Town Planning Study

Traffic and Circulation Study Winchester, MA

Prepared for **The Town of Winchester**

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Watertown, MA

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Executive Summary

Vanasse Hangen Brustlin, Inc. (VHB) was retained by the Town of Winchester to compile available traffic data and conduct a transportation assessment of the major roadways within the Town.

The purpose of the Winchester Traffic and Circulation Study effort is to proactively address issues brought on by residential and commercial growth in the Town. This study is designed to identify the Town's transportation issues and develop mechanisms to protect neighborhoods, provide adequate access to businesses, improve safety and protect the residential quality of life.

The study primarily considers corridor-wide treatments along major roadways and specific intersection recommendations at signalized intersections.

Since the basis of the study was available traffic data, additional data collection related to traffic volume and travel speeds is recommended in many locations.

This report consists of the following three chapters:

- **Chapter 1 –Existing Conditions –** presents a baseline of deficiencies and needs;
- **Chapter 2 –Future Conditions –** a forecast of future traffic demands is prepared;
- **Chapter 3 – Alternatives, Recommendations, and Next Steps –** an overview of suggestions the Town should consider moving forward.

This document serves as a companion to a series of matrices that were developed at the request of the planning board, which highlight recommended next steps only; without the supporting details found herein.

1

Existing Conditions

The first component of the Transportation section to the Winchester Transportation Plan is a review of the existing transportation infrastructure and traffic conditions within the Town. This chapter includes a description of the roadway system serving the Town; quantifies existing traffic conditions and accident history; identifies the existing condition of roadway and intersection infrastructure; describes the public transportation services available in the Town; and identifies bike and pedestrian facilities. The data and observations presented were compiled from an extensive review of past and current studies and input from Town officials and key stakeholders within the Town of Winchester.

The provision of excellent transportation access is central to the success of the Town's development. Key elements of an ideal transportation system consist of:

- Well defined access from the regional highway system
- An internal circulation system that is user-friendly and easy to understand, yet encourages traffic to stay on arterial roadways
- Convenient and available parking
- Convenient and available public transportation
- Well planned bicycle and pedestrian connections between residential areas and major activity centers

This chapter describes existing access to and within the Town of Winchester and defines deficiencies in the existing system in terms of how successfully it meets the ideal elements listed above.

To better understand the magnitude of the traffic issues in the study area, the following transportation components were evaluated and are discussed in the sections that follow:

- Roadway systems
- Roadway infrastructure
- Intersection safety analysis
- Public transportation
- Pedestrian and bicycle facilities

A map of the study area including roadways, signalized intersections, and unsignalized intersections is shown in Figure 1.

Study Area Roadways
Unsignalized Study Area Intersections
Signalized Study Area Intersections

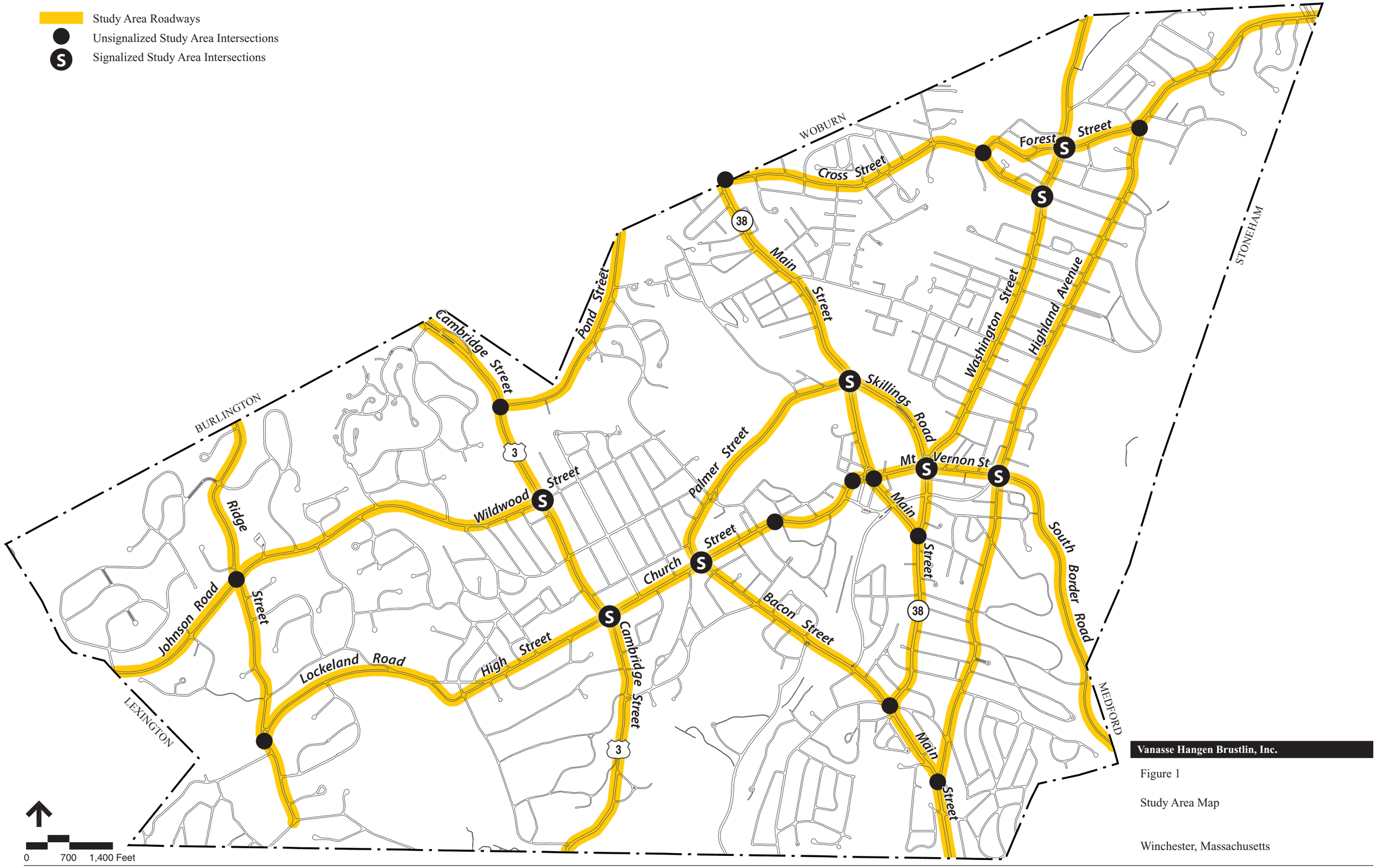

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Figure 1

Study Area Map

Winchester, Massachusetts

Roadway System

The roadways in the Town of Winchester have been categorized as either regional access or local roadways. The local roadways section includes a list of the intersections that have been analyzed in detail in this study.

Regional Access

The Town of Winchester, is located in Eastern Massachusetts and occupies 6.3 square miles along the upper Mystic Valley of the Greater Boston Area, approximately 8 miles northwest of Boston. The Town is bordered by Woburn to the north, Stoneham to the east, Medford to the southeast, Arlington to the south, and Lexington to the west. State Route 38 and US Route 3 both provide north-south access through the Town. East-west access is provided via an Urban Minor Arterial (Lockeland Road, High Street, Church Street, Mount Vernon Street) and several Urban Collectors (see Figure 2).

Two regional highways, I-95 (Route 128) and I-93 provide access to Winchester, however, neither runs through the Town. I-95 is located west and north of the town while I-93 is located nearby to the east in Stoneham. An interchange between I-93 and I-95 is located about 2.5 miles northeast of the Town. Along I-95, interchange access is provided at Main Street (Route 38) and at Washington Street within the City of Woburn. Access to I-93 is located just east of the Town on Fallon Road in Stoneham or just north of the Forest Street overpass of I-93 on Montvale Avenue in Woburn.

Local Roadways

The significant local roads that traverse the Town are listed by functional classification. The local roadways of Winchester fall into one of three functional classifications:

- Urban Minor Arterials provide connectivity within the community from north to south and east to west as well as connections to major origins and destinations on the regional roadway network. Urban Minor Arterials include:
  - Highland Avenue
  - Washington Street
  - Forest Street from the town line to Washington Street
  - Bacon Street from Mystic Valley Parkway to Main Street
  - South Border Road
  - Mount Vernon Street

- Church Street
- High Street
- Lockeland Road
- Ridge Street, south of Lockeland Road

- Urban Collectors provide access and circulation within the various communities that make up the Town of Winchester. Often these roads provide connectivity for residential neighborhoods. Urban Collectors include:

  - Cross Street
  - Pond Street
  - Ridge Street, north of Lockeland Road
  - Johnson Road
  - Wildwood Street
  - Fletcher Street-Palmer Street-Lake Street
  - Bacon Street, north of Mystic Valley Parkway and Ginn Road

- Local Roads carry the lowest traffic volumes and serve primarily to provide access to the Collectors and Minor Arterials for individual properties. Local Raods include:

  - Main Street, from Skillings Road to Washington Street
  - Forest Street from Washington Street to Brookside Avenue
  - Brookside Avenue

As shown in Figure 2, the majority of these roadways are considered under Town jurisdiction with only Cambridge Street (Route 3) under MassDOT jurisdiction[1].

This study examined 20 key intersections situated throughout the Town (as depicted in Figure 1):

- Ridge Street at Johnson Road
- Ridge Street at Lockeland Road
- Cambridge Street (Route 3) at Pond Street
- Cambridge Street (Route 3) at Wildwood Street
- Cambridge Street (Route 3) at Church Street
- Church Street at Bacon Street/Fletcher Street
- Church Street at Dix Street (west)
- Church Street at Dix Street (east)
- Main Street (Route 38) at Church Street/Mount Vernon Street/Shore Road
- Skillings Road/Washington Street (Route 38) at Washington Street/Mount Vernon Street

[1] Massachusetts Department of Transportation, MassDOT Road Inventory File, December 2011.

- Highland Avenue at Mount Vernon Street/South Boarder Road/Mystic Valley Parkway
- Main Street (Route 38) at Washington Street/Mount Pleasant Street
- Main Street/Skillings Road (Route 38) at Main Street/Lake Street
- Main Street (Route 38) at Cross Street/Border Street
- Cross Street at Forest Street (Brookside)
- Washington Street at Cross Street
- Washington Street at Forest Street
- Highland Avenue at Forest Street
- Main Street (Route 38) at Bacon Street/Grove Street/Everell Road
- Main Street (Route 38) at Highland Avenue

Descriptions of the major roadways and study intersections are presented below and depicted in Figure 1.

- Principal Arterial
- Rural Minor Arterial / Urban Principal Arterial
- Rural Major Collector / Urban Minor Arterial
- Rural Minor Collector / Urban Collector
- Local Roadway

- State Jurisdiction
- Local Jurisdiction

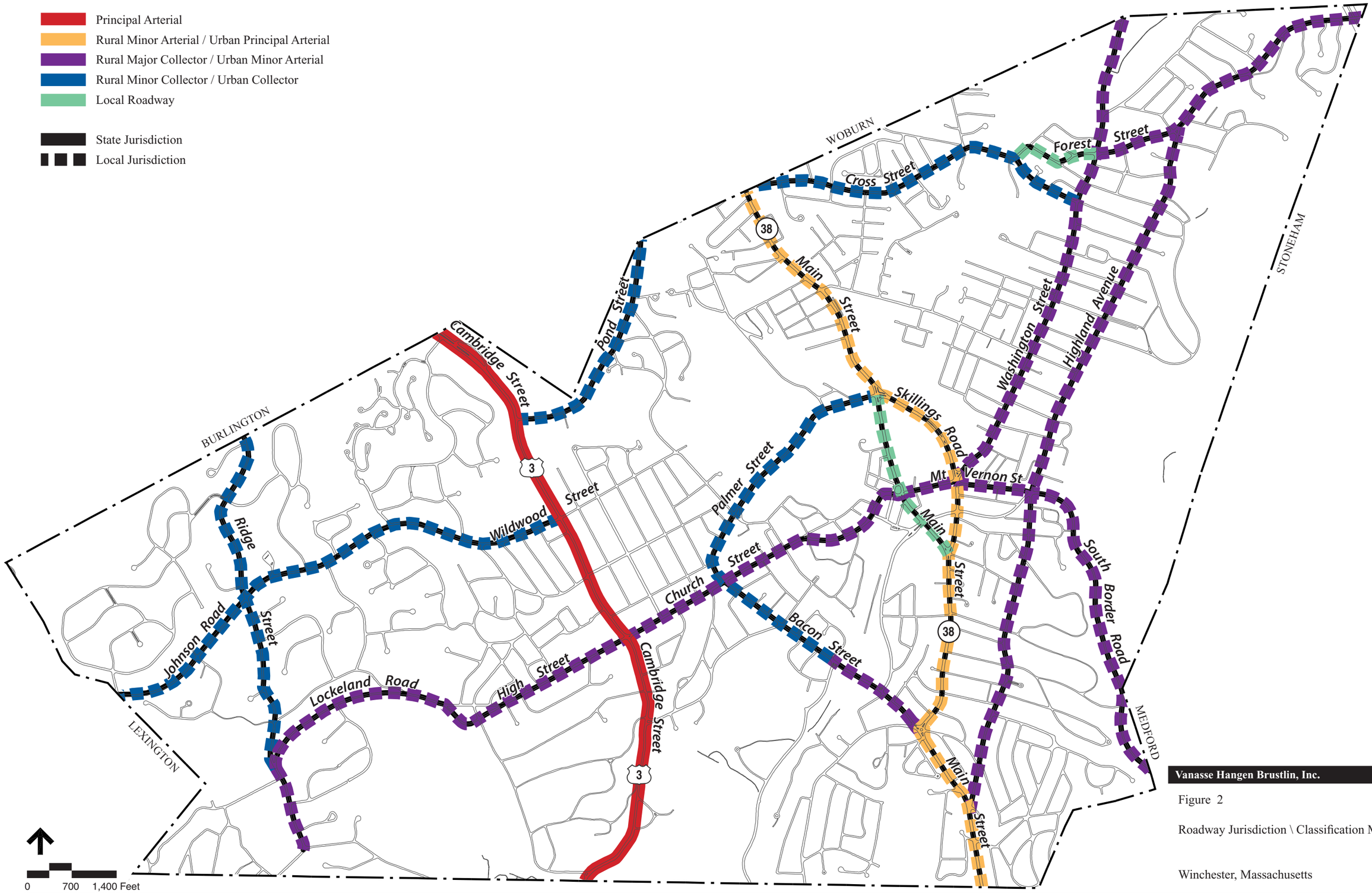

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Figure 2

Roadway Jurisdiction \ Classification Map

Winchester, Massachusetts

Intersections

A total of 20 intersections were examined for this study including eight signalized intersections and 12 unsignalized intersections. Three of the intersections are on Cambridge Street at Pond Street, Wildwood Street, and Church Street. These intersections are under state jurisdiction while the others are within the Town's jurisdiction.

The list of unsignalized intersections includes one roundabout and one traffic circle:

- The intersection of Main Street, Church Street, Mount Vernon Street, and Shore Road form a traffic circle that plays an important role in circulation in the Town Center. The eastbound approach of this traffic circle is controlled by a pedestrian traffic signal.
- The intersection of Main Street, Bacon Street, Grove Street, and Everell Road form a roundabout less than a mile south of the Town Center. Grove Street and Bacon Street effectively share the eastbound approach to the roundabout.

Figure 1 graphically presents the location of each study intersection within the Town of Winchester.

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Traffic Volumes

The following sections present available daily and peak hour traffic volumes along key study area roadways. Traffic counts were compiled by VHB with help from Winchester Town officials. Once the available traffic data was complied, it was provided to the Central Transportation Planning Staff (CTPS) for incorporation into the regional transportation model.

Daily Traffic Volumes

Automatic traffic recorder (ATR) counts were compiled from traffic studies prepared for the Town of Winchester. Available typical weekday traffic volumes for key roadway locations are presented below in Table 1. Based on the available data, the busiest roadway in the Town is Cambridge Street, which carries almost 19,000 vehicles per weekday; about eight percent and nine percent of the daily total occur during the morning and evening peak hours, respectively.

Automatic traffic recorder counts for Skillings Road in the Town Center show weekday daily volume of 9,419 vehicles with motr than 8 percent of this volume occurring during both the morning and evening peak hours.

Table 1
Existing Weekday Traffic Volume Summary

Location	Count Date	Weekday Daily Volume (vpd)[1]	Weekday Morning Peak Hour Volume (vph)[2]	Weekday Morning Peak Hour K Factor[3]	Weekday Morning Peak Hour Directional Distribution	Weekday Evening Peak Hour Volume (vph)	Weekday Evening Peak Hour K Factor	Weekday Evening Peak Hour Directional Distribution
Pond Street, east of Cambridge Street	June 2006	8,009	644	8.0	60% WB	718	9.0	57% EB
Cambridge Street (Route 3), south of Pond Street	June 2006	18,822	1,406	7.5	50% SB	1,653	8.8	52% NB
Skillings Road, south of Shore Road	December 2006	9,419	784	8.3	66% SB	768	8.2	51% NB
Washington Street, north of Mystic Valley Parkway	October 2006	6,476	944	14.6	65% NB	748	11.6	56% SB
Mount Vernon Street, east of Kendall Street	December 2006	5,649	570	10.1	53% WB	557	12.9	62% WB

Source: ATR counts conducted by various agencies (2006)
1 Daily traffic volumes expressed in vehicles per day.
2 Peak hour volumes expressed in vehicles per hour.
3 Percent of daily traffic occurring during the peak hour.

Peak Period Turning Movement Counts

In addition to ATR data, peak period turning movement counts (TMCs) were also compiled from previous traffic studies made available by the Town. TMC data are typically collected during the weekday morning (7:00 AM-9:00 AM) and weekday evening (4:00 PM -- 6:00 PM) peak periods. In order to supplement this data, current turning movement count data were collected at four intersections during October 2011 for the same morning and evening peak periods.

This compilation of existing intersection turning movementvolumes is presented in Figures 3 and 4 for the morning and evening peak hours , respectively. A list of these intersections and ATR locations is included in the Appendix by year. Figures 5 and 6 show the levels of traffic volumes during the morning and evening peak periods currently utilizing the Winchester roadways. They are based on the CTPS regional transportation model and the traffic data provided by VHB.

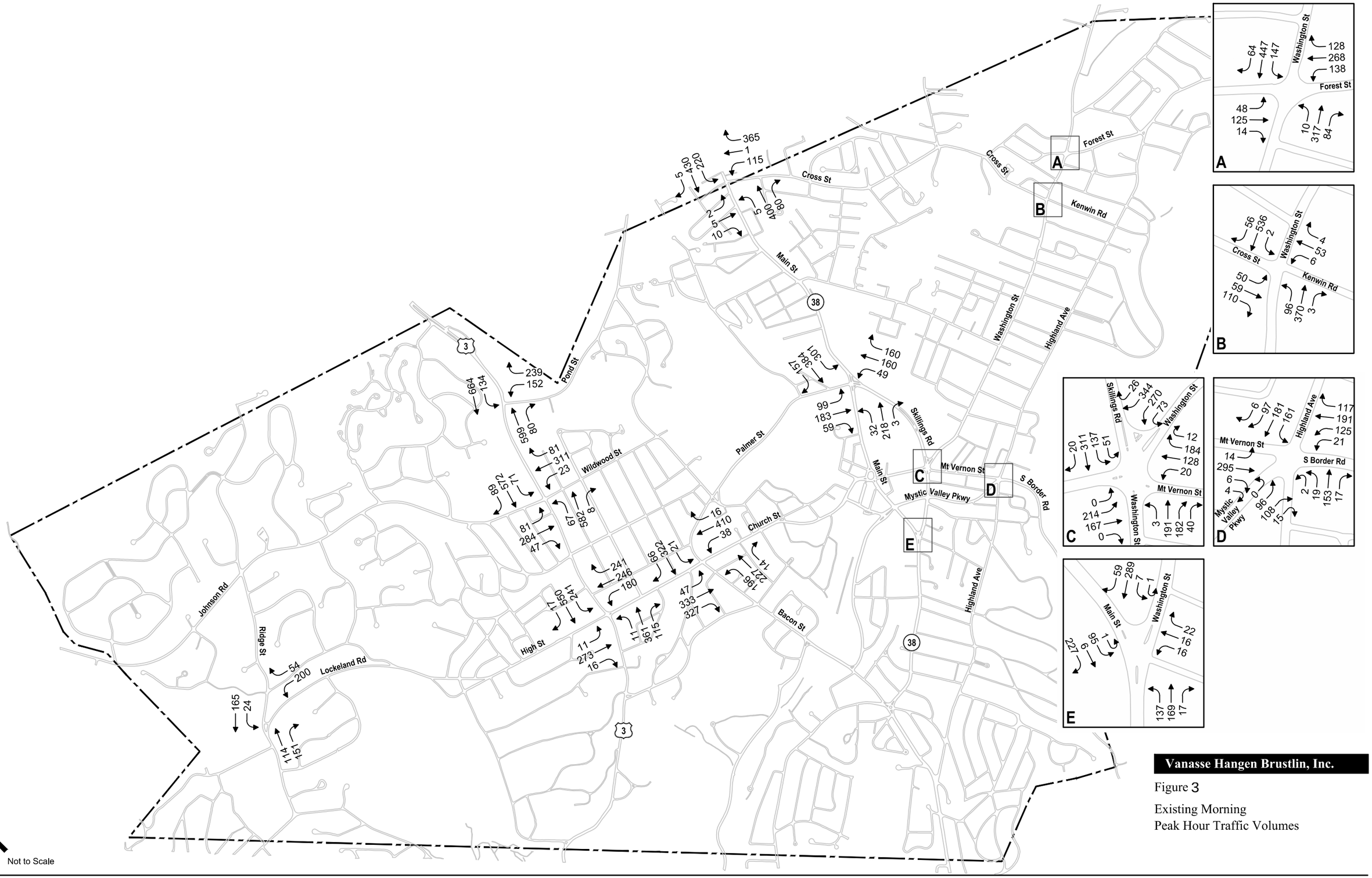

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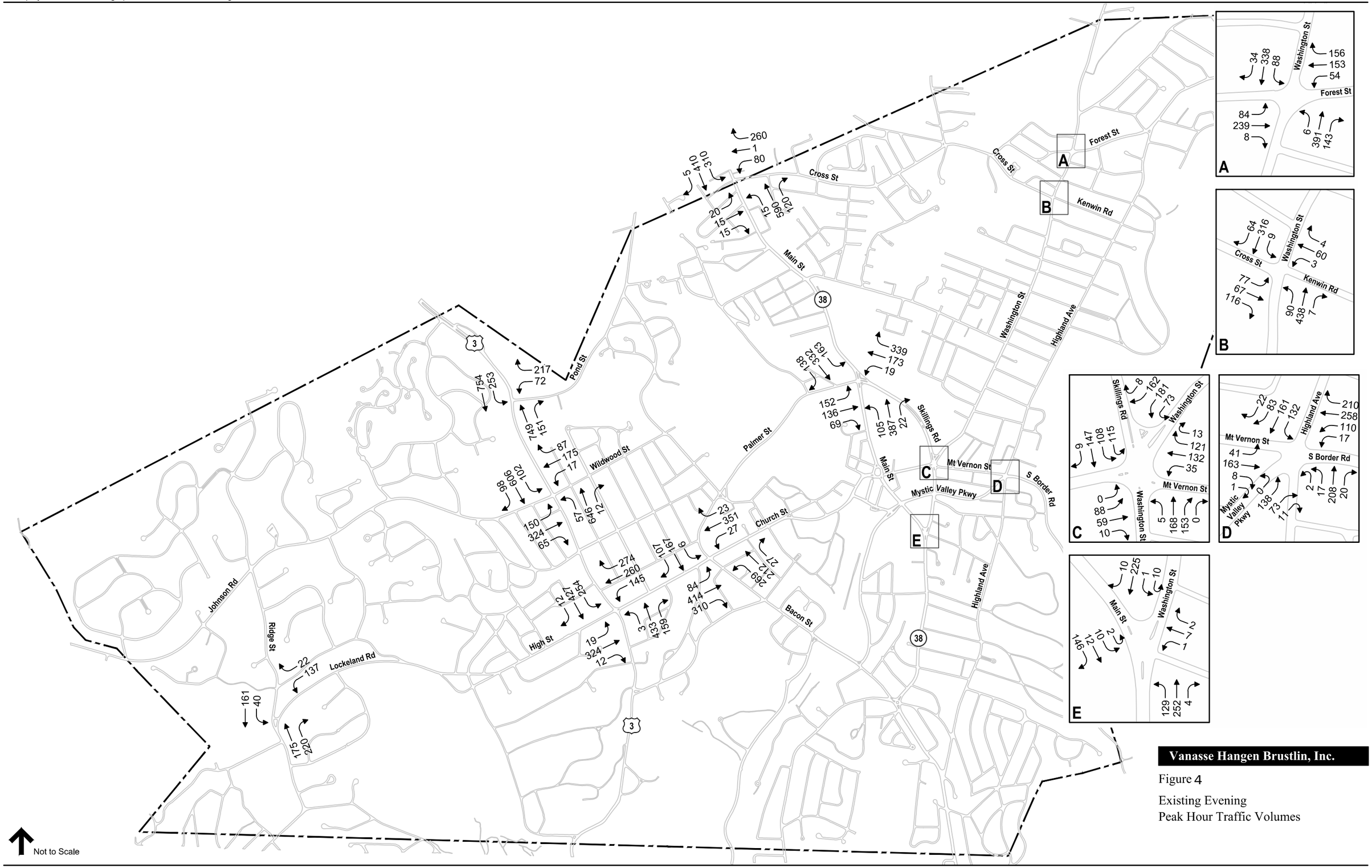
Figure 3

Existing Morning
Peak Hour Traffic Volumes



Not to Scale

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Figure 4

Existing Evening
Peak Hour Traffic Volumes

0 - 1,000 vehicles in peak 3 hours
1,001 - 2,000 vehicles in peak 3 hours
2,001 - 3,000 vehicles in peak 3 hours
3,001 - 4,000 vehicles in peak 3 hours
4,000+ vehicles in peak 3 hours

Source: CTPS 2010 travel demand model raw volumes.

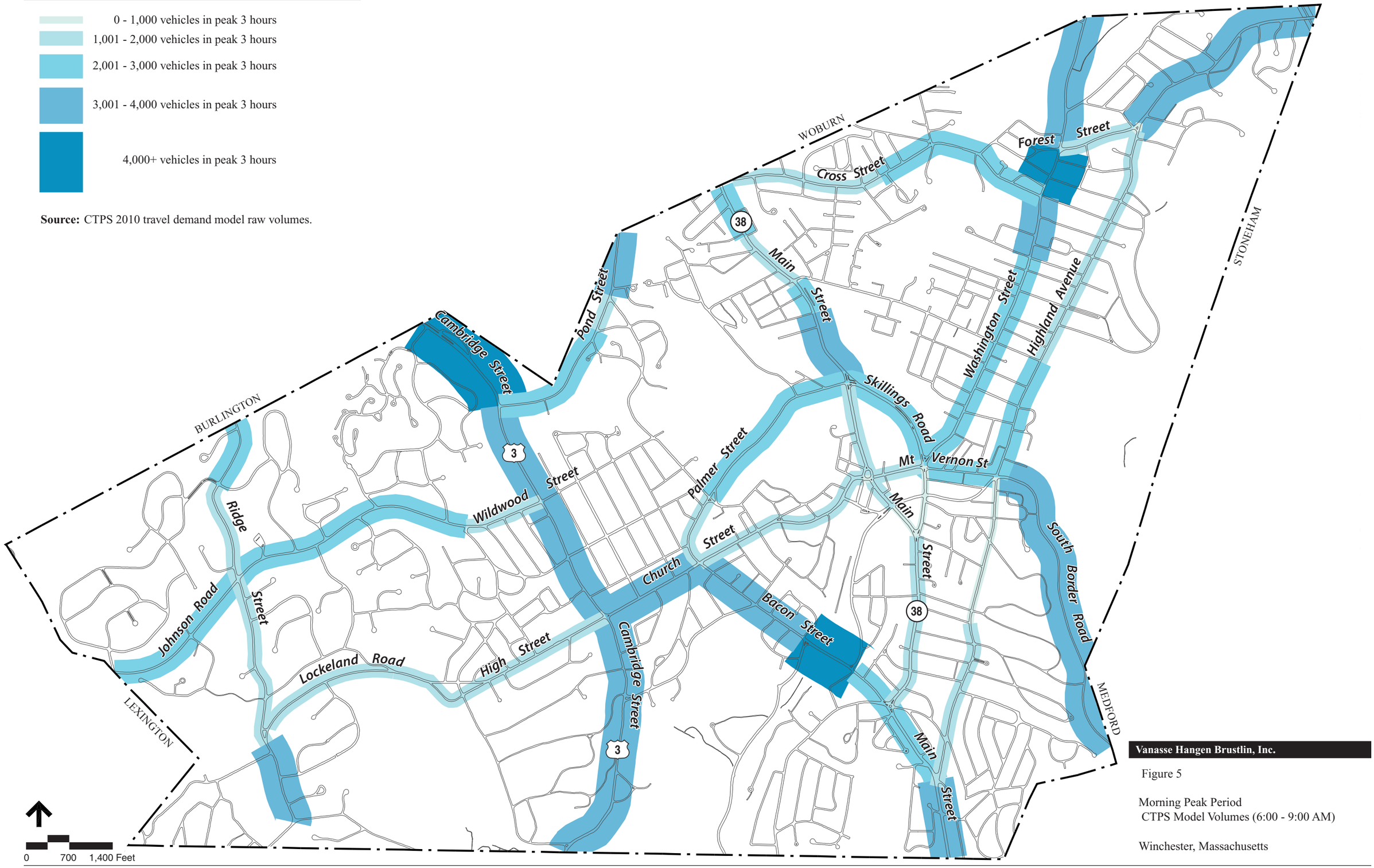

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Figure 5

Morning Peak Period
CTPS Model Volumes (6:00 - 9:00 AM)

Winchester, Massachusetts

0 - 1,000 vehicles in peak 3 hours

1,001 - 2,000 vehicles in peak 3 hours

2,001 - 3,000 vehicles in peak 3 hours

3,001 - 4,000 vehicles in peak 3 hours

4,000+ vehicles in peak 3 hours

Source: CTPS 2010 travel demand model raw volumes.

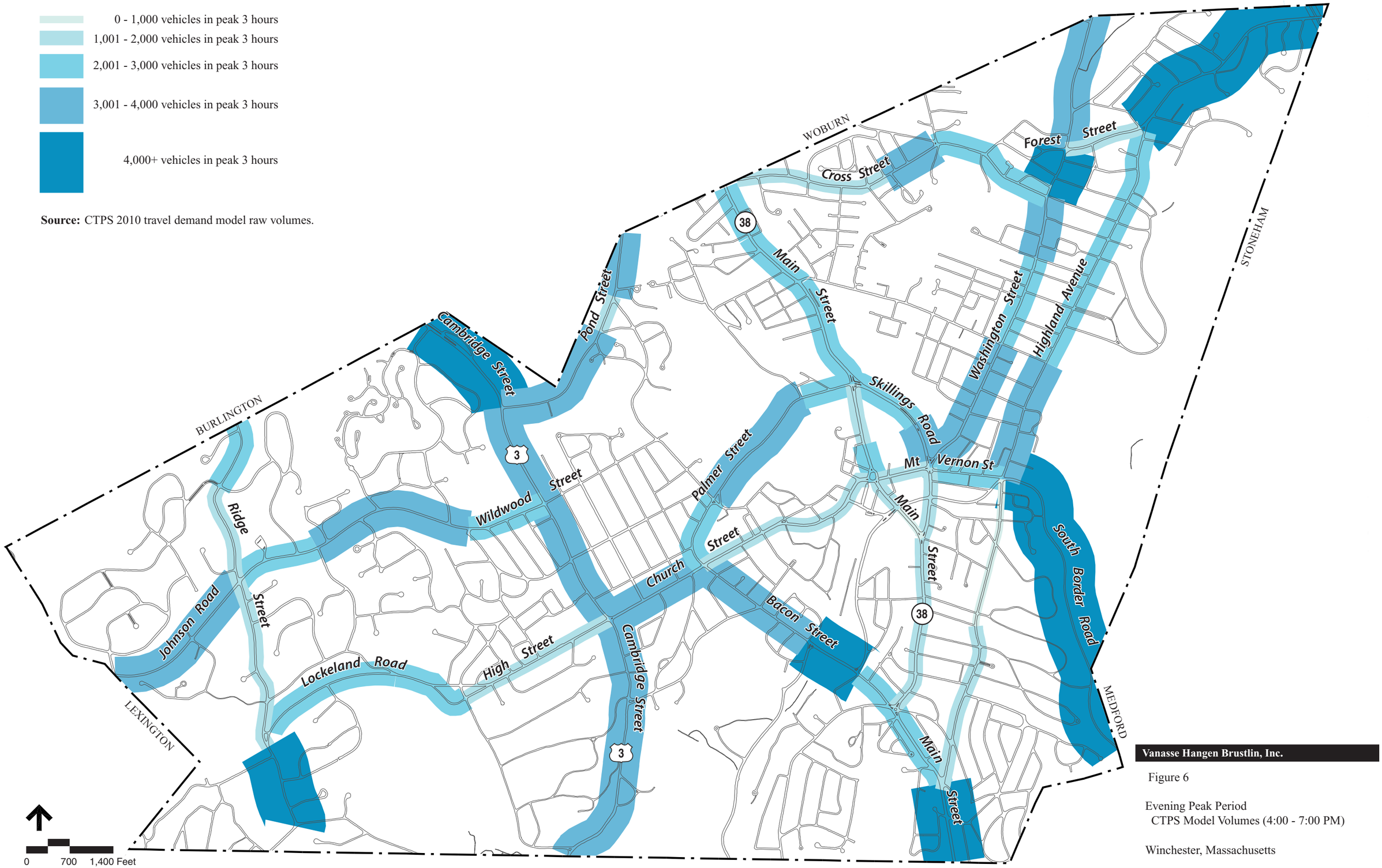

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Figure 6

Evening Peak Period
CTPS Model Volumes (4:00 - 7:00 PM)

Winchester, Massachusetts

Existing Roadway Infrastructure

Table 2 provides a detailed matrix of the existing roadway infrastructure conditions within the study area. Bicycle and pedestrian infrastructure considerations are discussed in a following section.

Table 2
Study Area Roadway Inventory

Roadway	Section	General Land Use[a]	Approximate Lane Width (feet)	Posted Speed Limit	Observed Vehicular Speeds (High, Moderate, Low)	Observed Sight Distance Issues	Width of Sidewalks [b]	Width of Striped Shoulders[b]	On-Street Parking Permitted?	Striped Parking?	Comments
Ridge Street	Town line to Wincrest Drive	Residential	11' NB / 11' SB	25 mph to 30 mph	Moderate	None	None	None	Varies	No	
	Wincrest Drive. to Lockeland Road	Residential	12' NB / 12' SB	30 mph			None NB/5.0' SB	2.5' NB/ 2.5' SB			
	Lockeland Road to town line	Residential	12' NB / 13' SB	30 mph			None NB/5.5' SB	3.0' NB/ 3.0' SB			
Cambridge Street	Town line to Pond Street	Residential	13' NB / 13' SB	35-40 mph			5.0' NB / 5.5' SB	4.0' NB/ 6.0' SB	No		
	Pond Street to Wildwood Street	Residential	13' NB / 13' SB	35 mph	Moderate	None	5.0' NB / 5.5' SB	4.0' NB/ 6.0' SB	No		
	Wildwood Street to Church St.	Residential	14' NB / 13' SB	35 mph			4'.0 NB / None SB	2.0'NB/ 2.0' SB	No		
	Church Street to town line	Residential	14' NB / 13' SB	35 mph			4.0' NB / None SB	2.0'NB/ 2.0' SB	No		
Pond Street	Cambridge Street to town line	Residential	12' EB / 13' WB	30 mph	Moderate	Trees and residential fences obstruct sight distance at some intersections	6.5' EB/None WB	1.5' EB/ 2.5' WB	Yes		
Johnson Road/ Wildwood Street	Town line to Ridge Street	Residential	12 EB /12' WB				4.5' EB/5.0' WB	3.0' EB/ 3.0' WB			
	Ridge Street to Cambridge St.	Residential	12' EB / 13' WB	30 mph	Moderate to	None	4.0' EB/ 4.0' WB	2.0' EB/ 3.0' WB	Yes	No	Wildwood Street slows to 20 mph approaching the curve towards the south.
	Cambridge St. to Woodside Rd.	Residential	12' EB /13' WB		High		4.0' EB/ 4.0' WB	2.0' EB/ 3.0' WB			
Lockeland Road	Ridge Street to High Street	Residential	12'EB / 12' WB	30 mph	Moderate	None	5.0' EB/ None WB	1.0' EB/ 1.5' WB	Yes	No	
High Street	Lockeland Rd to Cambridge St.	Residential	14' EB / 16' WB	30 mph	Moderate	Roadway Curvature, vertical and horizontal	4.5' EB/ None WB	None	Yes	No	Sidewalk width varies greatly and is in poor condition
Church Street	Cambridge Street to Bacon St.	Residential	19' EB / 19' WB				5.5' EB / 6.0' WB	None	Yes	No	
	Bacon Street to Dix St. (west)	Residential	19' EB / 19' WB	30 mph	Moderate	None	5.5' EB / 6.0' WB	None	Yes	No	
	Dix St. (west) to Dix St. (east)	Res. and CBD	20' EB / 20' WB				5.5' EB / 6.0' WB	None	Yes	No	
	Dix St. (east) to Mt. Vernon St.	CBD	20' EB / 20' WB				5.5' EB / 6.0' WB	None	Yes	No	
Mount Vernon Street	Main Street to Skillings Road	Institutional and CBD	10.5'EB / 10.5' WB	30 mph	Low to Moderate	None	8.0' EB/ 9.0' WB	None	Yes	Yes	Striped parking spaces 8' wide eastbound and westbound
South Border Road	Highland Avenue to town line	Residential	12' NB / 12' SB	30 mph	Moderate	Horizontal curvature	None NB / 5.0' SB	4.0' NB/ 2.5' SB	No		
Fletcher St./ Palmer St/ Lake Street	Church Street to Main Street	Residential	15' EB / 15" WB	30 mph	Moderate	None	5.0' EB/ 5.0' WB	None	Yes	Some	Striped spaces at the tennis courts

Table 2 (continued)
Study Area Roadway Inventory

Roadway	Section	General Land Use[a]	Approximate Lane Width (feet)	Speed Limit	Observed Vehicular Speeds (High, Moderate, Low)	Observed Sight Distance Issues	Width of Sidewalks[b]	Width of Striped Shoulders[b]	On-Street Parking	Striped Parking?	Comments
Bacon Street	Church Street to Main Street	Residential	16' NB / 15' SB	30 mph	Moderate	None	5.0' NB/ 5.0' SB varies up to 8.0'NB/8.0'SB	None	Varies	No	On-street parking permitted from Mystic Valley Parkway to Mystic Valley Parkway, northbound and southbound
Main Street	Cross Street to Skillings Road	Res. and Com.	22'NB/20'SB	30 mph			6.5' NB/ 6.0' SB	None	Yes	Yes	
	Skillings Rd. to Mt. Vernon St.	Res., Com., CBD	15'NB/14'SB	30 mph	Moderate	None	7.5' NB/ 7.5' SB	8.0' NB/ 8.0' SB	Yes	Yes	
	Mt. Pleasant to Bacon Street	Residential	13'NB/20'SB	35 mph			5.0' NB/ 7.5' SB	None	Yes	No	
	Highland Ave. to town line	Res. and Inst.	21'NB/24'SB	35 mph			4.5' NB/ None SB	None	Yes	No	
Skillings Road	Lake Street to Mt. Vernon St.	Institutional and Residential	22' NB / 21' SB	30 mph	High	None	6.5' NB/ 6.0' SB	None	Yes	No	Wider sidewalks outside of the high school
Cross Street	Main Street to Forest Street	Residential	15'EB / 13' WB	30 mph	Moderate	Roadway Curvature	5.0' EB/ 5.0' WB	1.5' EB/ 3.0' WB	No		Double yellow line under the bridge is faded. Sidewalk under the bridge is protected by a wooden fence.
	Bridge underpass		13' EB / 12' WB			Abutments	None EB/5.0' WB	None			
Forest Street	Cross St. to Washington St.	Residential	12' EB/13' WB	30 mph, speed limit may not be appropriate for roadway	Moderate to High	Horizontal curvature	5.0' EB/ 5.0' WB	2.0' EB/ 2.0'WB	Yes		Shoulders are not striped for most of Cross St. to Washington St. segment, only closest to the intersection
	Washington St. to Highland Ave.	Residential	14' EB/ 14' WB		Moderate to High	Vertical curvature	5.0' EB/ 4.5' WB	2.0' EB/ 1.5' WB	No		
Washington Street	town line to Forest Street	Residential	12' NB/12' SB	35 mph	Moderate	None	5.0' NB/ 6.0' SB	2.0' NB/ 2.0' SB	No		None
	Cross St. to Mt. Vernon Street	Residential	13' NB/12' SB	30 mph			10' NB/ 9.0' SB	2.0' NB/ None SB	Yes	Yes	Northbound shoulders present when no parking is striped. 10.0' striped parking northbound near the Town Center and southbound throughout
Highland Avenue	Forest Street to Mt. Vernon St.	Residential	12' NB / 13'SB	30 mph	Moderate	None	5.0' NB/ 4.0' SB	None	Varies	Yes	7.0' wide parking spaces are striped southbound outside of the hospital
	Mt. Vernon St. to Main Street	Residential	15' NB / 14' SB				5.5' NB/ 4.0' SB	None			

a General Land Use is based on the Town of Winchester zoning map. For the purposes of this study Land Use is categorized as Residential, Commercial, Institutional, or Central Business District (CBD).

b The Width of Sidewalks and the Width of Shoulders varies slightly over most sections, the information reported represents a typical cross section.

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Signalized Intersection Inventory

VHB reviewed the traffic signal and controller equipment at eight of the Town's signalized intersections. An inventory of these traffic signals is presented in Table 3. This inventory shows what deficiencies exist at each signal and how well each signal complies with standards established by the Manual of Uniform Traffic Control Devices (MUTCD) and to standards for compliance with the Americans with Disabilities Act (ADA). Only one of the eight intersections is in complete compliance with the MUTCD.

Table 3 Traffic Signal Inventory

Intersection	2009 MUTCD Issues/Violations	Defective and/or Broken Equipment	ADA Issues (Non-Compliance)	Other Issues
Washington Street at Forest Street	➤ None	➤ None	➤ None	➤ None
Washington Street at Cross Street/Kenwin Street	➤ Flashing Don't Walk interval not to current standards	➤ None	➤ None	➤ None
Washington Street at Mount Vernon Street	➤ Mt. Vernon St. EB has a "blind lead" phase ➤ Flashing Don't Walk interval not to current standards	➤ Washington St NB: green arrow indication out on 4-section head ➤ Time Clock within the controller is incorrect	➤ None	➤ Vehicle clearance intervals are insufficient
Church Street at Main Street	➤ Flashing vehicle signal displays ➤ Parking within 20' of the crosswalk on Church Street ➤ Flashing Don't Walk interval not to current standards ➤ No stop lines ➤ Signal heads within 40' of the assumed stopping point	➤ None	➤ None	➤ None
Church Street at Bacon Street	➤ Only 1 signal head per approach ➤ No pedestrian signal heads – ped. phase indicated by red/yellow display ➤ Flashing Don't Walk interval not to current standards	➤ None	➤ Wheelchair Ramps	➤ None
Cambridge Street at Church Street	➤ 8" signal display lenses ➤ Flashing Don't Walk interval not to current standards	➤ Broken wire loops on Church Street	➤ Pedestrian Buttons ➤ Wheelchair Ramps ➤ Crosswalks to no sidewalk ➤ One crosswalk has no pedestrian signal heads	➤ Pavement Rutting
Cambridge Street at Wildwood Street	➤ Flashing Don't Walk interval not to current standards	➤ Broken wire loops on Wildwood Street	➤ Pedestrian Buttons ➤ Wheelchair Ramps	➤ Controller/Cabinet in poor condition
Main Street at Skillings Street	➤ Some pedestrian heads use word indications (Walk/Don't Walk) ➤ Flashing Don't Walk interval not to current standards	➤ Date (1980) and time clock in the controller is incorrect	➤ Pedestrian Buttons ➤ Wheelchair Ramps	➤ Vehicle clearance intervals are insufficient
Mount Vernon Street at Highland Avenue/South Border Road	➤ Protected vehicle movements for 3 phases without proper arrow displays ➤ Flashing Don't Walk interval not to current standards	➤ Date (1983) and time clock in the controller is incorrect	➤ Pedestrian Buttons ➤ Wheelchair Ramps	➤ None

Pedestrian and Bicycle Facilities

Currently, there are no dedicated bicycle facilities in Winchester. The following summarizes pedestrian and bicycle observations through town. Suggestions for improving pedestrian and bicycle accommodations are presented in Chapter 3.

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Pedestrian Facilities

A fairly extensive and well-connected sidewalk system is present throughout Winchester. Most major town roads have sidewalks on at least one side of the road. Sidewalks measured at least four feet in width and some were as wide as ten feet in areas with higher pedestrian traffic. Sidewalks often varied in width and may switch sides of the road due to right of way constraints and topography. The condition of sidewalks varies throughout the Town.

Crosswalks are present throughout the Town Center, crossing major intersections, and in most school zones. At most signalized intersections pedestrian signal heads were present. However, some of these signal heads are not up to current standards and many of the pedestrian signal timings are not adequate based on current standards. The traffic signal inventory presented in Table 3 includes a number of deficiencies and non-compliant equipment and timings that impact pedestrian mobility.

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Pedestrian Crashes

According to the MassDOT crash data, there have not been any pedestrian crashes over the most three-year period (2007-2009) data are available. Crashes involving pedestrians that are not reported to the police are not included in the available data. Since 2009, there has been one pedestrian crash on Skillings Road. A high school student crossing Skillings Road on a weekday morning was struck and sustained minor injuries.

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Bicycle Facilities

Currently, the Town has no designated bicycle facilities. Bicycle who chose to bike along the roadways must share the road with vehicular traffic. Several main roadways within the Town provide wide shoulders that accommodate bicycles and provide a buffer from traffic. The width of shoulders varies greatly throughout the Town. In many places, cyclists share the roadway shoulder with parked vehicles. There are no roadway markings advising drivers or cyclists about the presence of bicycles or about how to share the roadway.

The Middlesex Fells Reservation in eastern Winchester spans across five municipalities. This reservation maintains one mountain biking trail which traces the perimeter of the three eastern reservoirs.

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Bicycle Crashes

According to the MassDOT crash data files, there has been one bicycle related crash over the most recent three-year period (2007-2009) data were available. This crash occurred at the intersection of Main Street at Church Street and only involved property damage. Accidents involving bicyclists that were not reported to the police department are not included in the data.

Safety

In order to identify accident trends, safety concerns, and/or roadway deficiencies within the study area, accident data were obtained from the Massachusetts Department of Transportation for the three-year period from January 1, 2007 to December 31, 2009 (the most recent data available). The accident data was compiled for the 20 study intersections. A summary of the accident data is presented in Table 4, and complete crash data can be found in the Appendix.

As the table show, a total of 217 accidents have occurred at the study area intersections in the three years 2007 through 2009. The highest number of crashes was experienced at Cambridge Street (Route 3) and Wildwood Street (22 crashes). Four other intersections follow very closely in number of crashes: Cambridge Street (Route 3) at Church Street and High Street (21 crashes), Church Street at Bacon Street and Fletcher Street (20 crashes), Main Street at Church Street (20 crashes), and Cambridge Street (Route 3) at Pond Street (19 crashes). Crashes occurring on Cambridge Street (Route 3) fall under state jurisdiction while all others are in the town's jurisdiction.

The majority of crashes at the above locations are of the angle (92 crashes) or rear-end (61 crashes) type. Angle-type crashes often occur when vehicles are turning from a minor road onto a high-speed or high volume major road or are turning left from the major roadway into a minor roadway. Rear-end accidents often occur when vehicles attempt to turn and the vehicle behind them either does not slow quickly enough or advancies thinking that the turning vehicle has already proceeded.

Massachusetts Department of Transportation has prepared a list of the top 200 high crash intersections through the entire state of Massachusetts. The most current list, released in August 2011, compiles data from 2007, 2008, and 2009. No intersections in Winchester were on this list of high crash locations.

Another method for determining relative safety is eligibility for Highway Safety Improvement Program (HSIP) funding which looks at intersection safety from a national perspective. In Massachusetts, the top 5 percent of crash locations in each region are eligible for HSIP funds. In 2009, none of the intersections in Winchester were HSIP eligible. In 2008, however, the intersections of Cambridge Street (Route 3) at Pond Street and the intersection of Cambridge Street (Route 3) at Wildwood Street were both eligible for HSIP funding. These intersections are under state jurisdiction and improvement plans are currently underway by MassDOT.

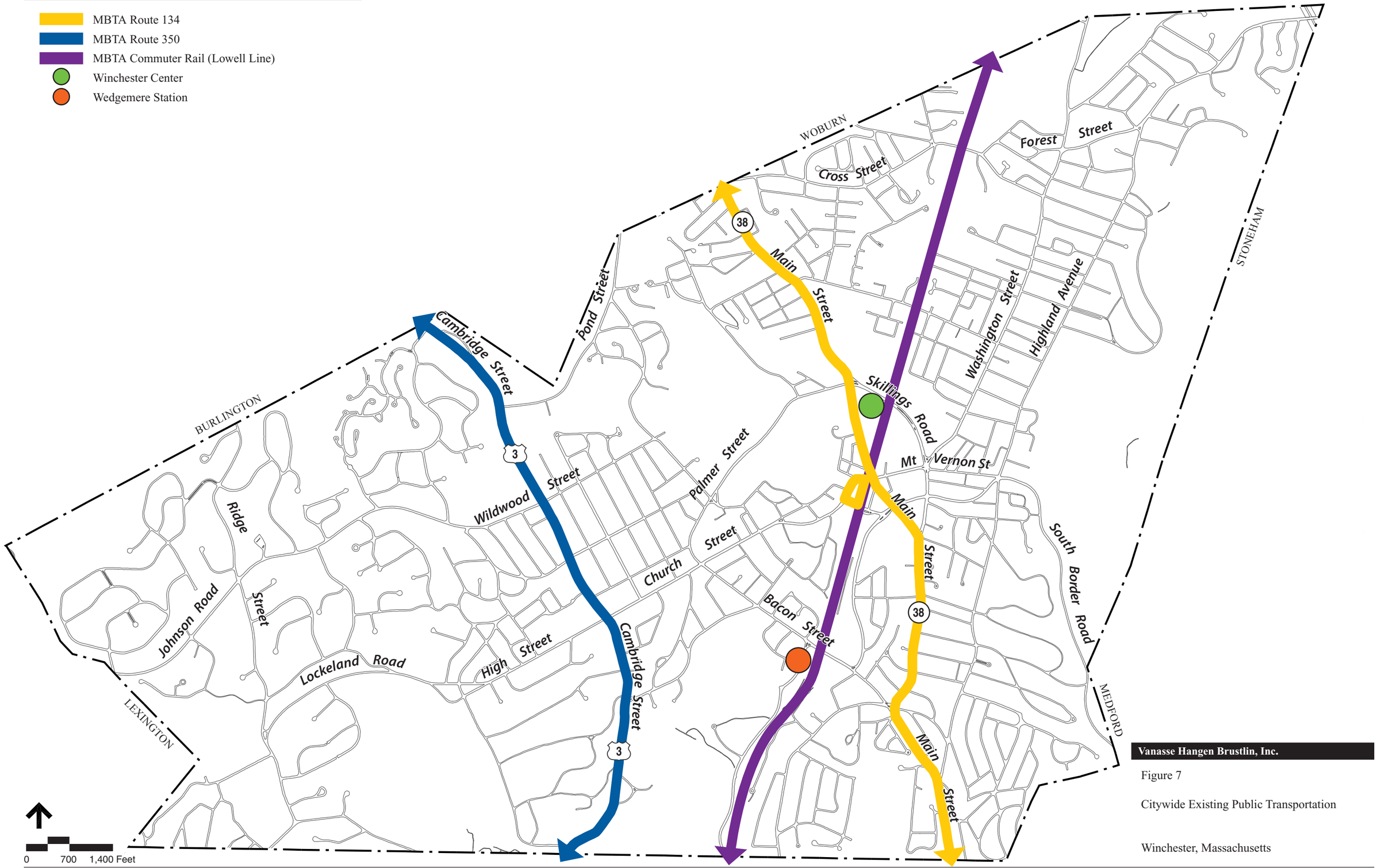
Table 4
Intersection Accident Summary — 2007-2009

	Town of Winchester																			
	Ridge Street at		Cambridge Street at			Church Street at			Main Street at	Mt. Vernon Street at		Main Street at			Cross Street at		Washington Street at	Highland Ave. at	Main Street at		Total
	Johnson Road	Lockeland Road	Pond St.	Wildwood Street	Church St./ High Street	Bacon St./ Fletcher St.	Pine St./ Ravine Rd.	Dix St.	Church Street	Washington Street	Highland Avenue	Washington Street	Skillings Road	Cross St./ Border St.	Brookside Ave/ Forest St.	Washington St./ Kenwin Rd.	Forest Street	Forest Street	Bacon Street	Bacon St/ Highland Ave.	
Signalized?	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	Yes	No	No	Yes	Yes	No	No	No	
MassDOT District 4 Average Crash Rate	.59	.59	.59	.78	.78	.59	.59	.59	.59	.78	.78	.59	.78	.59	.59	.78	.78	.59	.59	.59	
Year																					
2007	1	2	6	11	6	4	0	3	9	6	2	2	5	0	1	5	3	5	2	0	73
2008	9	0	7	8	12	11	1	1	4	4	6	2	7	0	4	2	3	3	4	0	88
2009	2	3	6	3	3	5	1	1	7	2	3	2	5	0	2	1	4	3	2	0	55
Total	12	5	19	22	21	20	2	5	20	12	11	6	17	0	7	8	10	11	8	1	**217**
Collision Type																					
Angle	10	2	12	8	9	12	0	0	8	5	4	3	3	0	4	2	1	4	5	0	92
Head-on	1	0	1	0	2	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	8
Rear-end	0	2	2	10	5	3	1	0	5	3	4	1	6	0	1	4	5	5	3	1	61
Sideswipe, opposite direction	1	0	1	0	0	0	0	2	0	0	0	0	1	0	1	0	1	0	0	0	7
Sideswipe, same direction	0	0	2	2	3	1	1	2	5	0	0	0	6	0	0	1	0	1	0	0	24
Single-vehicle crash	0	0	1	1	1	2	0	1	1	3	2	1	0	0	1	1	2	0	0	0	17
Unknown	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Not reported	0	1	0	1	1	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	7
Total	12	5	19	22	21	20	2	5	20	12	11	6	17	0	7	8	10	11	8	1	**217**
Crash Severity																					
Fatal injury	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-fatal injury	5	1	5	4	2	3	0	1	1	3	1	1	1	0	1	1	3	1	0	0	34
Property damage only (none injured)	6	4	13	17	18	17	2	3	16	9	8	5	14	0	4	6	6	6	5	1	160
Unknown	1	0	1	1	1	0	0	1	2	0	2	0	1	0	2	0	1	3	3	0	19
Not reported	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	1	0	0	4
Total	12	5	19	22	21	20	2	5	20	12	11	6	17	0	7	8	10	11	8	1	**217**
Total Non-Motorist (Pedestrians/Bikes)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Time of Day																					
Weekday, 7:00 AM - 9:00 AM	2	2	4	3	4	3	0	0	3	1	2	2	3	0	0	0	2	2	2	0	35
Weekday, 4:00 PM - 6:00 PM	3	2	5	3	2	7	0	1	3	5	0	0	3	0	2	1	1	4	1	0	43
Saturday, 11:00 AM - 2:00 PM	1	0	2	0	1	1	0	0	0	0	0	0	2	0	2	1	1	0	0	0	11
Weekday, other time	4	1	5	8	12	8	2	4	10	4	8	2	7	0	3	6	4	4	3	1	96
Weekend, other time	2	0	3	8	2	1	0	0	4	2	1	2	2	0	0	0	2	1	2	0	32
Total	12	5	19	22	21	20	2	5	20	12	11	6	17	0	7	8	10	11	8	1	**217**
Pavement Conditions																					
Dry	9	2	16	14	14	17	2	4	14	9	7	5	15	0	4	6	9	9	3	0	159
Wet	2	1	0	8	3	1	0	0	3	2	4	1	2	0	3	2	1	2	4	1	40
Snow	1	0	1	0	3	2	0	0	1	1	0	0	0	0	0	0	0	0	1	0	10
Ice	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4
Other/Unknown	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4
Total	12	5	19	22	21	20	2	5	20	12	11	6	17	0	7	8	10	11	8	1	**217**

Source: Compiled by Vanasse Hangen Brustlin, (VHB) Inc. from the Massachusetts Department of Transportation.

Public Transportation

Public transportation within the Town of Winchester includes Massachusetts Bay Transportation Authority (MBTA) commuter rail and bus service. Commuter Rail Service is provided on the Lowell Line, with stops at Winchester Center and Wedgemere. Bus Service is provided on MBTA Route 134 , which runs between North Woburn and the Wellington Orange Line station in Medford. Additionally, Winchester Hospital offers a private shuttle program for employees and patients. Figure 7 presents the public transportation service routes within the Town.



Vanasse Hangen Brustlin, Inc.

Figure 7

Citywide Existing Public Transportation

Winchester, Massachusetts

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MBTA Commuter Rail Service

The Lowell Commuter Rail line provides service to North Station from the Winchester Center and Wedgemere stations. Other stations along the line include Lowell, North Billerica, Wilmington, Anderson Regional Transportation Center (Woburn), and West Medford. The travel time from Winchester Center to North Station is approximately 20 minutes. Both Winchester Center and Wedgemere stations are managed by the Town of Winchester. Winchester Center is located in the town center and has 239 parking spaces and 27 bike spaces. Wedgemere Station can be accessed from Bacon Street and Mystic Valley Parkway and has 103 parking spaces.

Parking permits are $125 each quarter for any of the three town center parking facilities including the Aberjona lot nearest Winchester Center. The Wedgemere lot is a non-permit lot. The fare structure for a one-way trip from Winchester Center or Wedgemere to Boston is $5.50 and monthly passes are available for $173.00.

From Winchester Center, there are 26 inbound (to Boston) and 23 outbound (from Boston) trains daily on weekdays. Train service is available on weekdays from Winchester Center station to Boston from 6:02 AM until 11:02 PM and from North Station to Winchester from 5:45 AM until 12:10 PM. The service generally operates at 20-minute headways during the morning peak period and 30-minute headways during the evening peak period.

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Bus Service

Two MBTA buses serve the Town of Winchester: Route 134 and Route 350. Route maps for each are provided in the Appendix. Each route costs $1.50 per ride for Charlie Card holders and $2.00 per ride without a Charlie Card.

Route 134. The Route 134 Bus runs between North Woburn and Wellington Station on Routes 38 and 60 via Woburn Square, Winchester Center, Winthrop Street, Medford Square, Riverside Avenue, and Meadow Glen Mall. This bus makes stops in Winchester on Cambridge Street in 15 locations. During peak weekday travel this bus runs at 20 to 30 minute headways.

Route 350. The Route 350 bus runs between North Burlington and Alewife Station along Routes 3 and 3A via the Burlington Mall. This bus makes stops in Winchester on Cambridge Street in 14 locations. During peak weekday travel this bus runs at 20 to 30 minute headways.

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Winchester Hospital Shuttle Program

The Winchester Hospital shuttle program operates five days per week beginning Mondays at 3:00AM. Shuttle routes connect some of Winchester Hospital's various medical and parking facilities within the Town of Winchester, City of Woburn, and the Town of Stoneham. Operating times for the different routes vary from 12 hours per day to 22 hours per day. Individual routes make between 20 and 100 parking lot trips each day.

Town Center

Winchester Town Center has some of its own unique transportation concerns, which is common of central business districts in New England. From a land use perspective, Winchester Town Center provides a central business district as well as commercial, institutional, and residential land uses. These various uses draw in commuters, students, heavy vehicles, bicyclists, and pedestrians. Each of these modes brings different needs and concerns. Furthermore, Winchester is an old town with a mix of modern and historic infrastructure, another unique challenge.

The bounds of the Town Center are defined by Mystic Valley parkway to the south, Waterfield Road to the west, Lake Street to the north, and Durham Street to the east. The section of Waterfield Road from Church Street to Mystic Valley Parkway is also included because of the access it provides to the Waterfield permit parking lot for both automobiles and pedestrians.

- Roadway Segments
  - Main Street from Skillings Road to Mystic Valley Parkway
  - Skillings Road from Main Street to Washington Street
  - Washington Street from Ridgeway Street to Mystic Valley Parkway
  - Mount Vernon Street from Main Street to Washington Street
  - Church Street from Waterfield Road to Main Street
  - Waterfield Road from Church Street to Mystic Valley Parkway
- Intersections
  - Main Street at Skillings Road/Lake Street
  - Washington Street at Skillings Road/Mount Vernon Street
  - Quill Rotary

One important factor in identifying current traffic and circulation issues in the Town Center is finalizing the redevelopment goals for the Town Center. The *Winchester Town Center Initiative Development Concepts* released in December 2010 was reviewed to better focus this analysis.

Ultimately, the Development Concepts hope to achieve two goals:

- "Supporting local business owners and encouraging the diversification of businesses, and

- Bringing more residential housing into the town center to take advantage of the higher density of development that can be supported by commuter rail and transit services."

The second goal in particular speaks to the importance of developing a reliable transportation network within the Town Center to support a greater number of residents relying on a varied mix of transportation services. These development concepts will ultimately be worked into a redevelopment plan for the Town of Winchester. At this time, there are a number of elements to this plan related to transportation and circulation within the Town Center.

- Winchester Center Commuter Rail Station Improvements
- Railroad Viaduct for pedestrian access
- New pedestrian passageways through the "Great Wall"
- Town Center Greenwalks and Greenways
- Rezoning

The following sections and tables summarize transportation issues in the Town Center.

Parking

In November 2010, the Town of Winchester had a town center parking study done to better understand parking conditions. This study reported that there were 3,665 parking spaces within a quarter mile of the town center which include the middle school and the high school parking. Of the 3,665 spaces counted, 2,300 of the spaces are public spaces.

This study found that in general Town Center parking is underutilized with a peak utilization of 47 percent during weekday afternoons during the lunch hour. Parking utilization was reported to be higher in the Town Center core. The Town Center core is not strictly defined but is centered around the Quill Rotary and includes the segments that serve the rotary. The study found that despite the fact that some lots or blocks may reach capacity, generally there is a facility a short distance away with available parking. Lastly, the study found that parking lots are also underutilized on weekends.

Pedestrians and Bicycles

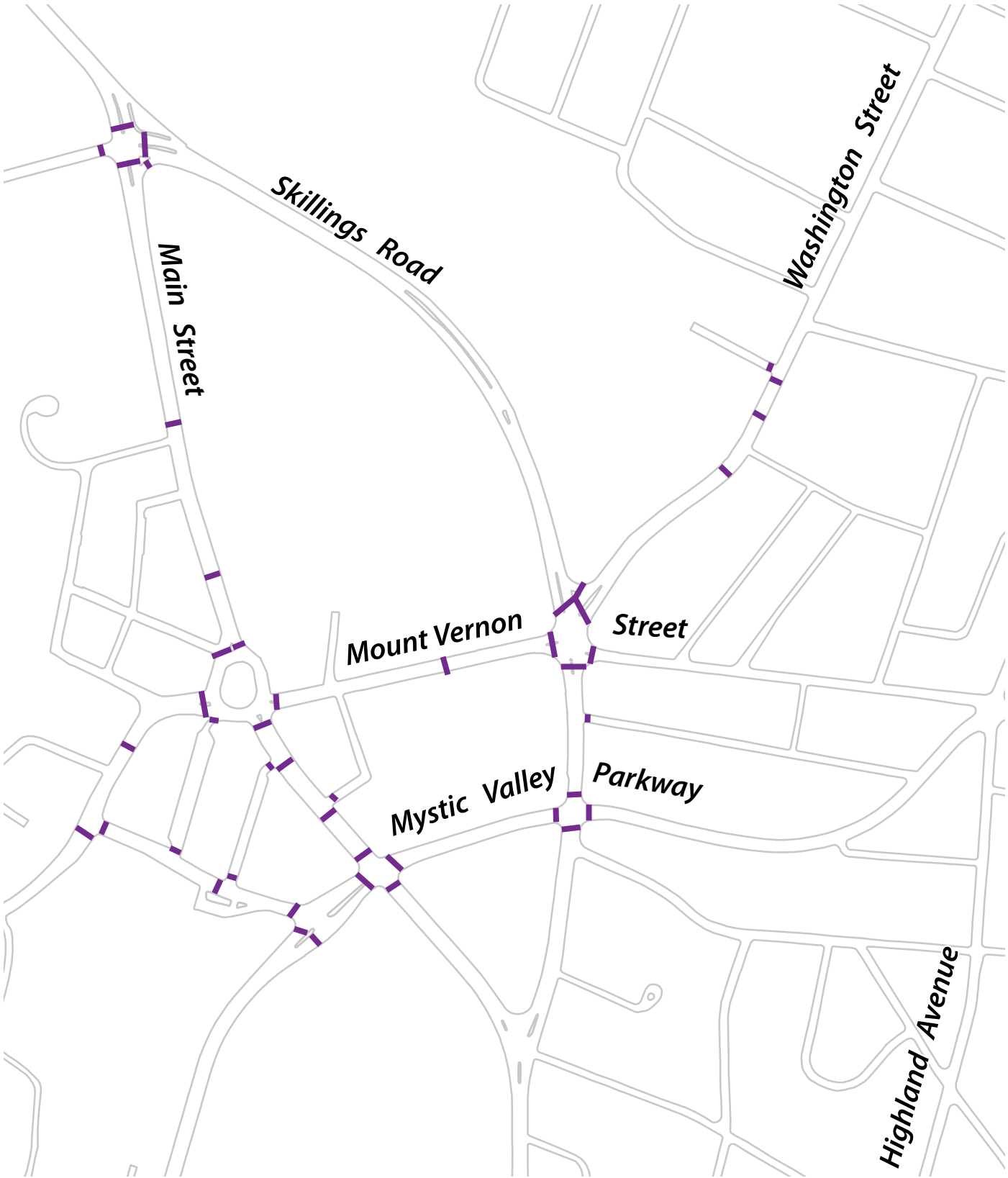
The condition of pedestrian and bicycle accommodations in the Town Center is similar to the conditions town wide. The network of sidewalks in the Town Center is in good condition with strong connectivity. Sidewalks are present on both sides of the roads throughout the Town Center study area. Mount Vernon Street and portions of Main Street and Church Street sidewalks are uniformly bricked, particularly closest to Quill Rotary. The remaining sidewalks are concrete slabs or asphalt and generally in good condition.

In addition to sidewalks, crosswalk conditions and connectivity are generally good in the Town Center with few segments showing deficiencies. Figure 8 shows an inventory of the crosswalks in the Town Center. Main Street and Church Street crosswalks nearest Quill Rotary are uniform brick red and textured. All other crosswalks in the study area are striped including crosswalks at the Town Center Study Area intersections. One observed deficiency is insufficient buffers between mid-block crosswalks and parked vehicles. A minimum buffer of 20 feet should be provided between parked cars and a crosswalk on either side of a crosswalk to ensure pedestrian safety. At a signalized intersection this distance is increased to a 30 foot buffer. Alternatively, a bump out could be use to sufficiently protect the crosswalk.

As described in the Signal Inventory Table (Table 3) and town wide Pedestrian Accommodations Table (Table 4), the traffic signals are not fully compliant with MUTCD and ADA standards. One common issue at the Town Center intersections is non-compliant pedestrian signal timings.

Winchester residents have expressed concerns and dissatisfaction with pedestrian mobility in the Town Center. The Quill Rotary has been described as 'unwalkable'. Additionally, complaints have been made about how long it takes to cross the intersection of Washington Street at Mount Vernon Street and Skillings Road due to the wide geometry of the roadway and the lengthy signal times.

Bicycle accommodations in the Town Center are limited. The discussion of accommodations in the Town in general are representative of accommodations in the town Center. Bicycles use the shoulders as a buffer to vehicular traffic, however, in many places in the Town Center that shoulder is shared with parked vehicles. This condition occurs more often in the Town Center then it does town wide. In 2009 a cyclist was struck at the intersection of Main Street at Church Street. This crash highlights the need to consider complete streets for all modes as the Town Center continues to develop its transportation infrastructure and consider how the various modes will share the road.



Town Center Crosswalk Inventory

Town Input on Existing Issues

A meaningful component of this Transportation Plan is the information collected through meetings with key Town staff and local residents. Prior to developing a feasible set of strategies for the Town of Winchester, the study team gained an understanding of the existing transportation issues within the area. Much of the information used to identify the issues came from these meetings. Input from the local community is not only important in gaining a clear idea of the issues, but is also critical in developing support for the recommended strategies. As part of the public process, an initial meeting on town wide issues (including transportation) was held in December 2011. In addition, a transportation-related public meeting was held in January 2012. At this meeting, local residents were given the opportunity to voice and prioritize transportation concerns. The meeting notes for each of these meetings are included in the Appendix. To the extent practical, the transportation concerns are incorporated into the improvements and strategies recommended in Chapter 3.

2

Future Conditions

This chapter describes the future transportation conditions within the study area. To be consistent with regional long-range transportation planning, a 2035 planning horizon year was chosen for this study. Understanding future projections of traffic volumes in Town helps to shape future policy decisions and anticipate future infrastructure needs for all users.

Future Traffic Conditions

An important component of this study involved forecasting travel demands and patterns to the year 2035. The future traffic projection includes planned roadway improvements and regional background traffic growth resulting in the 2035 Future Conditions.

Planned Roadway Improvements

A review of available information on the Transportation Improvement Plan and discussions with key state and local officials were completed to determine what future planned roadway improvements may play a role in future traffic growth along the Winchester roadway network. Agencies that were consulted include MassDOT District 4, the Central Transportation Planning Staff (CTPS) (both in terms of the travel demand model assumptions and as the staff for the Boston Metropolitan Planning Organization), the Town of Winchester, and the City of Woburn.

The primary roadway improvement project that is likely to affect transportation in the Town is the Interstate-93/Interstate-95 interchange improvement project. Improvements to the interchange could improve traffic flow on the interstate, potentially reducing traffic or changing travel patterns in Winchester. This project has been under development for a number of years and at this time, there is no identified funding.

Although the CTPS regional model includes interchange improvements and the official long range transportation plan assumes the improvements will be complete by 2035, the Town requested that CTPS remove the improvements from the regional model for the purposes of this study. With no other planned roadway improvements, the traffic growth is the based only on ambient traffic growth.

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Traffic Growth

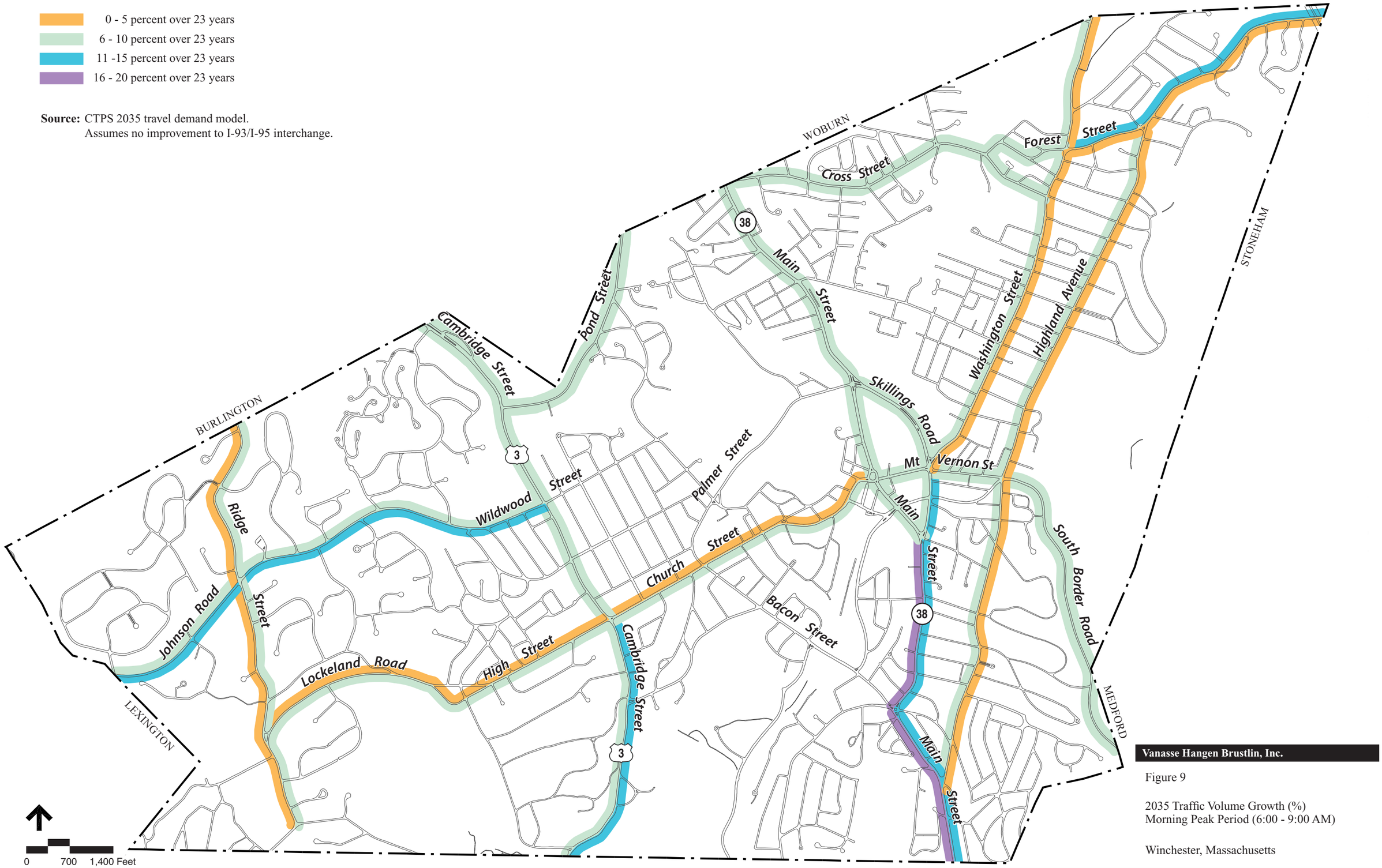
Traffic growth on area roadways is a function of the expected land development, economic activity, and changes in demographics. In order to evaluate traffic growth on a regional level, changes in such factors beyond the borders of the Town of Winchester needed to be considered. The CTPS regional travel demand model was used to make projections on traffic growth in Winchester.

In order to produce results consistent with the traffic trends in Winchester, the existing traffic volumes compiled were provided to CTPS. CTPS was able to use this data to calibrate their model and provide relative growth values for traffic flow in Winchester. As noted above, the relative growth assumes no improvement to the I-93/I-95 interchange, as requested by the Town.

Overall, traffic growth in Winchester is projected to be about 5 percent over the 23 year planning horizon (2035). The distribution of this growth varies by day of week and time of day. Figures 9 and 10 show the weekday morning and evening relative traffic growth on the major regional roadways in Winchester based on the model results. Data provided by CTPS can be found in the Appendix.

- 0 - 5 percent over 23 years
- 6 - 10 percent over 23 years
- 11 -15 percent over 23 years
- 16 - 20 percent over 23 years

Source: CTPS 2035 travel demand model.
Assumes no improvement to I-93/I-95 interchange.



Vanasse Hangen Brustlin, Inc.

Figure 9

2035 Traffic Volume Growth (%)
Morning Peak Period (6:00 - 9:00 AM)

Winchester, Massachusetts

- 0 - 5 percent over 23 years
- 6 - 10 percent over 23 years
- 11 -15 percent over 23 years
- 16 - 20 percent over 23 years

Source: CTPS 2035 travel demand model.
Assumes no improvement to I-93/I-95 interchange.

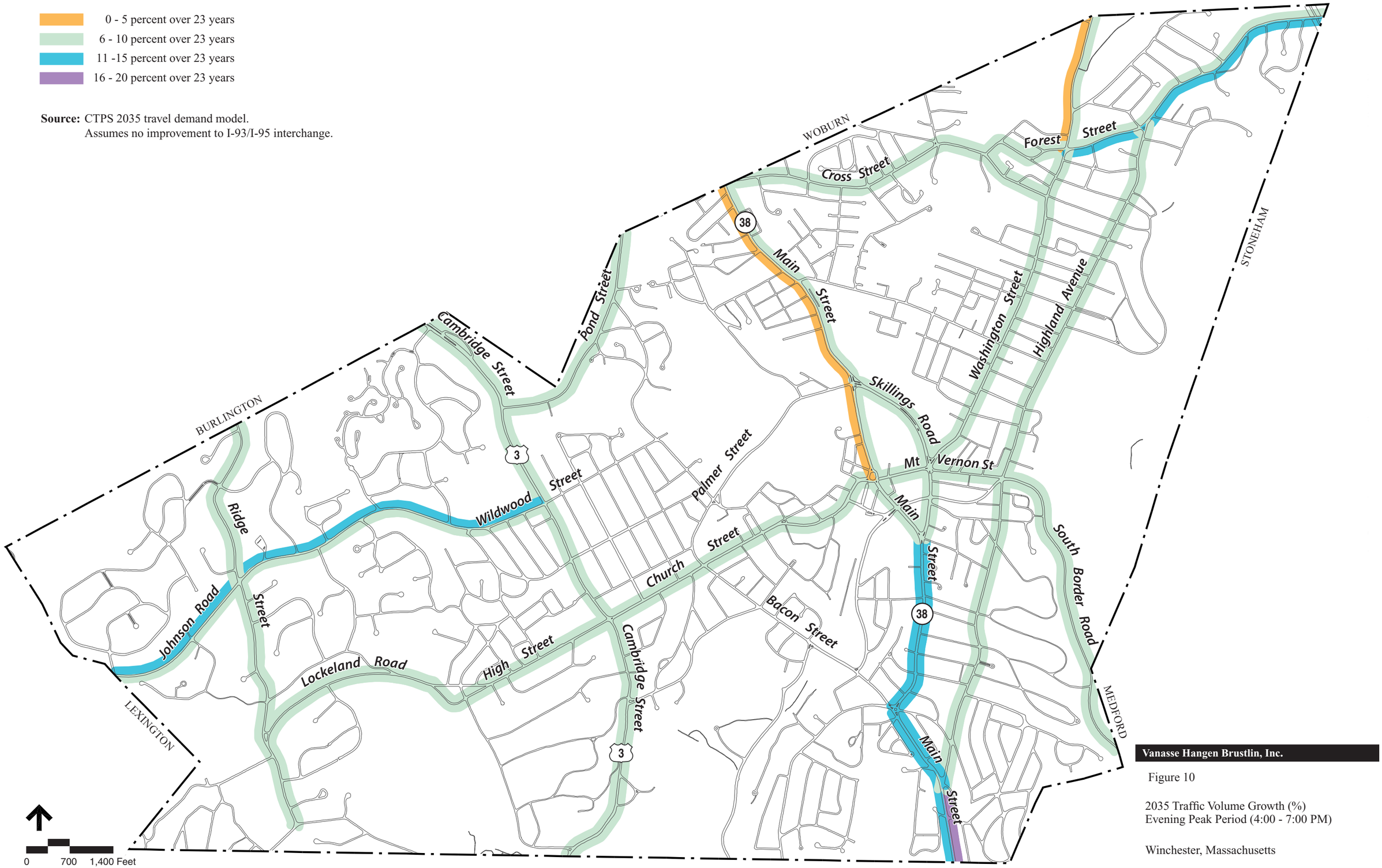


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Figure 10

2035 Traffic Volume Growth (%)
Evening Peak Period (4:00 - 7:00 PM)

Winchester, Massachusetts

3

Alternatives, Recommendations, Next Steps

As a companion to this existing and future conditions summary, the Planning Board has requested a book of mapping and prioritization matrices highlighting deficiencies and solutions that can be consulted location-by-location. This book presents the following information:

- Existing CTPS travel demand model volumes
- Future CTPS roadway growth projections
- Bicycle Accommodations/Recommendations
- Traffic Flow Deficiencies and Improvements
- Transportation Deficiencies and Improvements

The book highlights the potential strategies and solutions to the transportation issues identified throughout the study. The issues identified range from regional-level deficiencies in traffic flow to neighborhood specific challenges with mobility and travel speeds. Public outreach and collaboration with the Town played an important role in identifying issues that are relevant to the stakeholders. Collaboration was also key to developing a method for the Town to advance the strategies and solutions recommended that is specific to the goals of the Planning Board.