three-year review period.
- With the exception of the Dedham Street/Centre Street intersection, the study area intersections experienced an average of two (2) or fewer reported motor vehicle crashes per year over the three-year review period and were found to have a motor vehicle crash rate below the MassDOT average crash rate for an unsignalized intersection for the MassDOT Highway Division District in which the Town is located (District 6).
- The intersection of Dedham Street at Centre Street was found to have experienced 16 reported motor vehicle crashes over the three-year review period, or an average of approximately 5 crashes per year.

⁷Traffic count data is required in order to complete crash rate calculations.

- The majority of the crashes occurring at the Dedham Street/Centre Street intersection involved property damage only; occurred on a weekday, during daylight, under clear weather conditions; and were reported as angle or rear-end type collisions. In addition, the intersection was found to have a motor vehicle crash rate above the MassDOT average for an unsignalized intersection.

The detailed MassDOT Crash Rate Worksheets are provided in the Appendix.

**TABLE 3
MOTOR VEHICLE CRASH DATA SUMMARY^a**

	Dedham Street Corridor											
	Dedham Street (Not at an Intersection)	Dedham Street/ Burnham Road	Dedham Street/ Centre Street	Dedham Street/ Chestnut Street	Dedham Street/ Dedham Street	Dedham Street/ Haven Street	Dedham Street/ Hutton Road	Dedham Street/ Mill Street	Dedham Street/ Park Avenue	Dedham Street/ Willow Street/ Cross Street	Centre Street/ Haven Street	Centre Street/ Cross Street
<i>Year:</i>												
2007	10	0	4	1	0	0	0	1	1	1	1	1
2008	7	1	10	0	0	1	0	0	0	0	3	1
<u>2009</u>	<u>4</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>0</u>
Total	21	1	16	1	0	1	1	1	1	1	5	2
<i>Average Rate^b</i>	7.0	0.33	5.33	0.33	0.00	0.33	0.33	0.33	0.33	0.33	1.67	0.67
<i>Significant?^c</i>	N/A	NC	0.84 Yes	NC	NC	0.11 No	NC	NC	NC	0.09 No	0.34 No	0.15 No
<i>Type:</i>												
Angle	3	1	8	1	0	0	0	0	1	1	4	0
Rear-End	1	0	5	0	0	0	0	0	0	0	0	1
Head-On	0	0	0	0	0	0	0	0	0	0	0	0
Fixed Object	6	0	1	0	0	1	0	1	0	0	0	1
Sideswipe	2	0	0	0	0	0	0	0	0	0	1	0
<u>Other/Unknown</u>	<u>9</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	1	16	1	0	1	1	1	1	1	5	2
<i>Severity:</i>												
Property Damage Only	19	1	11	1	0	0	0	1	1	1	4	2
Personal Injury	2	0	5	0	0	1	1	0	0	0	1	0
<u>Fatal</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	1	16	1	0	0	0	1	1	1	5	2
<i>Conditions:</i>												
Clear	11	0	9	1	0	1	1	0	0	1	3	0
Cloudy	8	1	4	0	0	0	0	0	0	0	0	2
Rain	1	0	2	0	0	0	0	1	1	0	2	0
Snow/Ice	1	0	0	0	0	0	0	0	0	0	0	0
<u>Other/Unknown</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	1	16	1	0	1	1	1	1	1	5	2
<i>Lighting:</i>												
Daylight	8	1	13	1	0	1	1	0	1	1	2	2
Dawn/Dusk	4	0	1	0	0	0	0	0	0	0	0	0
Dark (Road Lit)	3	0	1	0	0	0	0	0	0	0	3	0
Dark (Road Unlit)	6	0	0	0	0	0	0	1	0	0	0	0
<u>Other/Unknown</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	1	16	1	0	1	1	1	1	1	5	2
<i>Day of Week:</i>												
Monday through Friday	18	1	15	1	0	1	0	0	1	1	5	2
Saturday	1	0	1	0	0	0	1	0	0	0	0	0
<u>Sunday</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	
Total	21	1	16	1	0	1	1	1	1	1	5	2

^aSource: MassDOT Safety Management/Traffic Operations Unit records, 2007 through 2009.

^bCrash rate per million vehicles entering the intersection.

^cThe intersection crash rate is significant if it is found to exceed 0.57 crashes per million vehicles entering the intersection for unsignalized intersections and 0.77 crashes per million vehicles entering the intersection for signalized intersections as defined by MassDOT for the MassDOT Highway Division District in which the Project is located (District 6).

NC = not calculated.

SIGHT DISTANCE MEASUREMENTS

Sight distance measurements were performed at the study area intersections in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)⁸ standards. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with AASHTO and MassDOT standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 4 presents the measured SSD and ISD at the study area intersections.

Table 4
SIGHT DISTANCE MEASUREMENTS

Intersection/Sight Distance Measurement	Required Minimum (Feet) ^a	Desirable (Feet) ^b	Measured (Feet)
<i>Centre Street at Dedham Street</i>			
<i>Stopping Sight Distance:</i>			
Centre Street approaching from the north	250	--	650+
Centre Street approaching from the south	250	--	650+
<i>Intersection Sight Distance:</i>			
Looking to the north from Dedham Street	250	335/390	650+
Looking to the south from Dedham Street	250	335/390	650+
<i>Dedham Street at Haven Street</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	441
Dedham Street approaching from the east	360	--	377
<i>Intersection Sight Distance:</i>			
Looking to the west from Haven Street	360	430/500	450
Looking to the east from Haven Street	360	430/500	369
<i>Dedham Street at Willow Street</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	314
Dedham Street approaching from the east	360	--	469
<i>Intersection Sight Distance:</i>			
Looking to the west from Willow Street	360	430/500	308
Looking to the east from Willow Street	360	430/500	479

See notes at end of table.

⁸ *A Policy on Geometric Design of Highways and Streets*, 6th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2011.

Table 4 (Continued)
SIGHT DISTANCE MEASUREMENTS

Intersection/Sight Distance Measurement	Required Minimum (Feet) ^a	Desirable (Feet) ^b	Measured (Feet)
<i>Dedham Street at Cross Street</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the southwest	360	--	425
Dedham Street approaching from the northeast	360	--	551
<i>Intersection Sight Distance:</i>			
Looking to the southwest from Cross Street	360	430/500	409
Looking to the northeast from Cross Street	360	430/500	560
<i>Centre Street at Haven Street</i>			
<i>Stopping Sight Distance:</i>			
Centre Street approaching from the north, looking west	250	--	650+
Centre Street approaching from the north, looking east	250	--	592
Centre Street approaching from the south, looking west	250	--	544
Centre Street approaching from the south, looking east	250	--	523
<i>Intersection Sight Distance:</i>			
Looking to the north from Haven Street eastbound	250	335/390	650+
Looking to the south from Haven Street eastbound	250	335/390	593
Looking to the north from Haven Street westbound	250	335/390	498
Looking to the south from Haven Street westbound	250	335/390	501
<i>Centre Street at Cross Street</i>			
<i>Stopping Sight Distance:</i>			
Centre Street approaching from the north	250	--	511
Centre Street approaching from the south	250	--	650+
<i>Intersection Sight Distance:</i>			
Looking to the north from Cross Street	250	335/390	528
Looking to the south from Cross Street	250	335/390	650+
<i>Crosswalk on Dedham Street at Caryl Park/Park Avenue</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	360+
Dedham Street approaching from the east	360	--	360+
<i>Dedham Street at Caryl Park West Driveway</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	534
Dedham Street approaching from the east	360	--	360
<i>Intersection Sight Distance:</i>			
Looking to the west from Caryl Park Driveway	360	430/500	546
Looking to the east from Caryl Park Driveway	360	430/500	345
<i>Dedham Street at Chickering Fields Driveway</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	380
Dedham Street approaching from the east	360	--	650+
<i>Intersection Sight Distance:</i>			
Looking to the west from Chickering Fields Driveway	360	430/500	427+
Looking to the east from Chickering Fields Driveway	360	430/500	650+

See notes at end of table.

Table 4 (Continued)
SIGHT DISTANCE MEASUREMENTS

Intersection/Sight Distance Measurement	Required Minimum (Feet) ^a	Desirable (Feet) ^b	Measured (Feet)
<i>Crosswalk on Dedham Street east of Chickering Fields Driveway</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	360+
Dedham Street approaching from the east	360	--	360+
<i>Dedham Street at Caryl Park East Lot</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	426
Dedham Street approaching from the east	360	--	400
<i>Intersection Sight Distance:</i>			
Looking to the west from Caryl Park East Lot	360	430/500	389
Looking to the east from Caryl Park East Lot	360	430/500	420
<i>Dedham Street at Access Road East of Caryl Park</i>			
<i>Stopping Sight Distance:</i>			
Dedham Street approaching from the west	360	--	400+
Dedham Street approaching from the east	360	--	388
<i>Intersection Sight Distance:</i>			
Looking to the west from Access Road	360	430/500	450+
Looking to the east from Access Road	360	430/500	402

^aRecommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*, 6th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2011, and based on an approach speed of 45 mph along Dedham Street and 35 mph along Centre Street.

^bValues shown are the intersection sight distance for a vehicle turning right/left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed.

As can be seen in Table 4, in general, the lines of sight at the study intersections were found to meet or exceed the required minimum sight distance requirements for a 45 mph approach speed along Dedham Street and a 35 mph approach speed along Centre Street, consistent with the measured 85th percentile vehicle travel speed along these roadways and/or 5 mph over the posted speed limit. Lines of sight were found to be limited at the Dedham Street/Willow Street intersection both approaching from and looking to the west along Dedham Street due to the curvature of Dedham Street approaching the intersection from the west. Suggested measures to address the sight line limitations at the intersection include: a) reconfiguring the intersection to prohibit left-turns from Willow Street; or b) closing the segment of Willow Street between Cross Street and Dedham Street thereby directing vehicles to the Dedham Street/Cross Street intersection to access Dedham Street.

Sight lines looking to the east from the Caryl Park west driveway (proximate to Park Avenue) were also found to be slightly below the minimum required sight distance for a 45 mph approach speed along Dedham Street due to the curvature of Dedham Street approaching the intersection from the east. Suggested measures to address the sight line limitation at the driveway include: a) relocating the driveway to the east of its current location; or b) reconfiguring the access to the parking lot served by the driveway so that the current drive serves as a one-way entrance to the Park and constructing a new exit drive to the east.

In addition, sight lines at the following locations were found to meet or just slightly exceed the minimum required sight distance for safety:

- Dedham Street at Haven Street (looking to the east from Haven Street)
- Raised crosswalk on Dedham Street at Park Avenue
- Dedham Street at the Chickering Fields driveway (approaching from the west on Dedham Street)
- Dedham Street at the Chickering Fields crosswalk; and
- Dedham Street at the Caryl Park east driveway (looking to the west).

The primary factors affecting sight lines at these locations include: i) the 45 mph approach speed along Dedham Street; ii) the curvature of Dedham Street approaching or departing the locus; and/or trees and vegetation. As with the other locations along Dedham Street noted above, the 45 mph travel speed is the primary factor that defines the sight line requirements.

FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2016, which reflects a five-year planning horizon and is consistent with the planning horizon established in the state guidelines for the preparation of Traffic Impact Assessments. Traffic volumes on the roadway network under 2016 Design Year conditions include all existing traffic and new traffic resulting from background traffic growth.

BACKGROUND TRAFFIC GROWTH

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

Specific Development by Others

The Town of Dover and MassDOT were contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, the following project was identified for inclusion in this assessment:

Caryl Park Field Renovations, Dover, Massachusetts. Based on a conceptual plan developed by the Dover Parks and Recreation Department in 2010, this potential future project would entail the renovation and expansion of the playing fields and associated parking facilities and amenities located within Caryl Park and along the south side of Dedham Street in Dover, Massachusetts.

Based on the 2010 conceptual plan, the improvements may consist of the following major components:

- Rehabilitation of the existing little league and softball fields;
- Addition of a new little league field in the northwest corner of the Park (proximate to Dedham Street);
- Rehabilitation and expansion of the Tot-Lot;
- Construction of two new multi-purpose synthetic turf fields to be located south of the Tot-Lot to include an associated jogging trail, concession stand and picnic area; and
- Access, parking and stormwater management improvements.

In conjunction with the Park enhancements, the parking area proximate to Dedham Street that serves the existing soccer and little league/softball fields would be expanded to accommodate parking for 66 vehicles and a new parking area would be provided adjacent to the proposed synthetic turf fields to accommodate parking for 94 vehicles, resulting in parking accommodations for approximately 200 vehicles at project completion. Access to Caryl Park would continue to be provided by way of the existing driveways that serve the Park and intersect the south side of Dedham Street. The western driveway would be reconstructed to be aligned opposite Park Avenue in order to improve traffic operations and enhance safety, and the proximate raised crosswalk would be reconstructed as necessary.

Traffic volumes associated with the aforementioned project were obtained from the March 2010 *Traffic Impact Assessment* prepared in support of the then proposed Caryl Park field renovations,⁹ a copy of which is provided in the Appendix, and were assigned onto the study area roadway network based on the traffic pattern presented therein. No other developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the background traffic growth rate.

General Background Traffic Growth

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general traffic growth trends. Based on a review of this data, it was determined traffic volumes in the general area have fluctuated over the past several years, ranging from increases of approximately 11 percent to decreases of approximately 3 percent. On average, traffic volumes were found to have generally increased by approximately 0.32 percent per year. In order to account for future traffic growth and presently unforeseen development within the study area, a 1.0 percent per year compounded annual background traffic growth rate was used.

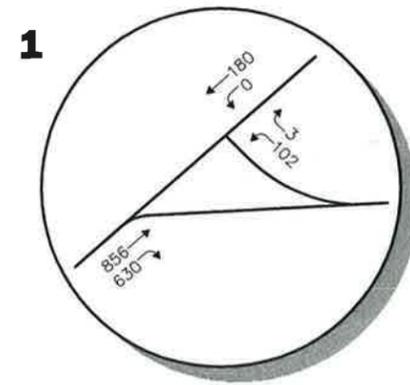
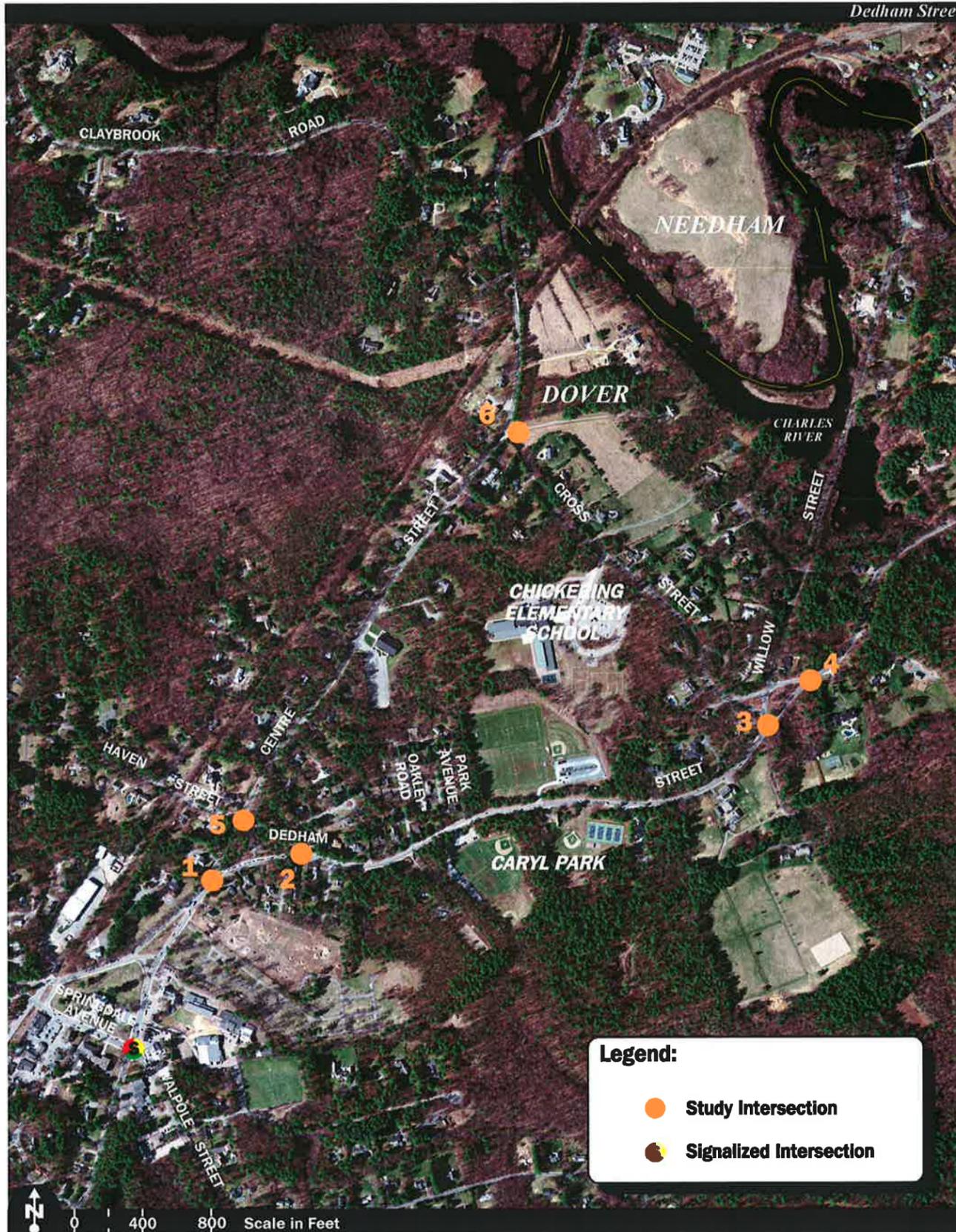
ROADWAY IMPROVEMENT PROJECTS

The Town of Dover and MassDOT were contacted in order to determine if there were any planned future roadway improvement projects expected to be complete within the 2016 Design Year that would impact traffic volumes or travel patterns within the study area. Based on these discussions, no roadway improvement projects were identified at this time aside from routine maintenance activities.

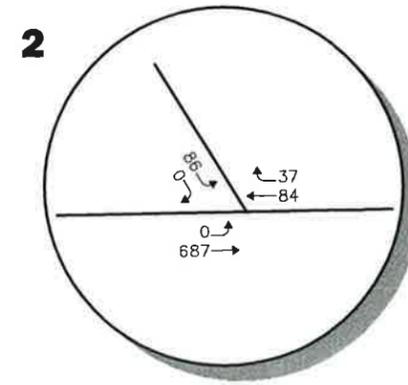
⁹Ibid 6.

DESIGN YEAR TRAFFIC VOLUMES

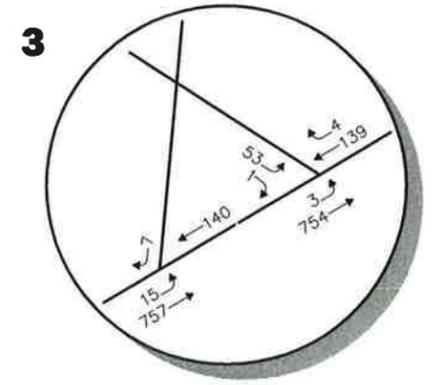
The 2016 Design Year peak-hour traffic-volumes were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2011 Existing peak-hour traffic volumes and then superimposing the peak-hour traffic volumes expected to be generated by the previously identified specific development by others. The resulting 2016 Design Year weekday morning and evening peak-hour traffic-volumes are shown on Figures 5 and 6, respectively.



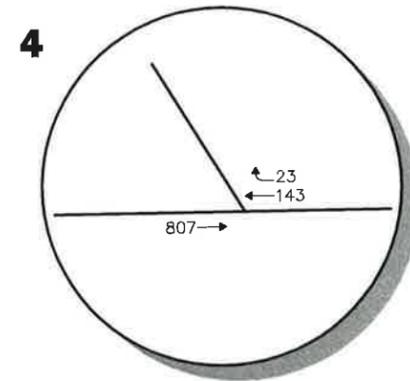
DEDHAM STREET/ CENTRE STREET



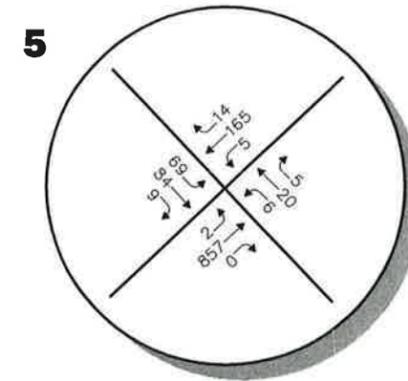
DEDHAM STREET/HAVEN STREET



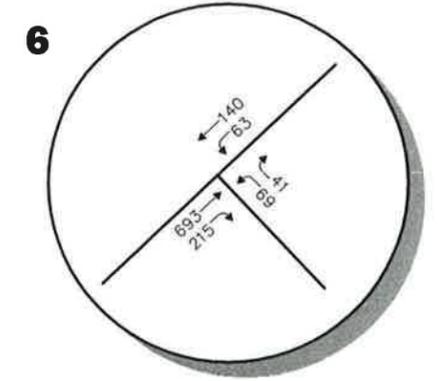
DEDHAM STREET/WILLOW STREET



DEDHAM STREET/ CROSS STREET



CENTRE STREET/HAVEN STREET



CENTRE STREET/CROSS STREET

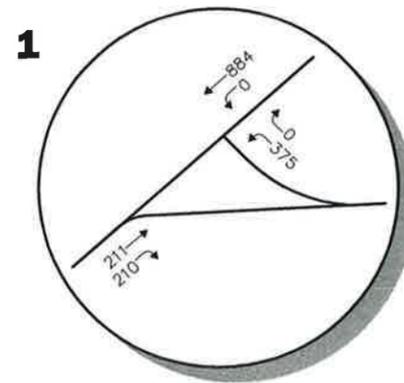
Figure 5

2016 Design Year
Weekday Morning
Peak Hour Traffic Volumes

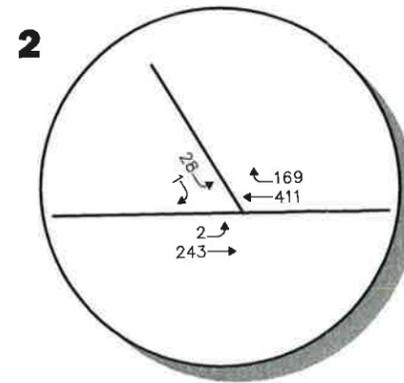


Legend:

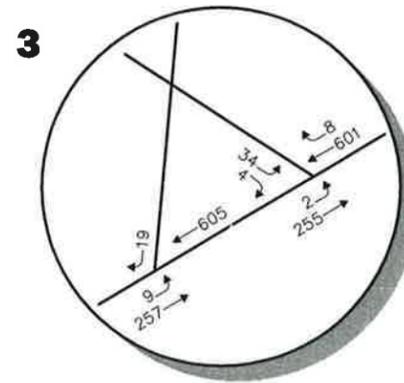
- Study Intersection
- Signalized Intersection



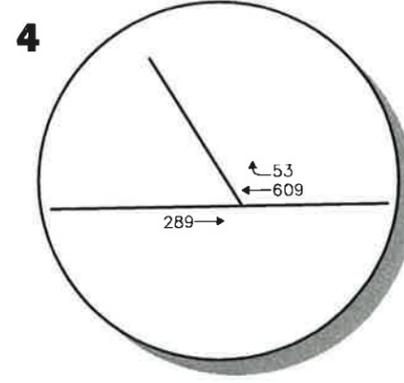
DEDHAM STREET/ CENTRE STREET



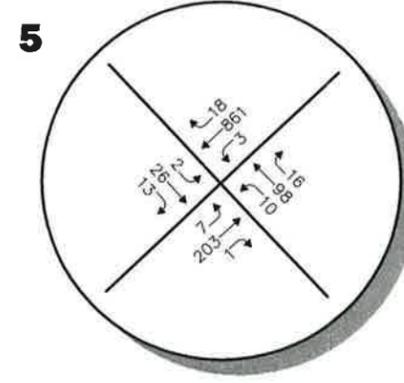
DEDHAM STREET/HAVEN STREET



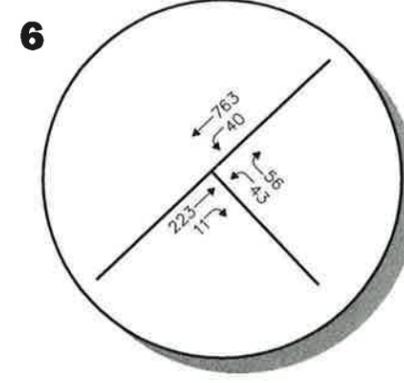
DEDHAM STREET/WILLOW STREET



DEDHAM STREET/ CROSS STREET



CENTRE STREET/HAVEN STREET



CENTRE STREET/CROSS STREET

Figure 6
 2016 Design Year
 Weekday Evening
 Peak Hour Traffic Volumes

TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing and Design Year traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.¹⁰ The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year. A detailed discussion concerning the definition and level-of-service thresholds for signalized and unsignalized intersections is provided in the Appendix.

¹⁰The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000.

Vehicle Queue Analysis

Vehicle queue analyses are a direct measurement of an intersection's ability to process vehicles under various traffic control and volume scenarios and lane use arrangements. The vehicle queue analysis was performed using the Synchro™ intersection capacity analysis software which is based upon the methodology and procedures presented in the 2000 *Highway Capacity Manual*. The Synchro™ vehicle queue analysis methodology is a simulation based model which reports the number of vehicles that experience a delay of six seconds or more at an intersection. For signalized intersections, Synchro™ reports both the 50th (median) and 95th percentile vehicle queues. For unsignalized intersections, Synchro™ reports the 95th percentile vehicle queue. Vehicle queue lengths are a function of the capacity of the movement under study and the volume of traffic being processed by the intersection during the analysis period. The 95th percentile vehicle queue is the vehicle queue length that will be exceeded only 5 percent of the time, or approximately three minutes out of sixty minutes during the peak one hour of the day (during the remaining fifty-seven minutes, the vehicle queue length will be less than the 95th percentile queue length).

ANALYSIS RESULTS

Level-of-service and vehicle queue analyses were conducted for 2011 Existing and 2016 Design Year conditions for the intersections within the study area. The results of the analysis are summarized in Table 5, with detailed analysis results presented in the Appendix.

The following is a summary of the level-of-service and vehicle queue analyses for the intersections within the study area.

Dedham Street at Centre Street

Under 2011 Existing conditions, the critical movements at this unsignalized intersection (all movements from Dedham Street) were shown to operate at LOS E during the weekday morning peak-hour and at LOS F during the weekday evening peak-hour. Under 2016 Design Year conditions, the critical movements were shown to remain operating at LOS E during the weekday morning peak-hour and at LOS F during the weekday evening peak-hour. Vehicle queues at the intersection were shown to range from 0 to 863 feet (approximately 35 vehicles) during the peak periods under 2011 Existing conditions and from 0 to 1,059 feet (approximately 43 vehicles) under 2016 Design Year conditions.

Dedham Street at Haven Street

Under 2011 Existing conditions, the critical movements at this unsignalized intersection (all movements from Haven Street) were shown to operate at LOS C during the weekday morning and evening peak hours. Under 2016 Design Year conditions, the critical movements were shown to degrade to LOS D during the weekday morning peak-hour and to remain operating at LOS C during the weekday evening peak-hour. Vehicle queues at the intersection were shown to range from 0 to 38 feet (approximately 2 vehicles) during the peak periods under 2011 Existing conditions and from 0 to 44 feet (approximately 2 vehicles) under 2016 Design Year conditions.

Table 5
INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Peak Hour/Movement	2011 Existing				2016 Design Year			
	Demand ^a	Delay ^b	LOS ^c	Queue ^d 95 th	Demand	Delay	LOS	Queue 95 th
<i>Dedham Street at Centre Street</i>								
<i>Weekday Morning Peak Hour:</i>								
Dedham Street WB LT/RT	99	39.5	E	80	105	49.3	E	100
Centre Street NB TH	814	0.0	A	0	856	0.0	A	0
Centre Street NB RT	677	0.0	A	0	630	0.0	A	0
Centre Street SB TH	171	0.0	A	0	180	0.0	A	0
<i>Weekday Evening Peak Hour:</i>								
Dedham Street WB LT/RT	338	>50.0	F	863	375	>50.0	F	1,059
Centre Street NB TH	201	0.0	A	0	211	0.0	A	0
Centre Street NB RT	187	0.0	A	0	210	0.0	A	0
Centre Street SB TH	841	0.0	A	0	884	0.0	A	0
<i>Dedham Street at Haven Street</i>								
<i>Weekday Morning Peak Hour:</i>								
Dedham Street EB LT/TH	651	0.0	A	0	687	0.0	A	0
Dedham Street WB TH/RT	105	0.0	A	0	111	0.0	A	0
Haven Street SEB LT/RT	82	23.3	C	38	86	26.0	D	44
<i>Weekday Evening Peak Hour:</i>								
Dedham Street EB LT/TH	221	0.1	A	0	245	0.1	A	0
Dedham Street WB TH/RT	527	0.0	A	0	580	0.0	A	0
Haven Street SEB LT/RT	28	15.4	C	8	29	16.8	C	9
<i>Dedham Street at Willow Street</i>								
<i>Weekday Morning Peak Hour:</i>								
Willow Street SB RT	7	9.3	A	1	7	9.3	A	1
Dedham Street NEB LT/TH	733	0.3	A	1	772	0.4	A	1
Dedham Street SWB TH	129	0.0	A	0	140	0.0	A	0
<i>Weekday Evening Peak Hour:</i>								
Willow Street SB RT	18	12.8	B	3	19	13.3	B	4
Dedham Street NEB LT/TH	229	0.4	A	1	266	0.4	A	1
Dedham Street SWB TH	562	0.0	A	0	605	0.0	A	0
<i>Dedham Street at Cross Street (south)</i>								
<i>Weekday Morning Peak Hour:</i>								
Cross Street EB LT/RT	51	23.5	C	25	54	26.1	D	30
Dedham Street NEB LT/TH	719	0.1	A	0	757	0.1	A	0
Dedham Street SWB TH/RT	132	0.0	A	0	143	0.0	A	0
<i>Weekday Evening Peak Hour:</i>								
Cross Street EB LT/RT	36	17.3	C	10	38	19.2	C	12
Dedham Street NEB LT/TH	230	0.1	A	0	257	0.1	A	0
Dedham Street SWB TH/RT	566	0.0	A	0	609	0.0	A	0

See notes at end of table.

Table 5 (Continued)
INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Peak Hour/Movement	2011 Existing				2016 Design Year			
	Demand ^a	Delay ^b	LOS ^c	Queue ^d 95 th	Demand	Delay	LOS	Queue 95 th
Dedham Street at Cross Street (north)								
<i>Weekday Morning Peak Hour:</i>								
Dedham Street NEB TH	766	0.0	A	0	807	0.0	A	0
Dedham Street SWB TH/RT	154	0.0	A	0	166	0.0	A	0
<i>Weekday Evening Peak Hour:</i>								
Dedham Street NEB TH	250	0.0	A	0	289	0.0	A	0
Dedham Street SWB TH/RT	616	0.0	A	0	662	0.0	A	0
Centre Street at Haven Street								
<i>Weekday Morning Peak Hour:</i>								
Haven Street EB LT/TH/RT	154	>50.0	F	172	162	>50.0	F	213
Haven Street WB LT/TH/RT	30	29.0	D	17	31	32.5	D	20
Centre Street NB LT/TH/RT	817	0.0	A	0	859	0.0	A	0
Centre Street SB LT/TH/RT	175	0.4	A	1	184	0.4	A	1
<i>Weekday Evening Peak Hour:</i>								
Haven Street EB LT/TH/RT	39	27.7	D	25	41	31.6	D	30
Haven Street WB LT/TH/RT	113	>50.0	F	116	124	>50.0	F	157
Centre Street NB LT/TH/RT	201	0.5	A	1	211	0.4	A	1
Centre Street SB LT/TH/RT	839	0.1	A	0	882	0.1	A	0
Centre Street at Cross Street								
<i>Weekday Morning Peak Hour:</i>								
Centre Street NB TH/RT	868	0.0	A	0	908	0.0	A	0
Centre Street SB LT/TH	193	4.3	A	10	203	4.6	A	11
Cross Street NWB LT/RT	105	>50.0	F	149	110	>50.0	F	185
<i>Weekday Evening Peak Hour:</i>								
Centre Street NB TH/RT	222	0.0	A	0	234	0.0	A	0
Centre Street SB LT/TH	764	0.8	A	2	803	0.8	A	2
Cross Street NWB LT/RT	94	17.7	C	32	99	19.2	C	37

^aDemand in vehicles per hour.

^bAverage control delay per vehicle (in seconds).

^cLevel-of-Service.

^dQueue length in feet.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; NEB = northeastbound; NWB = northwestbound; SEB = southeastbound; SWB = southwestbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

Dedham Street at Willow Street

Under 2011 Existing conditions, the critical movements at this unsignalized intersection (all movements from Willow Street) were shown to operate at LOS A during the weekday morning peak-hour and at LOS B during the weekday evening peak-hour. Under 2016 Design Year conditions, the critical movements were shown to remain operating at LOS A during the weekday morning peak-hour and at LOS B during the weekday evening peak-hour. Vehicle queues at the intersection were shown to range from 0 to 3 feet (less than 1 vehicle) during the peak periods under 2011 Existing conditions and from 0 to 4 feet (again, less than 1 vehicle) under 2016 Design Year conditions.

Dedham Street at Cross Street (south)

Under 2011 Existing conditions, the critical movements at this unsignalized intersection (all movements from Cross Street) were shown to operate at LOS C during the weekday morning and evening peak hours. Under 2016 Design Year conditions, the critical movements were shown to degrade to LOS D during the weekday morning peak-hour and to remain operating at LOS C during the weekday evening peak-hour. Vehicle queues at the intersection were shown to range from 0 to 25 feet (approximately 1 vehicle) during the peak periods under 2011 Existing conditions and from 0 to 30 feet (approximately 2 vehicles) under 2016 Design Year conditions.

Dedham Street at Cross Street (north)

Under 2011 Existing and 2016 Design Year conditions, all movements at this unsignalized intersection were shown to operate at LOS A during the peak periods with negligible vehicle queuing.

Centre Street at Haven Street

Under 2011 Existing and 2016 Design Year conditions, the critical movements at this unsignalized intersection (eastbound movements from Haven Street during the weekday morning peak-hour and westbound movements during the weekday evening peak-hour) were shown to operate at LOS F during both the weekday morning and evening peak hours. Vehicle queues at the intersection were shown to range from 0 to 172 feet (approximately 7 vehicles) during the peak periods under 2011 Existing conditions and from 0 to 213 feet (approximately 9 vehicles) under 2016 Design Year conditions.

Centre Street at Cross Street

Under 2011 Existing conditions, the critical movements at this unsignalized intersection (all movements from Cross Street) were shown to operate at LOS F during the weekday morning peak-hour and at LOS C during the weekday evening peak-hour. Under 2016 Design Year conditions, the critical movements were shown to remain operating at LOS F during the weekday morning peak-hour and at LOS C during the weekday evening peak-hour. Vehicle queues at the intersection were shown to range from 0 to 149 feet (approximately 6 vehicles) during the peak periods under 2011 Existing conditions and from 0 to 185 feet (approximately 8 vehicles) under 2016 Design Year conditions.

RAISED CROSSWALK SOUND STUDY

In conjunction with this assessment, an acoustical engineer was retained to evaluate the impact of sound generated by vehicles travelling over the raised crosswalk on Dedham Street west of Park Avenue on the proximate residences. The objective of the study was to compare the noise levels of vehicles passing over the crosswalk and then accelerating to those of similar vehicles travelling along Dedham Street in an area without a raised crosswalk. The closest residential properties to the raised crosswalk were determined to be situated along the north side of Dedham Street and are located approximately 25 feet from the centerline of the roadway. Accordingly, the sound measurements at the raised crosswalk were performed at a distance of 25 feet measured from the centerline of Dedham Street. Sound measurements were also conducted at a control location along Dedham Street which consisted of a relatively flat and open segment of roadway, and was situated approximately 550 feet east of the raised crosswalk. All measurements were conducted on Tuesday, July 19, 2011, between 10:30 and 11:50 AM, under favorable weather conditions and following standard acoustical measurement protocol. The sound measurement period was selected to include a representative mix of trucks and passenger vehicles that traverse the Dedham Street corridor on an average day.

After review of the sound measurements, the following conclusions were noted with respect to the sound generated by vehicles traversing the raised crosswalk on Dedham Street west of Park Avenue;

- The peak sound levels from cars and trucks passing over the raised crosswalk were found to be nearly identical to those generated by the same vehicles on the control section of roadway.
- The maximum measured sound level for a passenger car at the raised crosswalk was found to be 0.1dBA above the maximum sound level measured at the control location, with the maximum measured sound level for a truck found to be 1.7 dBA below the maximum sound level measured at the control location.¹¹
- The measured differences in sound level for both passenger cars and trucks were found to be less than 2 dBA, a difference that is too small to be perceptible by the human ear.

¹¹It was noted that trucks slowed approaching the raised crosswalk which reduced the measured sound level from that noted at the control location as "tire noise" was the primary sound source in addition to sound resulting from acceleration/deceleration.

Based on the above, the acoustical engineer concluded, “...*sound monitoring has established that the raised crosswalk on Dedham Street near Park Avenue does not increase roadway noise for the residential properties abutting Dedham Street.*” The complete sound study is included in the Appendix.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

VAI has completed a comprehensive study of the Dedham Street/Centre Street/Cross Street area within the Town of Dover in an effort to identify existing and potential future traffic demands, operational deficiencies (i.e. motorist delays and vehicle queuing), and safety concerns along these roadways, with the goal of identifying both short and long-term improvement strategies that address: i) roadway and intersection capacity; ii) safety; iii) neighborhood impacts; and iv) pedestrian and bicycle accommodations. This effort was completed as a cooperative venture with the Town of Dover, as well as in consultation with MassDOT and with input received from the Board of Selectmen and the public.

As a result of the analyses and information collected in conjunction with this study, the following issue areas were identified along the Dedham Street/Centre Street/Cross Street corridors:

- Existing travel speeds along Dedham Street exceed the posted speed limit of 40 mph by approximately 5 mph. This speed is not conducive to pedestrian and bicycle travel in a shared travelled-way condition, particularly in the vicinity of Caryl Park and the Chickering Fields, and is not consistent with the limiting design features of the roadways (i.e. sight lines, pavement width, and horizontal and vertical curves).
- Pedestrian accommodations within the study area were found to be generally good with respect to condition and accessibility, and provide links between residential neighborhoods, the Town Center, Caryl Park and both the Chickering Fields and the Chickering Elementary School. That said, pedestrians crossing Dedham Street at the “midblock” crosswalks in the vicinity of Caryl Park and the Chickering Fields may experience difficulty in crossing the roadway due to the speed of approaching traffic (measured 85th percentile vehicle travel speed in excess of 40 mph).
- An extensive network of bicycle paths is provided within Noanet Woodlands and that is accessible from Caryl Park; however, the roadways providing access to the facility (Dedham Street, Centre Street and Cross Street) do not provide a consistent roadway width that supports bicycle travel (14-foot minimum combined travelled-way and shoulder required).

- Sight line limitations were noted at the Dedham Street/Willow Street and Dedham Street/Caryl Park west driveway intersections due to the combination of the speed of traffic and the horizontal curvature of Dedham Street approaching the intersections. In addition, a number of intersections along the Dedham Street corridor, including the crosswalks and access drives serving Caryl Park, were found to meet or just slightly exceed the minimum required sight distance for a 45 mph approach speed on Dedham Street.
- The intersections evaluated along the Dedham Street/Centre Street/Cross Street corridors were found to have a motor vehicle crash rate below the MassDOT average for unsignalized intersections with the exception of the Dedham Street/Centre Street intersection.
- Excessive motorist delay and residual vehicle queuing were identified for intersections along the Centre Street corridor during both the weekday morning and evening peak commuter hours, with the most notable impacts identified at the Centre Street/Dedham Street intersection.
- Haven Street was found to accommodate a disproportionate volume of traffic between Dedham Street and Centre Street in relation to the nature and density of the abutting land use, and is a direct result of the constrained operating conditions at the Centre Street/Dedham Street intersection.
- No discernable (perceptible) difference in peak sound levels was noted at the raised crosswalks along Dedham Street when compared to the sound levels measured at a control location along the roadway without a raised crosswalk.

Upon review of these issue areas, a series of recommendations have been developed and refined in consultation with the Town that are designed to: i) address existing safety and operational deficiencies; ii) accommodate future traffic demands; iii) reduce impacts to adjacent residential areas; and iv) facilitate pedestrian and bicycle travel in a safe manner.

RECOMMENDATIONS

The following recommendations have been developed for the Dedham Street/Centre Street/Cross Street area and are designed to be implemented alone or in combination in order to achieve a balanced goal of facilitating traffic flow, enhancing safety and promoting pedestrian and bicycle accessibility. The recommended improvements have been grouped by intersection and corridor, and include both short and long term improvement measures, with specific access, management and safety measures identified for Caryl Park.

Short-Term Improvements

Short-term improvement measures have been developed for completion along the Dedham Street corridor and its intersecting roadways that are designed to improve traffic operations and enhance safety in the near-term. The recommended short-term improvement measures are summarized in Table 6 and are graphically depicted on Figure 7. The majority of the suggested improvements can be completed in conjunction with scheduled maintenance activities by the Town.

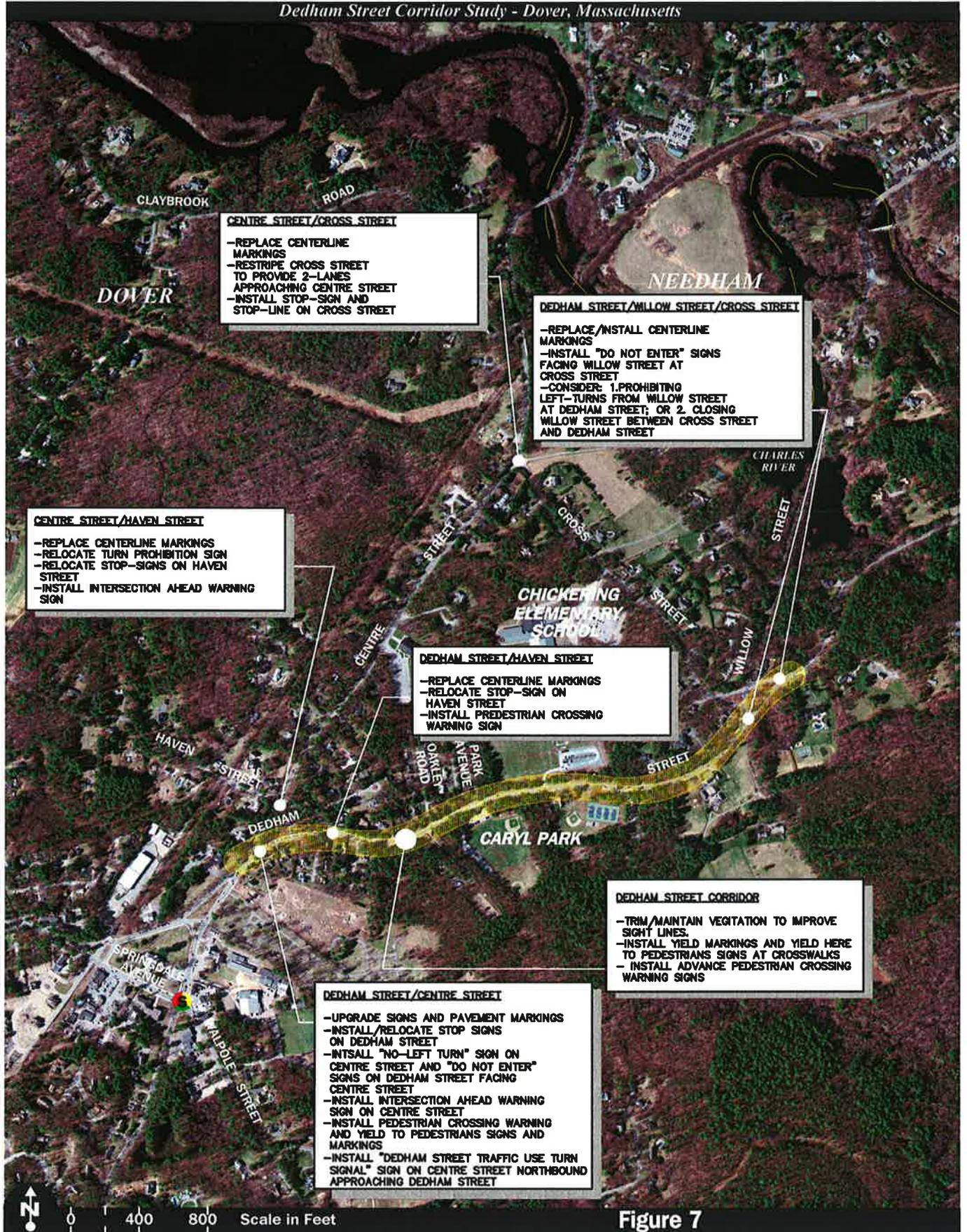


Figure 7

**Table 6
RECOMMENDED SHORT-TERM IMPROVEMENT MEASURES**

Location	Suggested Improvement Measure	Estimated Cost ^a
Dedham Street/Centre Street	<ul style="list-style-type: none"> - Review, maintain and replace signs and pavement markings as necessary in order to improve the visibility of the traffic control devices at and approaching the intersection. In particular, STOP-signs, STOP-lines and crosswalk markings should be maintained and replaced as necessary, and the white edgeline bounding the raised island should be replaced with a solid yellow line on Dedham Street and a solid white line on Centre Street. 	\$800
	<ul style="list-style-type: none"> - Install a STOP-sign in the raised island on the Dedham Street approach at the marked STOP-line. In addition, the existing STOP-sign on Dedham Street should be relocated closer to Centre Street and proximate to the STOP-line. 	\$200
	<ul style="list-style-type: none"> - Install a “No Left-Turn” sign (R3-2)¹² on Centre Street approaching Dedham Street facing southbound motorists and corresponding “Do Not Enter” (R5-1) signs should be installed facing Centre Street on either side of the Dedham Street approach. Current intersection geometry does not allow for left-turns from Center Street southbound to Dedham Street. 	\$200
	<ul style="list-style-type: none"> - Install a pedestrian crossing warning sign (W11-2) on Centre Street at the departure of the right-turn slip-ramp from Centre Street northbound to Dedham Street. In addition, it is suggested that yield markings (white triangles) and a “Yield Here to Pedestrians” sign (R1-5a) be installed on both sides of the crossing to accompany the yield markings. 	\$600
	<ul style="list-style-type: none"> - Install an intersection ahead warning sign (W2-3) on Centre Street approximately 100 feet north of Dedham Street in order to inform motorists of the potential for conflicting traffic. 	\$200
	<ul style="list-style-type: none"> - Install a “Dedham Street Traffic Use Turn Signal” sign on Centre Street northbound approaching Dedham Street. 	\$200

^aEstimated design and construction cost.

¹²Sign designations are from the *Manual on Uniform Traffic Control Devices*; Federal Highway Administration; Washington, DC; 2003.

Table 6 (Continued)
RECOMMENDED SHORT-TERM IMPROVEMENT MEASURES

Location	Suggested Improvement Measure	Estimated Cost ^a
Dedham Street/Haven Street	<ul style="list-style-type: none"> <li data-bbox="570 428 1235 579">– Replace the existing single-yellow centerline along Haven Street with a double-yellow centerline in accordance with the centerline pavement marking standards of the Manual on Uniform Traffic Control Devices (MUTCD).¹³ <li data-bbox="570 611 1235 762">– Relocate the STOP-sign on the Haven Street approach proximate to the marked STOP-line; install yield markings in advance of the crosswalk and “Yield Here to Pedestrians” signs (R1-5a) on both sides of the crosswalk. <li data-bbox="570 793 1235 911">– Install an advance pedestrian crossing warning sign (W11-2) facing Dedham Street on the northeast corner of the intersection given that the crossing is not located proximate to Dedham Street. 	<p data-bbox="1252 499 1466 531">\$1,500 per 1,000 lf</p> <p data-bbox="1325 680 1382 711">\$500</p> <p data-bbox="1325 848 1382 879">\$200</p>
Dedham Street/ Willow Street/Cross Street	<ul style="list-style-type: none"> <li data-bbox="570 951 1235 1037">– Replace the existing centerline pavement markings along Cross Street and Willow Street with a double-yellow centerline. <li data-bbox="570 1089 1235 1176">– Install double-yellow centerline pavement markings on the two-way segment of Cross Street between Dedham Street and Willow Street. <li data-bbox="570 1207 1235 1293">– Install “Do Not Enter” signs (R5-1) facing Willow Street on the one-way segment of Cross Street approaching Willow Street. <li data-bbox="570 1325 1235 1541">– Given the limited sight distance looking to the west from Willow Street at its intersection with Dedham Street, consideration should be given to implementing the following measures: 1) Prohibiting left-turn movements from Willow Street to Dedham Street eastbound; or 2) Closing the section of Willow Street between Dedham Street and Cross Street. <p data-bbox="610 1562 1235 1734">Should the closure of the segment of Willow Street be advanced, it is suggested that the STOP-sign and accompanying STOP-line on the Cross Street approach to Willow Street be removed and that the Willow Street approach to the intersection be placed under STOP-sign control.</p>	<p data-bbox="1252 995 1466 1026">\$1,500 per 1,000 lf</p> <p data-bbox="1252 1131 1466 1163">\$1,500 per 1,000 lf</p> <p data-bbox="1325 1257 1382 1289">\$400</p> <p data-bbox="1281 1488 1466 1551">Option 1: \$400 Option 2: \$8,500</p>

^aEstimated design and construction cost.

¹³ *Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, DC; 2003. The MUTCD states that centerline pavement markings shall consist of two parallel solid yellow lines where passing is prohibited. Further, the 2009 MUTCD (currently under review by MassDOT) states that a single solid yellow line shall not be used as a centerline on a two-way roadway.

Table 6 (Continued)
RECOMMENDED SHORT-TERM IMPROVEMENT MEASURES

Location	Suggested Improvement Measure	Estimated Cost ^a
Centre Street/Haven Street	<ul style="list-style-type: none"> - Replace the existing single-yellow centerline along Haven Street with a double-yellow centerline. 	\$1,500 per 1,000 lf
	<ul style="list-style-type: none"> - Relocate the “No Left Turn Between 4 PM and 6 PM” sign situated on the southeast corner of the intersection facing Haven Street to the southwest corner of the intersection (facing the Haven Street east leg). 	\$100
	<ul style="list-style-type: none"> - Relocate the STOP-sign on the Haven Street eastbound approach proximate to the marked STOP-line. 	\$100
	<ul style="list-style-type: none"> - Remove the “Dangerous Intersection” warning sign on the Centre Street southbound approach and install an intersection ahead warning sign (W2-1) approximately 100 feet in advance of the intersection. 	\$250
Centre Street/Cross Street	<ul style="list-style-type: none"> - Replace the existing single-yellow centerline along Centre Street with a double-yellow centerline. 	\$1,500 per 1,000 lf
	<ul style="list-style-type: none"> - Consider restriping the Cross Street approach to Centre Street to provide separate left and right-turn lanes. 	\$400
	<ul style="list-style-type: none"> - Install a STOP-sign and marked STOP-line on the Cross Street approach to Centre Street. 	\$300
Dedham Street Corridor	<ul style="list-style-type: none"> - Trim and maintain vegetation located within the public right-of-way in order to provide and maintain sight lines along Dedham Street. Specific areas to be addressed include the segment of Dedham Street at and approaching Cary Park and the Chickering Fields. In particular, sight lines at the crossing from the Chickering Fields should be improved by trimming and removing vegetation along the north side of Dedham Street east of the crossing (including along the curved portion of the roadway opposite the Caryl Park driveway serving the tennis courts and Tot Lot). Further, vegetation along the south side of Dedham Street both east and west of the Caryl Park driveways should be trimmed and maintained in order to improve sight lines. 	\$3,000

^aEstimated design and construction cost.

Table 6 (Continued)
RECOMMENDED SHORT-TERM IMPROVEMENT MEASURES

Location	Suggested Improvement Measure	Estimated Cost ^a
Dedham Street Corridor	<ul style="list-style-type: none"> - Install yield markings and “Yield Here to Pedestrians” signs (R1-5a) on both sides of the Dedham Street crossings (Park Avenue and at the Chickering Fields). 	\$1,200
	<ul style="list-style-type: none"> - When activities are scheduled at Caryl Park and/or at the Chickering Fields, in-street pedestrian crossing signs (R1-6, “State Law Yield to Pedestrians”) should be placed in the centerline of Dedham Street at both the Park Avenue and Chickering Fields crosswalks. The sign should be stanchion mounted so as not to exceed the proximate width of the centerline markings. The signs should be removed at the conclusion of the event. 	\$500
	<ul style="list-style-type: none"> - Install advance pedestrian crossing warning signs on Dedham Street approximately 175 feet east and west of both crosswalks. 	\$800
	<ul style="list-style-type: none"> - Develop an internal pathway system within Caryl Park with associated signs that would link amenities within the Park to the sidewalk and crosswalk system along Dedham Street serving the Park. 	Variable; dependent on pathway design and limits
	<ul style="list-style-type: none"> - Consider requesting that MassDOT end the 40 mph speed limit west of Willow Street/Cross Street and allow for the establishment of a 30 mph speed limit approaching Caryl Park and extending westerly to Centre Street. 	--

^aEstimated design and construction cost.

Long-Term Improvements

Long-term improvement measures have been developed for the Dedham Street corridor and intersecting roadways that are focused on improving traffic operations through specific geometric and traffic control measures. These measures include enhancements to the pedestrian crossings along Dedham Street proximate to Caryl Park; extension of sidewalk facilities; and suggested design features and management strategies for the Caryl Park recreation facilities. The following summarizes the suggested long-term improvement measures which are also graphically depicted on Figure 8.

Dedham Street/Centre Street

Operating conditions at the Dedham Street/Centre Street intersection were shown to be constrained during the peak periods, characterized by excessive motorist delay on Dedham Street (in excess of 50 seconds on average) and extended vehicle queuing (approximately 800 to 1,000 feet during the weekday evening peak-hour). These conditions are a contributing factor to the disproportionate number of motor vehicle collisions reported at the

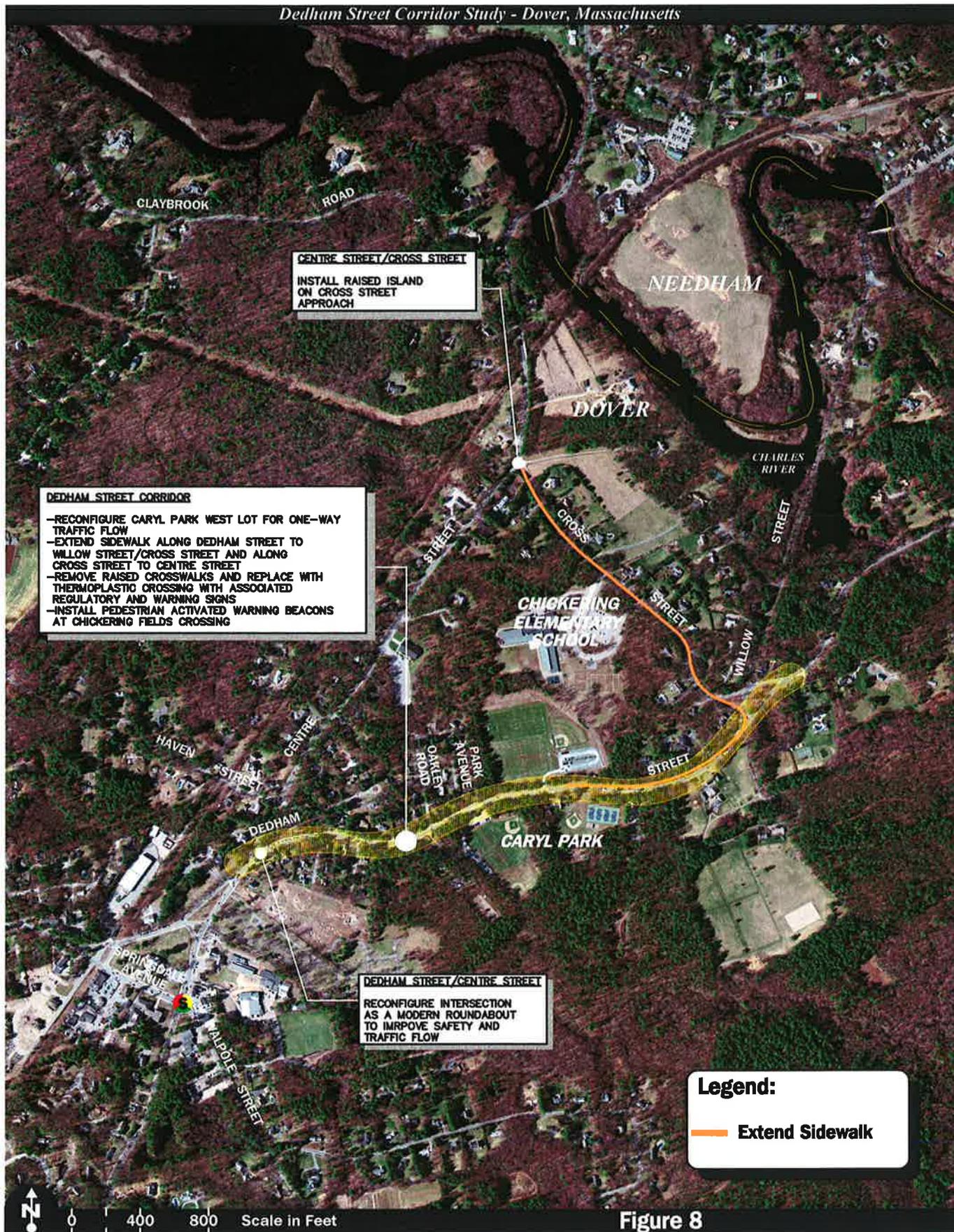


Figure 8

intersection. A preliminary review of traffic volumes at the Dedham Street/Centre Street intersection indicates that the intersection may meet the necessary criteria for the installation of a traffic control signal in order to improve traffic operations. However, given the scenic nature of the Dedham Street and Cross Street corridors and the historic character of the Town Center area, it is suggested that the Dedham Street/Centre Street intersection be assessed for reconfiguration as a modern roundabout.

The installation of a modern roundabout at the Dedham Street/Centre Street intersection would: i) improve traffic operations by allowing Dedham Street motorists “equal” access to Centre Street; ii) improve safety by reducing the number of conflict points at the intersection; and iii) preserve the scenic and historic character of the surrounding features. A modern roundabout would also serve as a traffic calming device for both roadways, moderating travel speeds through the Town Center area to be conducive to a pedestrian focused environment. Further, unlike a traffic signal, an appropriately designed modern roundabout would reduce vehicle queuing and potential queue spillback toward the Centre Street/Walpole Street/Springdale Avenue traffic signal.

Areas for further consideration with respect to the installation of a modern roundabout are as follows:

1. Land area required – is sufficient public right-of-way available;
2. Number of circulating lanes required – two lanes vs. single-lane;
3. Bicycle accommodations – integrated or separate (i.e., expanded sidewalk area);
4. Relationship to Centre Street/Walpole Street/Springdale Avenue traffic signal – queuing from signal;
5. Landscaping and drainage; and
6. Historic property impacts.

Estimated Cost: \$350,000, excluding land acquisition (if any)

Centre Street/Cross Street

Excessive motorist delays were noted on the Cross Street approach to Centre Street during the weekday morning peak-hour; however, the resulting vehicle queuing was shown to be minimal (185 feet). As such, specific traffic control enhancements at the intersection do not appear to be warranted at this time beyond the identified short-term improvement measures. However, it is suggested that consideration be given to the installation of a raised, landscaped island on Cross Street at the intersection to serve two purposes: 1) to reduce the width of the Cross Street throat at Centre Street; and 2) provide proper positioning of motorists when stopped.

Estimated Cost: \$9,000

Dedham Street Corridor

Dedham Street was found to provide appropriate accommodations to support the current and projected volume of traffic using the roadway. That said, the speed at which motorists travel was not found to be conducive to the residential environment and nature of the uses in the Caryl Park area. In an effort to balance the need to convey traffic along the roadway (functionally classified

as a minor arterial roadway) while promoting safe accommodations for pedestrians, bicyclists and residents, the following suggested improvement measures should be considered along the Dedham Street corridor:

- Consider reconfiguring the Caryl Park west parking lot to provide a one-way traffic flow with vehicles entering by way of the driveway opposite Park Avenue and exiting by way of a driveway at the east end of the parking lot. This modification would require the construction of one new driveway and would allow for the narrowing of the existing driveway opposite Park Avenue

Estimated Cost: \$15,000

- In order to link the Chickering Fields and Caryl Park areas to the residential neighborhoods to the east, the sidewalk along the north side of Dedham Street should be extended to the Dedham Street/Cross Street/Willow Street intersection, continuing east along Cross Street to meet the existing sidewalk along the east side of Centre Street.

Estimated Cost: \$70,000

- In conjunction with the resurfacing of Dedham Street in the vicinity of Caryl Park, it is suggested that the raised crosswalks be removed at both Park Avenue and at the Chickering Fields. While the crossings are likely moderating travel speeds in the vicinity of Caryl Park, the functional classification of the roadway (urban minor arterial), the posted speed limit (40 mph) and the volume and character of traffic using the roadway are not conducive to the installation of vertical traffic calming measures. Vertical traffic calming measures are most appropriately used in residential settings where the speed limit is 30 mph or less.¹⁴ The raised crosswalks should be replaced with marked crosswalks consisting of inlaid thermoplastic markings, similar to the textured treatment delineating the existing crossings. The pedestrian crossing signs and markings specified in the short-term improvement section for the Dedham Street crosswalks should be retained.

Estimated Cost: \$5,000, not including resurfacing

- Consideration should be given to the installation of a pedestrian crossing beacon at the Chickering Fields crossing to Caryl Park across Dedham Street. The beacon would consist of either an in pavement lighting system or alternating flashing-yellow lights at the crossing that would be activated by a pedestrian (pushbutton or presence detection). The installation of the suggested pedestrian crossing system would serve to increase motorist awareness of the crossing and the presence of pedestrians. Accompanying pedestrian crossing warning signs would be installed in advance of and at the crossing to reinforce the meaning of the traffic control device (i.e., “Yield to Pedestrian in Crosswalk When Flashing” or similar).

Estimated Cost: \$20,000 to \$30,000

¹⁴ *Guidelines for the design and Application of Speed Humps and Speed Tables*, A Recommended Practice of the Institute of Transportation Engineers; Institute of Transportation Engineers; Washington, D.C.; 2011.

Caryl Park

The following recommendations are offered as a planning tool to guide the development of potential improvements to Caryl Park and build upon the recommendations that resulted from the March 17, 2010 *Traffic Impact Assessment*¹⁵ and associated plans prepared in support of the Caryl Park field renovations.

Access and Circulation

- In order to connect amenities within Caryl Park, it is suggested that the existing pathway network be enhanced, supplemented and expanded. The pathways should be constructed of a suitable, stabilized material (i.e., stone dust, bituminous pavement, or other acceptable material) a minimum of 5-feet in width and include trailhead and intermediate directional signs. The pathway network should link to the sidewalk and crosswalk locations along Dedham Street serving Caryl Park. The completion of the pathway network would serve to enhance and encourage pedestrian travel within the Park rather than along the segment of Dedham Street where sidewalks are not provided. This suggested measure should be reviewed for implementation as a part of current capital maintenance activities for the Park.
- The access road serving the Town composting area should be realigned and integrated into the internal roadway network within the Park, providing a single access road and driveway serving both uses from Dedham Street.
- Driveways and the internal roadway network should provide a minimum travelled-way of 20-feet for two-way travel and 16-feet for one-way travel.
- Approaching Dedham Street and through parking areas with perpendicular parking along one or both sides of the circulating roadway, the cross-section should widen to 24-feet in order to accommodate vehicle turning and maneuvering.
- Circulating aisles within parking areas should be 24-feet in width for double row (i.e., back-to-back) parking. This width can be reduced if one-way circulation is provided.¹⁶
- Consideration should be given to developing a one-way circulation system within the Park. One-way circulating patterns promote efficient traffic flow and can limit pedestrian/vehicle conflicts.
- Subject to the availability of public right-of-way, consideration should be given to providing a left-turn lane on Dedham Street to accommodate turning traffic entering the fields. With a one-way circulation pattern, such improvements can be focused at a single access point. In addition, the exit drive (under a one-way circulation pattern) should provide two exiting travel lanes (separate left and right-turn lanes).
- Signs and landscaping adjacent to the driveways and along circulating roadways should be designed and maintained so as not to restrict lines of sight.
- Vehicles exiting the Park should be placed under STOP-sign control.

¹⁵Ibid 4.

¹⁶Aisle width is dependent on the parking angle and can vary from 24 feet to 11 feet.

- All signs and pavement markings (if any) should conform to the standards of the MUTCD.¹⁷
- Parking should be prohibited along Dedham Street and/or so limited so as not to block lines of sight to/from driveways, side streets and pedestrian crossing locations.

Traffic and Parking Management

- Develop the sport schedule to stagger the starting dates of various activities.
- Schedule events to stagger starting times for games and practices in order to avoid overlapping arrivals and departures.
- Schedule field use to avoid or minimize impacts during the commuter peak hours.
- Consider using the Chickering Fields parking lot for drop-off/pick-up activities, handicapped parking and parking for coaches and officials, with spectator and parent parking accommodated at the Chickering School for those events that occur at the Chickering Fields while the school is not in use.

Event Traffic Management Plan

In order to limit impacts during major events such as regional athletic tournaments, clinics and related events it is suggested that an event traffic management plan be developed in consultation with the Parks and Recreation Department, the Police and Fire Departments, and the Highway Department. Suggested elements of the management plan would consist of the following measures:

- To the extent practical, tournaments and events should be scheduled to commence during off-peak hours on a weekday or Saturday in order to reduce coincidental peaking of traffic.
- The scheduling of activities should be arranged to allow for dispersal of exiting traffic prior to the arrival of new traffic.
- The use of carpools, vanpools and buses should be encouraged.
- Satellite parking areas should be identified for larger events where shuttling of participants and patrons may be desirable.
- Directions to events and website based materials should specify the use of major roadways in order to avoid impacts to neighborhood streets for trips originating from outside of the town.

The elements of the event traffic management plan should be reviewed on an annual basis to ensure that public safety is maintained at all times. Police detail officers should be used as necessary to direct traffic during major events.

¹⁷ *Manual on Uniform Traffic Control Devices* (MUTCD); Federal Highway Administration; Washington, DC; 2003.

SUMMARY

VAI has completed a comprehensive study of the Dedham Street/Centre Street/Cross Street area located within the Town of Dover, Massachusetts, in a cooperative effort with the Town. As a result of this study and with input from residents and Town officials, a series of improvement strategies, both short and long-term, were developed and are designed to: i) accommodate existing and projected future traffic demands; ii) improve safety; and iii) facilitate pedestrian and bicycle travel; while minimizing impacts on residential neighborhoods and embracing the scenic nature of the roadway corridors within the Town. Implementation of the recommended measures will serve to provide a roadway environment that accommodates all users in a safe and efficient manner, both at present and in the future.