US Route 1

Greenwich/Stamford Operational Improvements Study

Volume One: Existing Conditions Report

August 2010

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Introduction

1.1 Study Purpose and Objectives

Route 1, also known as The Post Road, changes character, cross section, and function many times as it traverses from east to west from the New York State border, through Greenwich and into Stamford. Route 1 passes through three Greenwich villages; including the Central Business District, the Cos Cob neighborhood, and the Riverside neighborhood. The corridor crosses into Stamford, east of the Riverside neighborhood, amid a proliferation of big box retail establishments, hotels, and office parks. The roadway subsequently transitions to a short two-lane section where there are smaller scale retail stores. At Mill River Street/Greenwich Avenue, Route 1 becomes a six-lane divided urban arterial into Washington Boulevard (Route 137). The study area ends in Downtown Stamford.

As the character, adjacent land uses, cross section, and function changes; so do the issues, challenges, and needs of each of these various roadway segments. Most of the road is multi-lane with frequent curb cuts, but some sections, which have less dense development and fewer curb cuts, experience less interrupted traffic flow. In the higher density village areas, there is more congestion, due to on-street parking, frequent curb cuts, and increased vehicle turning movements. These areas also experience heavier pedestrian activity.

Finally, Route 1 is a State-maintained highway, running parallel to I-95, carrying commuter traffic not only from Greenwich and Stamford, but also from surrounding communities. Traffic congestion has continued to increase on I-95 and the Merritt Parkway, so Route 1 often functions as a diversion route when heavy traffic or accidents occur on either of these roadways.

These multiple and sometimes conflicting roles, as well as the varying character, issues, and opportunities along the length of Route 1, are at the core of the study. These multiple functions have, over time, contributed to increased congestion and a deteriorating community character. This study presents Greenwich and Stamford with the opportunity to address these varied issues, to develop a pro-active plan for Route 1 which supports a community vision for its long-term development, and to respond to increasingly urgent issues of access, flow, and operations along this key roadway.

The purpose of this study is to develop a coordinated plan to improve traffic operations on Route 1, improve pedestrian safety, manage access, accommodate transit and enhance the corridor's economic potential. The developed plan will consider not only enhancements to traffic flow or operations, but also urban design and development opportunities.

Purpose and Objectives:

- *Enhance operations of Route 1 Corridor,*
- *Improve safety for all users,*
- *Support economic development,*
- *Actively involve stakeholders,*
- *Develop a short and long term operational Improvements Plan.*

Coordination

2.1 Project Kick-Off

The project TAG (Technical Advisory Group) met for a project kick-off meeting at Greenwich Town Hall on January 21, 2010. The purpose of the meeting was to introduce the project team and the Technical Advisory Group (TAG), discuss the study purpose and objectives, study scope and schedule, and to gain a local perspective on the problems associated with the study area. The role and responsibility of the TAG is to provide study direction. TAG members will provide background information for the project, including approved and planned development, previous traffic impact studies and assist in the decision making process. A detailed meeting summary is included in ***Appendix A.***

2.2 Public Participation

A Public Participation Plan (PPP) was developed for the project following the project kick-off meeting. The goal of the PPP is to educate and inform as many public and private stakeholders as possible about the study process through a variety of media in order to provide maximum opportunity for input and consensus building. A key objective of this study is to focus on listening to, understanding and responding to the community's comments and concerns. A copy of the PPP is including ***Appendix A***.

The development of a Route 1 Operational Improvements Plan will be a collaborative effort which will include the staff and elected officials of the local jurisdictions (Stamford and Greenwich), property owners, general public, CTDOT, SWRPA and other regional and state-wide agencies. The planning process will include a variety of forums to engage these groups and stakeholders including a project website, newsletters and two multi-day workshop sessions.

The first workshop (Visioning Workshop) will include various segments including stakeholder interviews, a public visioning session, project team works sessions, field investigations, and a TAG work session. The intent of the first multi-day workshop is to define the "Vision" for the corridor and produce a corridor Framework Plan. The Framework Plan is intended to guide the development of concepts and transportation strategies and focus on the following topic areas: character areas, community goals and objectives, economic development/ redevelopment opportunities, new street network and connectivity, and multi-modal strategies.

The second workshop (Design Workshop) will be focused on developing, designing, and testing a range of potential projects and design concepts for the corridor.

Technical Advisory Group

Alex Karman	*SWRPA*
Sue Prosi	*SWRPA*
Floyd Lapp	*SWRPA*
Melissa Evans	*Town of Greenwich*
Amy Siebert	*Town of Greenwich*
Diane Fox	*Town of Greenwich*
Dave Thompson	*Town of Greenwich*
Mani S. Poola	*City of Stamford*
Todd Dumais	*City of Stamford*
Melanie Zimyeski	*CTDOT – Planning*
Kate Rattan	*CTDOT – Planning*

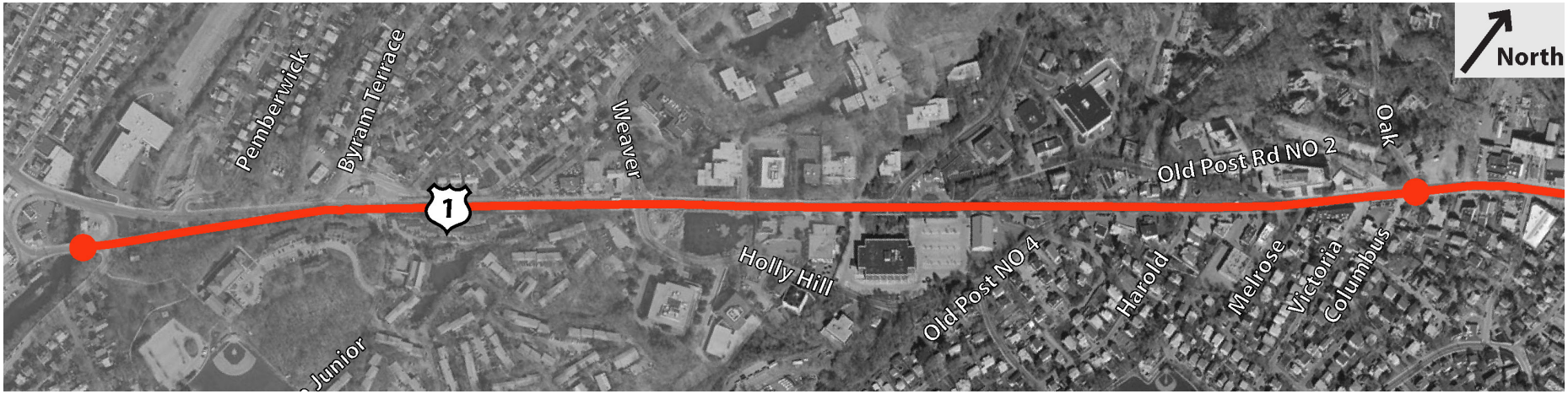
Study Area Characteristics

3.1 Study Area Characteristics

Route 1, also known as The Post Road, changes character, cross section, and function many times as it traverses from east to west from the New York State border, through Greenwich and into Stamford.

Pemberwick

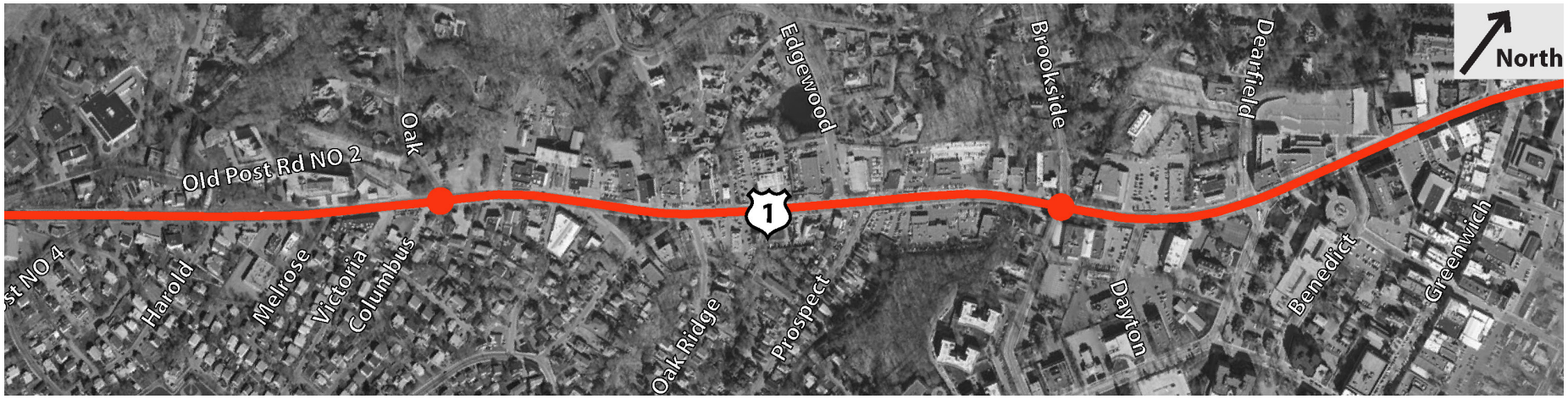
Traveling north along Route 1 from the New York State line, to Columbus Avenue/Oak Street (approximately 1 mile), development consists primarily of moderate density residential neighborhoods with some strip commercial. Two primary, intersecting roads, Pemberwick Road and Weaver Street, connect to the Merritt Parkway. The other intersecting streets in this section are typically smaller streets accessing residential communities. The residential communities west of Route 1 are low density, while the communities east of Route 1 tend to be more medium density and in some cases multi-family.



"Dealership Row"

As you travel north along Route 1 from the southernmost section of the project area, the density of commercial development increases. In particular, there are numerous car dealerships along both sides of the roadway within a distance of a half mile. Pedestrian activity is more frequent, and sidewalks exist along one or both sides of the roadway throughout the section. There are frequent driveways, and open access along the roadway. As you move further north along Route 1 towards downtown Greenwich, the dealerships begin to transition to other types of commercial development including the "Stop & Shop" and "Food Emporium" super markets north of Brookside Drive.

Maserati Dealership on Route 1 near Edgewood Avenue



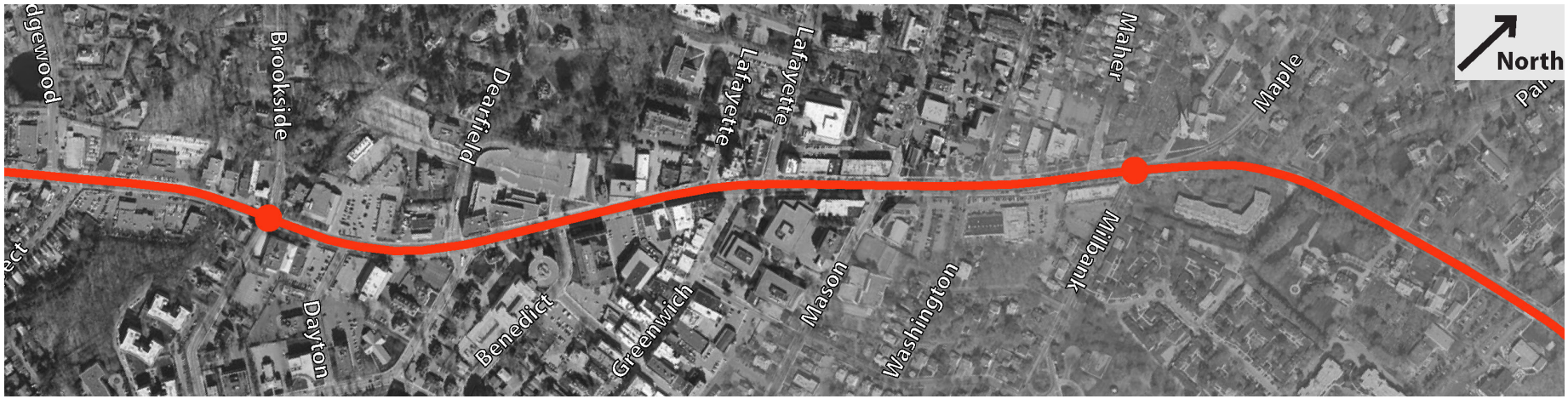
Downtown Greenwich

Dearfield Road and the Greenwich Library mark the beginning of Downtown Greenwich. This section of the corridor has dense commercial development, noticeably higher traffic volumes, and significant pedestrian activity. Metered on street parallel parking is located on both sides of the street, and signals are closely spaced.

The Greenwich Library at Dearfield Road

Looking south on Route 1 at Mason Street

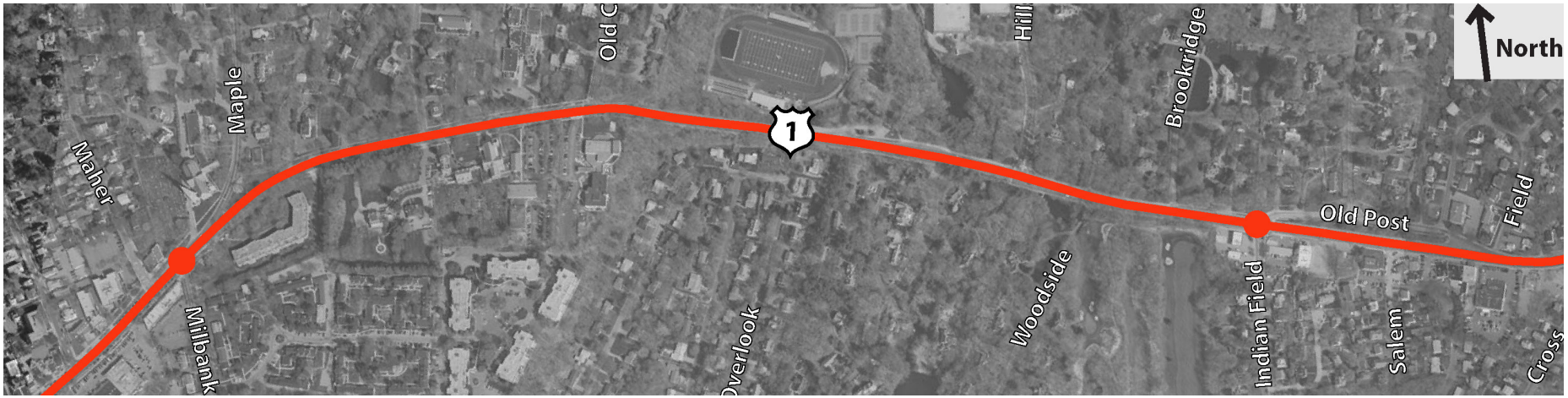
Greenwich Avenue, the primary commercial street in the downtown area, intersects Route 1 at a signalized T-intersection. Sidewalks are located on both sides of the street, and pedestrian activity throughout this section is the highest along the corridor.



Greenwich High School

As one travels north from the Greenwich Downtown area in the vicinity of Maple Avenue, the character changes again to low density residential for a distance of approximately 1 mile. Greenwich High school is located in this section, and is accessed by vehicles via Hillside Road. Additional pedestrian access points are provided for students entering and leaving the high school. The roadway widens to five lanes between West Brother Drive and Hillside Drive, allowing for a separate northbound left turn lane onto Hillside Drive.

Northbound Left Turn Lane at Hillside Drive



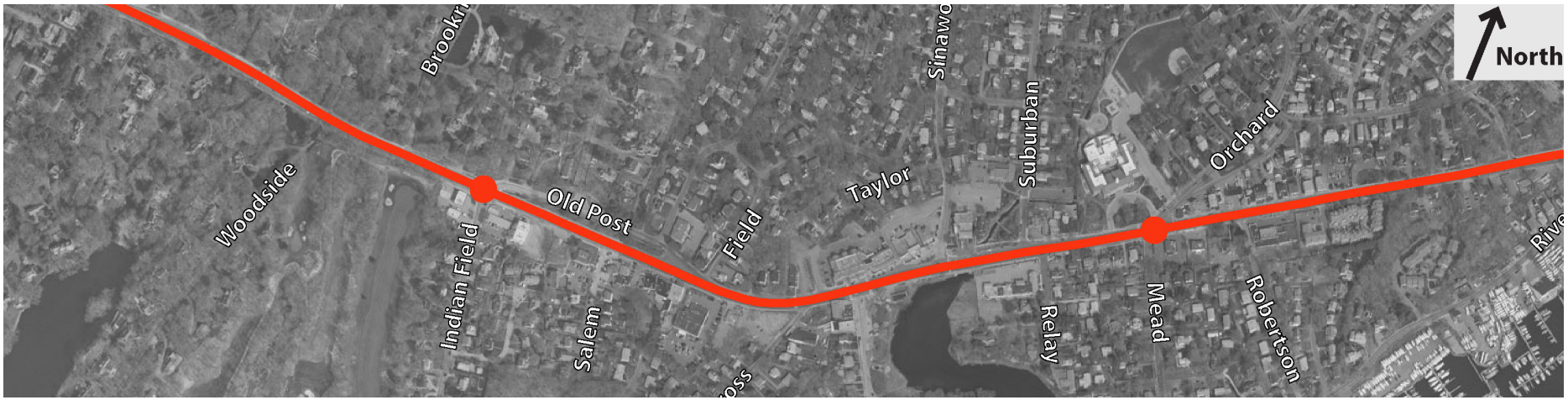
Cos Cob – *"The Hub"*

Just north of Indian Field Road, the character of the roadway becomes more commercial, with small businesses on each side of the road as you approach "the Hub" area. Sidewalks exist through the Hub, which has a busy village feel, with pedestrian activity and a high turn over of parking vehicles accessing the strip of stores on the southbound side of the roadway.

"The Hub" area in the Cos Cob Neighborhood

Cos Cob Elementary School on Route 1 at Orchard Street

In addition to the commercial activity, there are various other land uses in this section including the Greenwich Fire House, and Cos Cob elementary School.

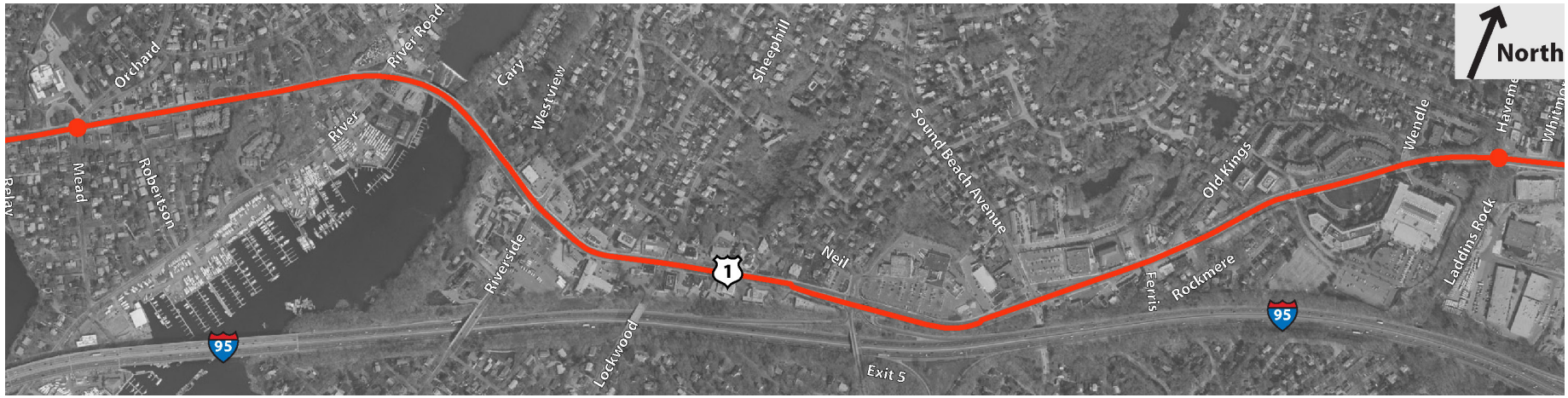


Riverside

North of Cos Cob, the roadway crosses the Mianus River in an area known as Riverside. This section of roadway is primarily commercial, with small strips of commercial stores and gas stations. The roadway widens to five lanes in much of the section allowing for left turn lanes at many of the signalized intersections. Sidewalks are located on both sides of the roadway throughout this section.

Bicyclist and Pedestrian Crossing Route 1 at Riverside Lane

Looking South on Route 1 at the Intersection with Havemeyer Lane



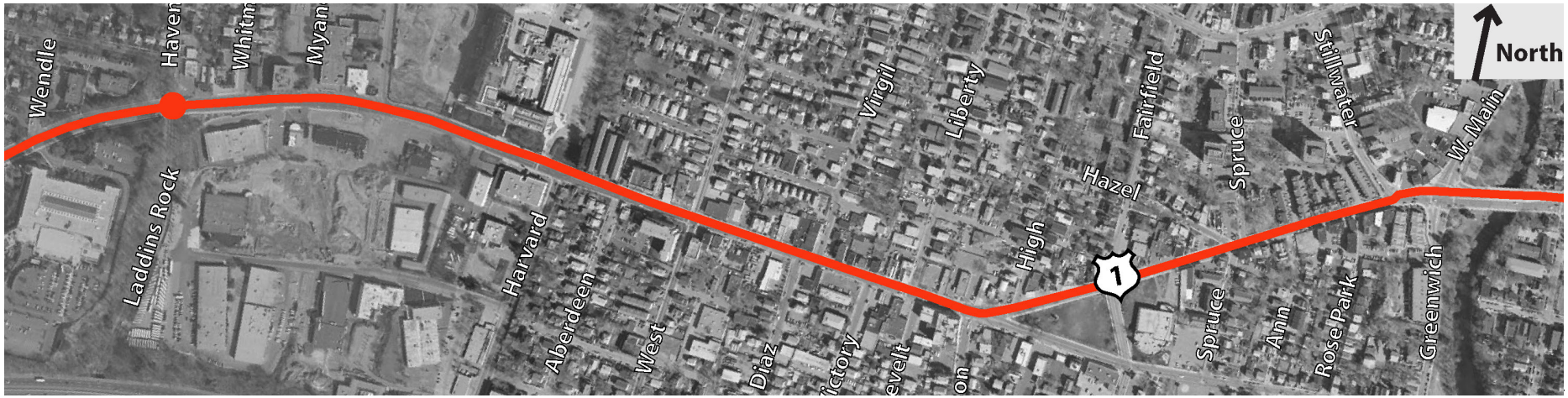
Stamford

As the roadway enters the City of Stamford, in an area known as West Side, the character changes to high density commercial. Parallel parking is located on both sides of the roadway, and travel lanes are reduced to one per direction with turn lanes at some signalized intersections. Sidewalks are provided on both sides, and pedestrian activity is noticeably high.

Looking South on Route 1 near Stillwater Avenue

The roadway transitions to downtown Stamford, as it widens again to a five lane cross section, with a noticeable downtown feel.

Looking North towards Downtown Stamford



Data Collection

4.1 Review of Previous and Ongoing Studies

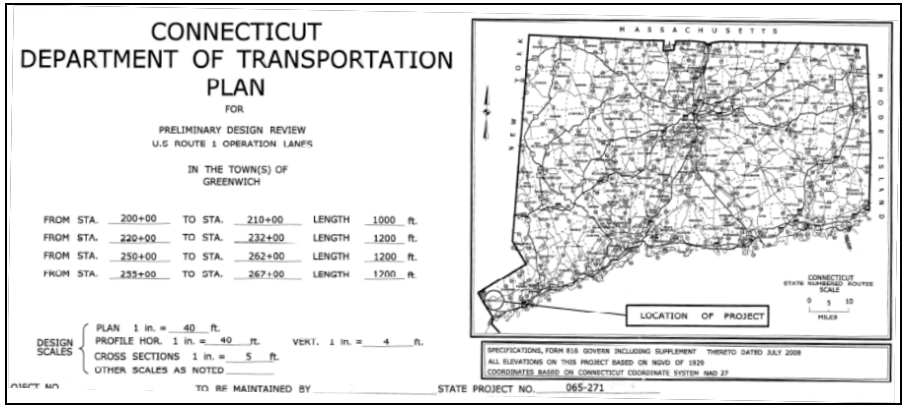
A review of data, plans and reports for the study area including transportation, traffic, transit services, environmental, economic, land use and development provided by SWRPA, CTDOT, the Town of Greenwich, and the City of Stamford was conducted. The purpose of this effort was to identify available information to be used in this study, information that needed to be updated, and identify any missing pieces of data. The following review summarizes each available document based on municipality.

TOWN OF GREENWICH

State Project No. 56-271 – US Route 1 Intersection Improvements

This CTDOT project began in early 2008 and has been dormant since December 2008. The project investigated possible intersection improvements at four locations along US Route 1 in Greenwich including: Valley Drive, Maple Avenue/Millbank Avenue/Maher Aveune, Orchard Street/Mead Avenue, and Indian Field Road. Documentation provided included preliminary plans, Synchro analysis reports, accident data from 2004 to 2008, record of two meetings, and a State Historic Preservation Office (SHPO) review of the project intersections. The files for project 56-271 did not include existing turning movement counts.

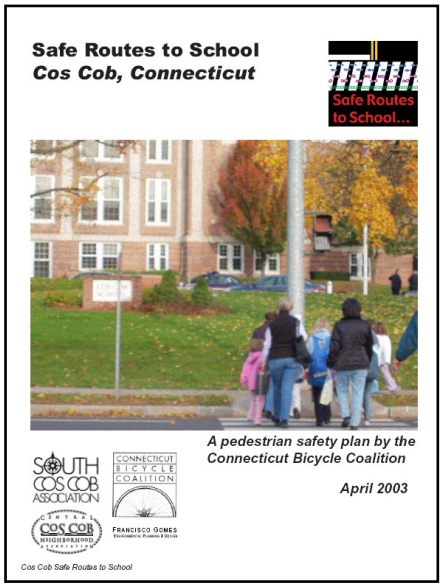
The first meeting was held on October 6, 2008 to discuss initial concepts due to geometric and operational constraints at the study intersections. Northbound and eastbound left turn pockets were proposed at the intersection with *Valley Drive*. *Maple Avenue/Millbank Avenue/Maher Avenue* proposed improvements included a southbound left turn lane onto Millbank Avenue from US Route 1. Due to a church, park, and significant grades on the north side of US Route 1 it was proposed the existing curb line would be maintained on the north side and widening to accommodate the left turn lane would be on the south side of US Route 1. Traffic analysis indicated that this left turn lane would provide a marginal improvement in Level of Service (LOS) at this intersection. The realignment of Millbank Avenue with Maple Avenue was discussed, but was noted that significant property acquisitions would be required. *Orchard Street/Mead Avenue* proposed improvements included a double left turn lane northbound onto Orchard Street and a left turn lane westbound from Mead Avenue to US Route 1 southbound. The CTDOT noted its concern with this design and stated a left turn lane southbound onto Mead Avenue should also be investigated. *Indian Field Road* discussion centered around US Route 1 southbound left turns onto Indian Field Road utilizing the existing Old Post Road #6 jughandle for this move and whether or not a left turn lane should be provided on US Route 1.



The second meeting was held on November 20, 2008 to solicit input from the Town of Greenwich on the conceptual plans for intersection improvements prior to developing preliminary designs. *Valley Drive* proposed improvements cost combined with the existing movements operating at an acceptable LOS allowed all parties to concur that this intersection not be developed beyond the conceptual phase. *Maple Avenue/Millbank Avenue/Maher Avenue* proposed improvements would require widening on the south side of US Route 1 and removal of eight trees. The Town did not believe that this tree removal would be acceptable to the public and noted that any proposed improvements would be subjected to significant scrutiny. The Town also commented on the realignment of Millbank Avenue and Maple Avenue not being feasible due to the significant property impacts on the south side of US Route 1, and this historic nature of this area. The Town also noted that making Maple Avenue one-way is probably not feasible, as it is a key access route to and from North Street and Merritt Parkway. *Orchard Street/Mead Avenue* proposed improvements from the first meeting included

a double left turn lane northbound onto Orchard Street, but the Division of Traffic Engineering and the Town expressed concern for the double left turn lane and both suggested revising the plans for opposing northbound and southbound single left turn lanes. It appears this was never done. *Indian Field Road* proposed improvements included northbound and southbound left turn lanes with the CTDOT identifying possible grade issues and maneuverability issues. The Division of Traffic Engineering recommended that no further action be taken at this intersection, but the Town did not concur and the CTDOT agreed to reevaluate this intersection with the Division of Traffic Engineering.

The SHPO letter recommended the following: Valley Drive has no cultural heritage in need of preservation, Maple Avenue/Millbank Avenue/Maher Avenue has several historic archeological resources and all plans must be submitted to SHPO for review, and Orchard Street/Mead Avenue is moderate to high sensitivity and a professional reconnaissance survey be performed. Accident history is provided from 2004 to 2008 for all four intersections with the exception of Indian Field Road which only has data from 2004 to 2006. The Synchro LOS analysis shows that all intersections with the exception of Valley Drive operate at LOS F during the 2033 PM peak hour under the existing intersection configuration. All preliminary design plans included with this project are discussed under the section discussing the second meeting held on November 20, 2008.



Safe Routes to School, Cos Cob, Connecticut

This pedestrian safety plan was created by the Connecticut Bicycle Coalition in April 2003 for the Cos Cob Elementary School located at the intersection of US Route 1 and Orchard Street/Mead Avenue. The US Route 1 focus area extended from Indian Field Road to River Road and typical recommendations included new crosswalk markings, pedestrian refuge islands, completion of gaps in sidewalks and intersection modifications. The report gives detailed recommendations for the focus area with estimated costs for each individual improvement.

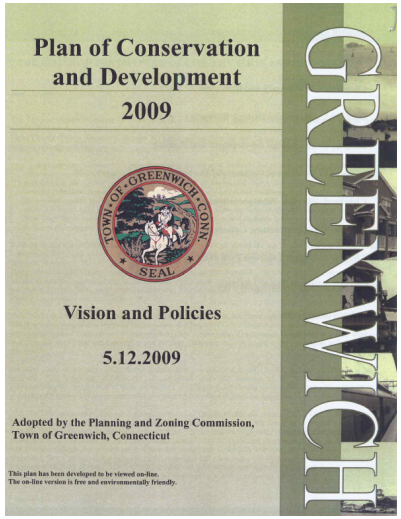
Town of Greenwich Traffic Signal Timing Implementation & Benefits Report, February 2008, DKS Associates

The report summarizes the results of the traffic signal coordination by the Town of Greenwich in 2007 at 49 signals. The signals were divided into eight coordination zones with the first four zones on US Route 1. Timing improvements were based on a cost/benefit ratio utilizing total delay, number of stops and fuel consumed as the measure of effectiveness. Turning movement counts were conducted in 2007 during the AM, MIDDAY and PM peak periods. The raw count data was not included in the report, but the electronic Synchro files contain all turning movement counts for the three analyzed peak periods. The conclusion of the report was to determine AM, MIDDAY and PM signal timing plans based on the coordinated zones in the Synchro network, implement these signal timings in the field, and fine tune the timings in the field based on observed traffic flows. Another conclusion was suggesting to evaluate the removal of the dedicated pedestrian phase and to have pedestrians proceed with the parallel through vehicle phase.

Greenwich 2009 Plan of Conservation and Development (POCD)

This plan includes the following:

- Water and land resources;
- Scenic and historic resources;
- Residential neighborhoods and housing;
- Downtown, commercial development and villages;
- Traffic, transportation and parking;
- Infrastructure, community facilities and services;
- Future land-use plan and plan consistency, and
- Implementing the plan.



The key items from the traffic and transportation section include addressing the parking needs, promoting transit, additional bicycle facilities, enhance sidewalk and pedestrian safety, and monitor airport expansion and flight paths. The POCD also details documents that should be updated with development build-out including the following:

- Greenwich Central Business District Traffic Management Plan (2002),
- Inventory of Pedestrian Safety Needs (2006),
- Bicycle Master Plan (2001),
- Management and Operations Parking Study (2002), and
- Supply/Demand Parking Study (2002).

The POCD also states that the transportation engineering firm Fuss and O'Neill was hired to evaluate transportation planning issues and made some specific recommendations for particular intersections that may help improve traffic flow. From a transit perspective the plan suggests working with current transit providers to develop a pilot project to extend hours of operation and shuttle services within Downtown and to businesses in Town as well as considering creating additional incentives to use transit.

Operational Analysis Report – Optimized Traffic Signal Timings for the Surface Street Network, January 6, 2006, DKS Associates

The project area for this study included 52 signalized intersections in Greenwich. The report includes only existing conditions with no turning movement count data or peak hour definitions for AM, MIDDAY or PM peaks. The report summarizes that the existing timing plan is one plan for the entire day and that AM, PM and OFF peak timing plans need to be developed and implemented.

CITY OF STAMFORD

Transportation Review, West Side – West Main Street

This May 2007 report looked at West Main Street (US Route 1) as it runs through the West Side of Stamford, and more specifically the intersections of Alvord Lane, Harvard Avenue and West Avenue. September 2006 counts showed a total of 950 vehicles and 1065 vehicles traveling eastbound and westbound, respectively, on US Route 1 in the project area during the afternoon peak hour. The report also stated LOS results for the above intersection which are as follows:

- Alvord Lane LOS E
- Harvard Avenue LOS C
- West Avenue LOS F

It was also noted that US Route 1 provides a critical bypass route during incidents on I-95, so that its traffic volumes increases substantially to failing conditions whenever a major incident occurs. The report also focuses on the

connection from I-95 to US Route 1 via West Avenue and Harvard Avenue stating each street carries approximately 8,000 vehicles daily. West Avenue is of particular concern with heavy turning volumes, increased truck traffic, and no turn pocket storage areas.

The report concluded with the following potential transportation improvements for this section of US Route 1 in Stamford:

1) *Extension and re-striping of left turn lanes at the eastbound and westbound approaches for US Route 1 at West Avenue. This improvement was included with the original Home Depot application as a traffic mitigation measure, but it does not produce an acceptable LOS at this intersection.*

2) *Construction of exclusive left turn lanes at both the northbound and southbound approached for West Avenue at West Main Street. This requires additional land acquisition and substantial re-grading on the southwest corner of the intersection.*

3) *Realignment of Alvord Lane with the Shoprite driveway. This was to be included with the Stop & Shop mitigation effort, but has not been completed.*

4) *Traffic calming on Alvord Lane and West Avenue. particularly to the north of the West Main Street intersection where it is largely residential in nature.*

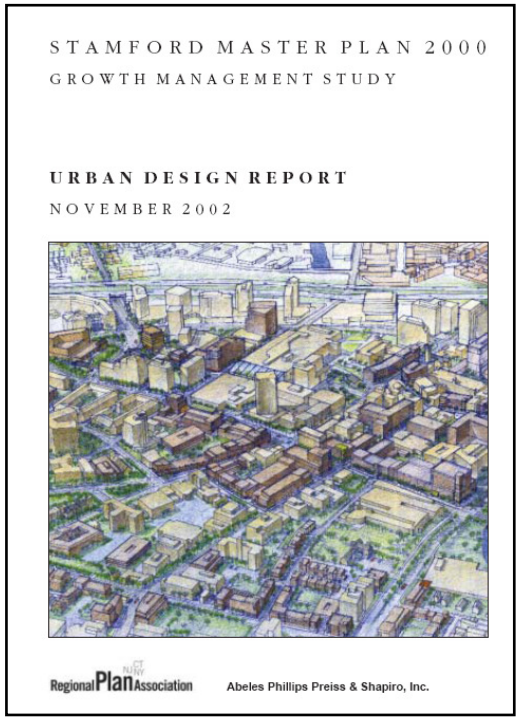
Stamford Master Plan 2002

The Master Plan includes a Citywide Policies Report, Neighborhood Plans and Master Plan Map. The Citywide Policies Report includes the following topics: diversity, city beautiful, neighborhood quality of life, and downtown. Backup studies to the Master Plan include Community Input; Economic Development; Traffic, Transit & Growth Management; Urban Design; and Affordable Housing Strategy.

The Traffic, Transit & Growth Management (TTGM) study is a planning level study looking at various growth scenarios (slow, trend and high) and cost to mitigate key intersections in Stamford to acceptable LOS results. The only intersection from the TTGM study matching this study is the US Route 1 and West Avenue intersection.

The four key findings of the TTGM study are as follows:

- *Future housing must be predominantly in the downtown, proximate to transit and to employment centers, to ameliorate traffic problems related to future growth;*
- *Traffic problems in Stamford will get worse and will need to be addressed even if Stamford grows slowly over the next 20 years;*
- *It is possible to mitigate traffic impacts of even the most ambitious growth scenarios, and*
- *There is no magic bullet, and the only way to make significant inroads into Stamford's traffic challenges is by combining various measures such as transportation demand management, transit improvements, and more housing for workers in Stamford.*


STAMFORD MASTER PLAN 2000
GROWTH MANAGEMENT STUDY

URBAN DESIGN REPORT
NOVEMBER 2002

Regional Plan Association Abeles Phillips Preiss & Shapiro, Inc.

Super Stop & Shop Traffic Impact Study

This April 2001 traffic impact study (TIS) analyzed the impacts a proposed supermarket on the northwest corner of the US Route 1 and Alvord Lane intersection would have on the surrounding network. Turning movement counts were conducted in November of 2000 during the Friday PM and Saturday MIDDAY peak hours at the following intersections along US Route 1: Havemeyer Road/Laddins Rock Road, Alvord Lane, Harvard Avenue, West Avenue, Roosevelt Avenue/Liberty Street, and Wilson Street/Richmond Avenue. Counts were also conducted at the I-95 Exit 6 northbound/southbound and Harvard Avenue intersections.

The Home Depot Traffic Study

This 2006 traffic impact study (TIS) analyzed the impacts a proposed home improvement store on the north side of the US Route 1 and Harvard Lane intersection would have on the surrounding network. Turning movement counts were conducted in April of 2005 during the Friday PM and Saturday MIDDAY peak hours at the following intersections along US Route 1: Havemeyer Road/Laddins Rock Road, Alvord Lane, Harvard Avenue, and West Avenue. Counts were also conducted at the I-95 Exit 6 northbound/southbound and Harvard Avenue intersections. Accident data is available from July 2001 to June 2004 on US Route 1 between Alvord Land and Harvard Lane, and also on Harvard Avenue between US Route 1 and Commerce Drive.

The West Side Neighborhood Study

This ongoing study is being led by the City's Land Use Bureau. It will review land use, housing, infrastructure and open space and investigate options for new zoning to support a strong neighborhood and to encourage revitalization through private investment.

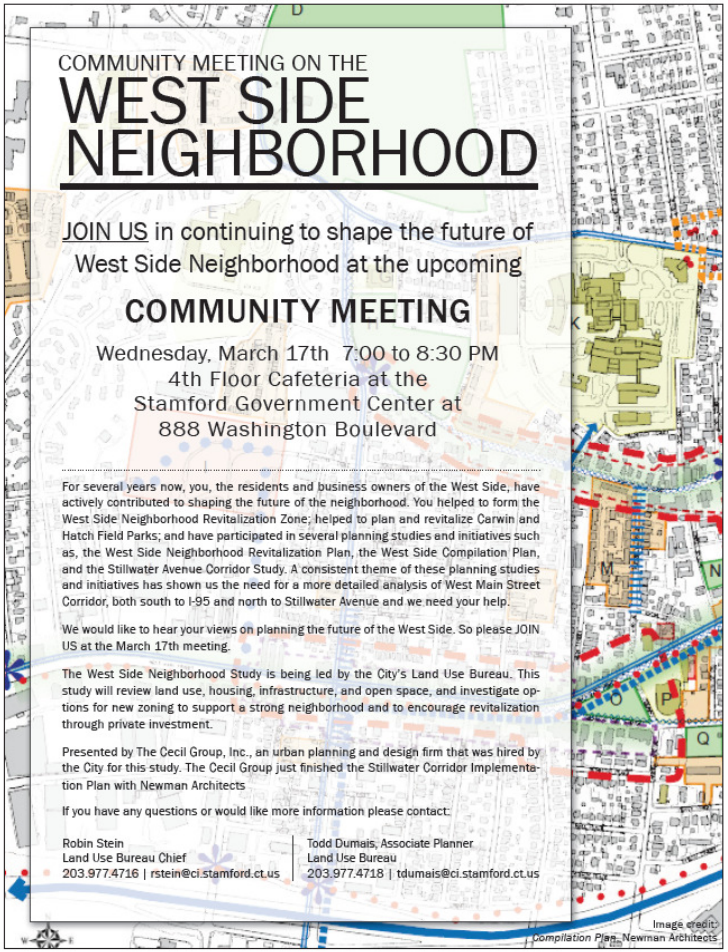


Table 4.1: Greenwich Intersection Turning Movement Counts

Mile Point	Signal	Location	2007 DKS Count	2010 Urban Count
0.25	Yes	Western Junior Highway	X	
0.46	Yes	Holly Hill Lane / East Weaver Street	X	
0.66	Yes	Valley Drive	X	
0.72	No	Old Post Road (No. 2 & 3)		X
0.90	Yes	Harold Avenue	X	
1.06	No	Oak St / Josephine Evaristo Ave		X
1.42	Yes	Prospect Street / Edgewood Drive	X	X
1.59	Yes	Brookside Drive	X	X
1.74	Yes	Dearfield Drive / Field Point Drive	X	
1.83	Yes	Benedict Place	X	
1.96	Yes	Greenwich Ave / Lafayette Court	X	X
2.00	Yes	Lafayette Place	X	
2.10	Yes	Church Street / Mason Street	X	X
2.30	Yes	Millbank Ave./Maple Ave./Maher	X	
2.66	Yes	Old Church Road	X	
2.83	Yes	Overlook Drive	X	
3.01	Yes	Hillside Road / High School	X	X
3.21	Yes	Indian Field Rd / Old Post Rd No. 6	X	
3.50	Yes	Strickland Rd / Cross Ln. / Taylor Dr.	X	X
3.60	Yes	Sinawoy Road	X	
3.78	Yes	Orchard Street / Mead Avenue	X	
4.03	Yes	Diamond Hill	X	
4.16	Yes	River Road	X	X
4.41	Yes	Riverside Lane	X	X
4.58	Yes	Lockwood Lane / Sheep Hill Road	X	
4.82	Yes	I-95 exit 5		X
5.05	Yes	Sound Beach Avenue	X	X
5.39	Yes	Rockmere Avenue	X	
5.53	Yes	Wendle Place	X	
5.64	Yes	Havemeyer Lane / Laddins Rock Rd	X	X

Table 4.2: Stamford Intersection Turning Movement Counts

Mile Point	Signal	Location	2007 DKS Count	2010 Urban Count
5.81	Yes	Alvord Lane / Shopping Center		X
5.97	Yes	Harvard Lane (T-intersection)		X
6.08	Yes	West Avenue		X
6.18	No	Virgil Street / Diaz Street		X
6.27	Yes	Roosevelt Avenue / Liberty Street		
6.32	Yes	Wilson St/Richmond Hill Ave/High St		X
6.43	Yes	Fairfield Avenue		
6.54	Yes	Spruce Street / Hazel Street		
6.67	Yes	Stillwater Avenue		X
6.71	Yes	Greenwich Ave / West Main Street		X
6.81	Yes	Clinton Avenue		
6.95	Yes	Washington Boulevard		

4.2 Intersection Turning Movement Counts

Manual intersection turning movement counts were conducted at 13 locations in Greenwich and seven locations in Stamford for the AM, Midday and PM peak periods during the month of April. There were a total of 28 intersections counted during the data collection efforts. This initial set of locations counted was identified based on available count information from previous studies, as well as input from TAG members from each City. Additional intersections were counted during model calibration to validate the available count information. Peak hour count information is provided in ***Appendix C*** of this report.

4.3 Travel Time Information

Travel time information was collected using GPS by SWRPA in coordination with the manual turning movement counts. Data was collected for both the northbound and southbound directions for each peak period, on multiple occasions. Data collected included travel time, delay, average speeds and causes of delays along the corridor. A summary of the travel time information is provided below in Table 4.3. More detailed information in provided in ***Appendix D*** of this report.

Table 4.3: Travel Time Summary

		Section	MP	Distance (miles)	Travel Time (sec)		
					AM	Mid	PM
Northbound	1	NY Line to Brookside	0.00 – 1.59	1.34	202	180	175
	2	Brookside to Old Church	1.59 – 2.67	1.08	214	269	318
	3	Old Church to River	2.67 – 4.16	1.49	271	286	335
	4	River to Havemeyer	4.16 – 5.64	1.49	321	291	337
	5	Havemyer to West Main	5.64 – 6.95	1.07	255	275	423
Southbound	1	NY Line to Brookside	0.00 – 1.59	1.34	229	170	164
	2	Brookside to Old Church	1.59 – 2.67	1.08	206	277	245
	3	Old Church to River	2.67 – 4.16	1.49	315	299	343
	4	River to Havemeyer	4.16 – 5.64	1.49	275	280	300
	5	Havemeyer to West Main	5.64 – 6.95	1.17	270	258	268

4.4 Field Observations

For traffic data collection and analysis purposes, the corridor was divided up into five sections by similar roadway cross section and traffic operations. Four sections are in Greenwich and the fifth section incorporates all of the Stamford section of the project (***See Figure 4.1***).

Intersection of Route 1 with Maple/Millbank

West Greenwich

The suburban Greenwich section begins at the New York State line with the Byram Road/Traffic Circle intersection (MP 0.00) and ends at Brookside Drive (MP 1.59). This section of the project area varies between residential and commercial (car dealership) development. Traffic volumes are generally light from the Traffic Circle through Harold Avenue (MP 0.90), and begins to increase through the Greenwich car dealership area towards the downtown.

There are no left turn lanes on Route 1 throughout this section, although left turning vehicles were not observed to be adversely impacting traffic.

Key Intersection: Prospect Street/Edgewood Drive is a four leg offset intersection with car dealerships on each corner. The southbound Route 1 traffic has a lead left phase for left turns onto southbound Prospect Street. The side street phases require split operations (operate separately) due to the physical offset between them. Vehicles traveling north have to noticeably slow down to facilitate making the tight right turn onto Prospect Street. The intersection appeared to operate well during most peaks with average queuing of 13 vehicles, or approximately 325 feet, on US Route 1 during the morning and evening rush hours.

Downtown Greenwich

The downtown Greenwich section extends from Brookside Drive to Old Church Road (MP 2.67). Queuing and delay on US Route 1 due to left turning vehicles occurs throughout this section particularly between the Greenwich Avenue/Lafayette Place intersection (MP 2.00) and the Maher Avenue/Millbank Avenue/Maple Avenue intersection (MP 2.30).

Key Intersection: Maher Avenue/Millbank Avenue/Maple Avenue consists of three offset 'T' intersections operating on one controller with multiple lead/lag phases between Maher Avenue and Maple Avenue to allow left turning vehicles to clear the intersection. Steep grades along Maple Avenue and US Route 1 north of the intersection affect sight distances. The over-utilization of the rightmost lane (e.g., northbound AM peak: 20 vehicles in right lane and 3 in left lane) was observed occurring throughout the day on each Route 1 approach to the intersection, and can likely be attributed to drivers avoiding the likelihood of queues and delay resulting from left turning vehicles. Maple Avenue maximum queuing reached 13 cars, and the Millbank Avenue offset approach stores approximately 6 vehicles with both approaches generally clearing every cycle.

East Greenwich and Cos Cob

The next section of roadway begins just south of Greenwich High School and extends through the Cos Cob neighborhood to the intersection with River Road. In the vicinity of Greenwich High School, significant queuing and delay was observed during the AM peak hour at approximately 7:30AM. This queuing and delay can be attributed to the arrivals at the High School on Hillside Road. The High School traffic impact was observed extending from Old Church Road (MP 2.66) through Indian Field Road (MP 3.21).

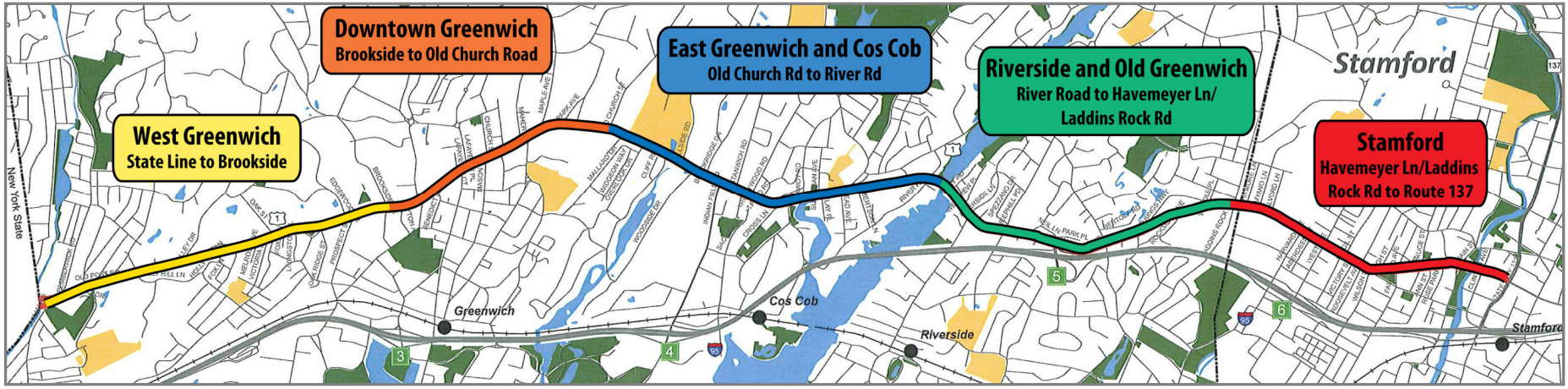


Figure 4.1: Field Observations Section Breakdown

Traffic volumes are noticeably high for all moves at the intersection with Indian Field Road (MP 3.21) with queuing observed throughout the day on the Indian Field Road approach. This is likely as a result of the Indian Field Road direct access to EXIT 4 of I-95. Just east is "*The Hub*" area of Cos Cob which consists of small commercial development. Significant peak hour queuing and delay was observed to extend from Strickland Road (MP 3.50) through the Orchard Street/Mead Avenue intersection (MP 3.78) where the Cos Cob Elementary School is located. On street parking with a high turnover rate was observed to contribute to the congestion in the area. The last intersection in this section of Route 1 is with River Road (MP 4.16) which was observed to operate well during all peaks.

Intersection with Strickland Road in "The Hub"

Key Intersection: Cross Lane/Taylor Drive/Strickland Road consists of three offset 'T' intersections operating on one controller. This area known as "*The Hub*" experiences significant queuing and congestion particularly during peak hours. Queuing on southbound US Route 1 was observed extending more than 1000 feet from Strickland Road to the Orchard Street/Mead Avenue intersection. Northbound queues of approximately 16 vehicles, or 400 feet, were recorded during peak periods. The signal phasing was observed to be creating a "*left turn trap*" for the southbound vehicles turning left onto Strickland Road. The "*left turn trap*" occurs when the traffic light changes to red for a southbound vehicle, which was permitted to make a left turn onto Strickland Road following the protected left turn lead phase, while the opposing northbound Route 1 traffic continues to have a green light. The southbound left turning vehicle is "trapped" in the middle of the intersection, with a red light and no opportunity to complete the turn. The purpose of the lag phase is to allow the northbound traffic turning left onto Taylor Drive to make the turn while the opposing traffic has the red light.

Riverside and Old Greenwich

The final section in Greenwich extends from Riverside Lane (MP 4.41) through the intersection with I-95 Exit 5 intersection (MP 4.82) to Havemeyer Lane/Laddins Rock Road (MP 5.64) which approximately marks the Greenwich/Stamford municipal boundary. Traffic volumes throughout this section are noticeably high. Significant volume and queuing was observed on the northbound, southbound, and westbound approaches to the Riverside Lane intersection with the southbound left turning vehicle queue extending well beyond the 200 foot left turn pocket.

Key Intersection: Based on observations, the signal timings at the intersection with Riverside Lane appears to give excess green time to the northbound left and Riverside Lane phases, and not enough time for the southbound left and US Route 1 phases. During the AM peak hour the northbound US Route 1 queuing was observed to extend to approximately 20 vehicles. It should be noted there is a school with two marked pedestrian crosswalks on the south side of the intersection which was observed to causing queuing to extend towards the intersection. The westbound Riverside Lane approach has a lead phase and

significant queuing with approximately 8 to 10 left turning vehicles processed during the lead phase.

Key Intersection: The Neil Lane/I-95 Exit 5 intersection (MP 4.82) is a large five-leg intersection, processing significant traffic volumes on all approaches. During normal peak operations, the key movement at this intersection is the southbound left turn movement onto I-95 which has significant volume and sometimes queues beyond the turn pocket onto Route 1. Traffic volumes processed for this move during the protected left turn phase ranged between 18 and 22 vehicles each cycle in the peak hour. The eastbound approach also has significant volume and due to proximity to the shopping center and McDonald's has minimal storage capacity with queues, at times, extending into the parking lots. The traffic exiting I-95 was observed to operate well with 17 vehicles being processed during the green signal phase from the southbound I-95 exit ramp (5th leg), however it was reported that during incidents on I-95 traffic exiting at this location is significantly increased.

Traffic existing I-95 at Exit 5

The Old Greenwich section begins at Sound Beach Avenue (MP 5.05) and ends at the Havemeyer Lane/Laddins Rock intersection (MP 5.64). Traffic through this area generally operates well with minimal queuing during peak periods. The Havemeyer Lane/Laddins Rock intersection operates with a lead/lag phasing operation for the US Route 1 protected left turn phases. The phasing order at this location changes between peaks. During the AM peak hour, queues were observed on both side street approaches to the intersection.

Stamford District

The Stamford district begins at Alvord Lane (MP 5.81) in the West Side section of Stamford and extends to the Route 137 (Washington Blvd) intersection (MP 6.95) in downtown Stamford. The traffic generally flows well on the five lane section between Alvord Lane (MP 5.81) and Harvard Lane (MP 5.97). Congestion increases significantly at West Avenue (MP 6.08) where the cross section is reduced to one lane per direction with on-street parking. Harvard Lane and West Avenue provide connections to I-95 Exit 6. Some peak hour queuing was observed on Harvard Lane during peak hours; however, generally the intersection operates well with minimal vehicular actuation from the opposing Cytec driveway.

Key Intersection: West Avenue carries significant vehicular and truck traffic from the I-95 connection as well as traffic from Stamford with only one lane on each approach with the exception of northbound US Route 1. Although the northbound US Route 1 approach consists of two through lanes the left lane was often observed to operate as a defacto left turn lane. The two northbound lanes taper to one lane approximately 75 feet after the intersection where on-street parking begins. The sudden drop of the rightmost lane at times results in vehicles having to stop and wait for a gap in traffic to merge and continue north on Route 1. The narrow lanes, sight distance, on street parking and high number of left turning vehicles from a shared lane creates a shadowing effect for the southbound US Route 1 left turning vehicles that have difficulty in seeing northbound through vehicles approaching the intersection. Westbound West Avenue was observed to have queuing of over 300 feet which did not always clear during the green phase.

North of West Avenue, at the Diaz Street/Virgil Street offset unsignalized intersection (MP 6.18), significant traffic, including school buses, was noted turning right from Diaz Street onto Route 1, then making an immediate left onto Virgil Street westbound. North of Diaz Street/Virgil Street queuing from the Roosevelt Avenue/Liberty Street intersection (MP 6.27) was noted in the

northbound direction during each peak hour. The next intersection to the north is a five leg intersection operating on one controller and also includes one approach controlled by a Stop sign (MP 6.32).

Key Intersection: Wilson Street/Richmond Hill Avenue/High Street is an unconventional, skewed, five-legged intersection where High Street is stop controlled entering the intersection. US Route 1 takes a north-westerly turn towards High Street at the intersection where Richmond Hill Avenue continues northbound straight through the intersection. Northbound US Route 1 queuing extends past Diaz Street, approximately 600 feet, causing blocking issues at the Diaz Street/Virgil Street unsignalized intersection. US Route 1 southbound has stop bars located prior to High Street and Wilson Street, and is striped for two lanes without lane markings between the two side streets leading to some driver confusion. This southbound US Route 1 section between High Street and Wilson Street has a four-section signal head with a lead green phase and the left striped lane frequently acts as a defacto left turn lane due to southbound US Route 1 returning to one lane of travel just after Wilson Street.

Intersection of Route 1 and Wilson Street/Richmond Hill/High Street

US Route 1 continues on towards the West Main Street/Greenwich Avenue intersection (MP 6.71) with generally light traffic. It was noted at the Spruce Street/Hazel Street intersection (MP 6.54) that a recent signalization of this intersection has occurred. The West Main Street/Greenwich Avenue intersection signifies the transition from West Side Stamford to downtown Stamford where US Route 1 widens to a five lane cross section. The northerly project limit is the Route 137 (Washington Blvd) intersection (MP 6.95) where US Route 1 is a seven lane cross section and Route 137 is a six lane cross section.

Route 1 in Downtown Stamford

Corridor Pedestrian Observations

The corridor as a whole has significant pedestrian and bicycle activity beginning in suburban Greenwich near the New York State line through to the projects limits at Route 137 (Washington Blvd) in Stamford. The first concentrated area of pedestrians begins in downtown Greenwich near the library on Benedict Place and continues to the Millbank Avenue/Maple Avenue intersection.

Pedestrians Crossing Route 1 at Mason Street in Greenwich

The second concentrated pedestrian area is in the Cos Cob Hub area between the intersections of Cross Lane/Taylor Drive/Strickland Road and Orchard Street/Mead Avenue. Between these two heavy pedestrian areas is the Greenwich High School on Hillside Road which has peak pedestrian activity when the school day begins and ends. The third concentrated pedestrian area encompasses most of Stamford beginning at West Avenue and extending through the northern project limit of Route 137.

Corridor Bicyclist Observations

Bicyclists on Route 1 near Maple Avenue

The bicycle activity in the project area is significant with more activity in Greenwich as compared to Stamford. The East Coast Greenway is a long-distance urban shared-use trail project that intersects US Route 1 in the Dearfield Drive/Field Point Road area and also at River Road as shown on the Connecticut 2002 statewide bicycle map (***Appendix G***). This map also shows the Connecticut cross state bicycle route crosses US Route 1 at River Road. In the project area US Route 1 generally lacks usable shoulders; therefore, all bicycle activity must share the road with vehicles.

Planning, Historical Resources and Environmental Data

5.1 Land Use Overview

Generalized Land Use

The Route 1 Corridor in Greenwich and Stamford is a suburban and urban environment with an overall pattern of land use that is very mixed. There are areas which are predominantly single and two-family residential interspersed with areas of mixed-use including commercial, office, and multi-family residential activity. To characterize land use for this study, five categories of predominant land use types were applied which are reflective of the character of the area and its complex mix of uses in many locales. They include:

- Auto Sales Cluster – an area dominated by auto dealerships and repair service establishments - this occurs in a single location; between Livingston Place and about Brookside Drive on Route 1 in Greenwich.
- Mixed-Office – mostly office buildings with some retail and service establishments amongst them – this occurs in relatively small pockets throughout the corridor but most notably, at Valley Drive in the area surrounding the Greenwich Hospital, near downtown Greenwich in the vicinity of Lockwood Lane, at Harvard Drive in Stamford, and at the northern Stamford terminus of the study corridor.
- Mixed-Commercial – a collage of retail, services, restaurants, smaller office complexes or buildings, and also some apartments and multi-family residential buildings. These are also scattered throughout the corridor, but most notably at the southern terminus of the corridor in Greenwich, just south of the Greenwich downtown at Dayton Avenue, and through most of the corridor in Stamford along Route 1 south of Alvord Lane.
- Residential – a range of housing with mostly single family homes and some two-family residences and multi-family complexes. These areas surround and fill the neighborhoods in between the mixed-use clusters and community centers.
- Town/Neighborhood Center – the more pedestrian scale mixed-use community and/or neighborhood core areas in Greenwich. These locations include the neighborhoods of Cos Cob, Downtown Greenwich, and a portion of Downtown Stamford.

Figure 5.1 shows generalized land use patterns within the study corridor.

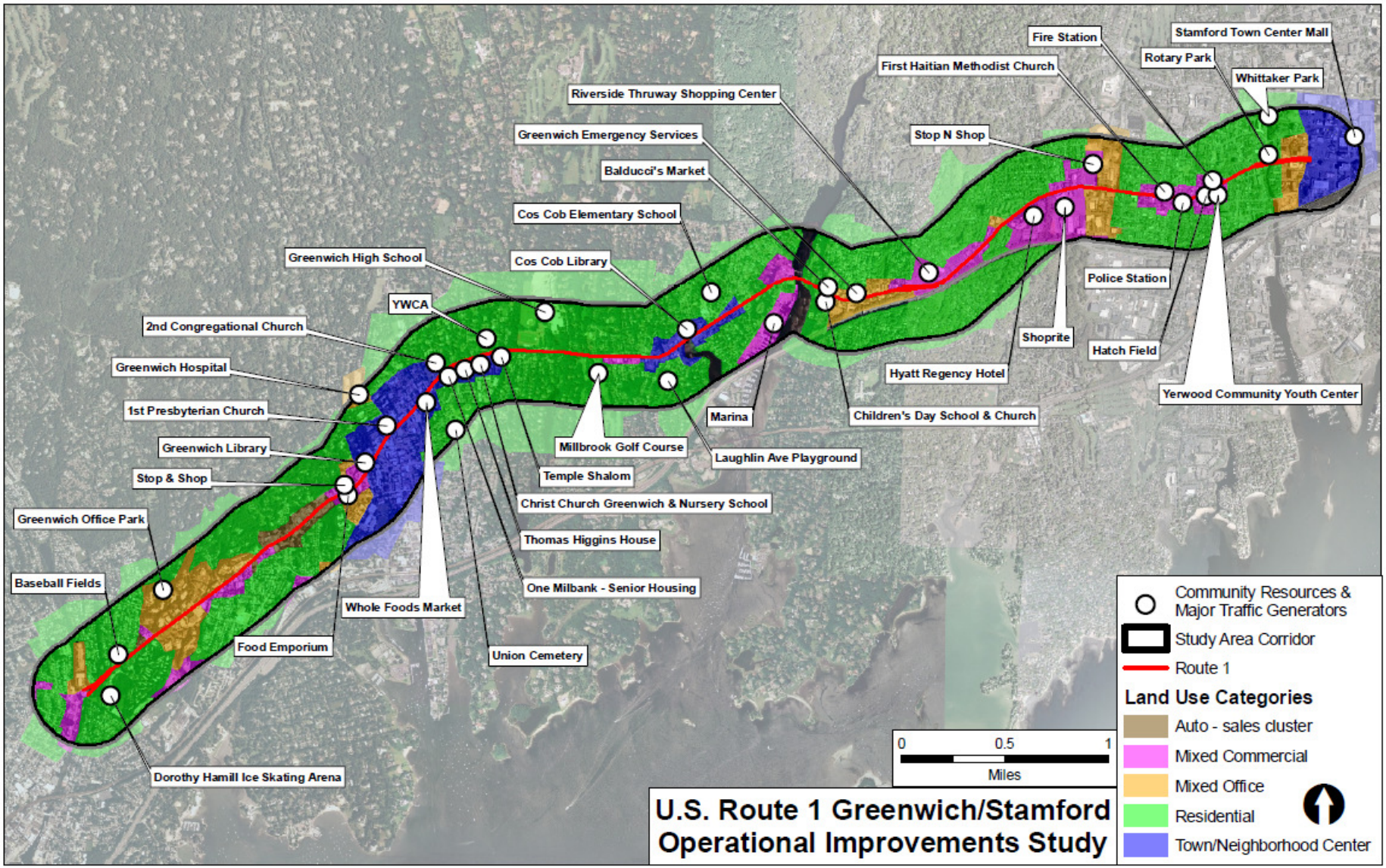


Figure 5.1: Generalized Lane Use Patterns on the Route 1 Corridor

Development Potential and Trends

Information on development trends and key locations where land use change is occurring or may occur was provided by the planning and zoning offices in Greenwich and Stamford. In general, the corridor is a densely developed urban/suburban environment. Most new development is expected to take the form of redevelopment of isolated underutilized sites and pockets of infill. Key potential development and/or redevelopment sites are shown as point locations on ***Figure 5.2***. The key development trends and sites within the study corridor for each community can be summarized as follows:

Greenwich: The pace of and interest in development in Greenwich has not slowed in recent years as evidenced by numerous zoning applications. Though the recent economic downturn has impacted Greenwich, development activity remains strong. A recent buildout analysis for Greenwich (Greenwich Planning and Zoning Office, April, 2008) concluded that within the commercially zoned areas of the town, there is the potential for approximately an additional 5.5 million square feet of commercial development. This would be about a 45 percent increase in commercial floor space over existing conditions. Five of the ten zoning district categories included in the analysis occur in portions of the study corridor. While the analysis did not break out potential square footage of commercial space by geographic subareas, it is reasonable to assume that there is some substantial development or redevelopment potential remaining in the study corridor.

In Greenwich, the primary development trend in the study corridor has been the redevelopment of scattered existing sites with a mix of uses, including some residential units on the upper floors of buildings with ground floor retail. All recent activity has been confined to redevelopment, with no extensive vacant undeveloped parcels available within the Route 1 corridor. Key sites where development is expected to occur in or adjacent to the study corridor in the future include:

- Vicinity of Greenwich Town Hall - large, non-conforming office buildings are expected to have some change in use. The UST Building and Benedict Place both used to hold one tenant and now are multi-tenant, which alters the trip generation from each site.
- West Putnam and Holly Hill lane – potential redevelopment site.
- Oak Street at Route 1- BMW has a current application for a dealership.
- Strickland Road and South Shore- considered potential TOD sites, near Cos Cob rail station. All TOD would be the redevelopment of existing sites.
- Edgewood Street at Route 1– the small vacant lot at Edgewood and Route 1 has a pending application for a parking lot intended as an overflow lot for a car dealership.
- Corner of Byram Terrace and Route 1 – this site has been explored in the past for use as a movie studio and remains a redevelopment opportunity site.
- Mead Street at Route 1– a Chase Bank has been proposed for this location.
- Corner of Sheep Hill Road and Apache Road - office/retail possibility.
- Lockwood at Sheep Hill Road – a major mixed-use development with 50 percent residential is planned on the corner lot.
- Greenwich High School – a Performing Arts Center has been proposed, but it is currently unknown whether it will serve just the school population or the community at large.
- Stanwich St – a new K-12 school is planned for a maximum of 700 students.
- Beacon Point at the marina – the marina and rowing club is located here. The owners would like to add a gym building; the site is within the coastal zone which limits potential redevelopment there

***Stamford*:** In Stamford, recent interest in development has been slow along the corridor as evidenced by the limited number of zoning applications. The planning office suggests this may be due to a combination of factors, including the mixed character of the area, the general slowing of the economy, and the limited availability of developable sites. The current West Side Study recommends overlay zoning for the corridor that will allow higher density and more mixed-use residential and commercial development, but with more green space (such as pocket parks and small plazas) than has been typically included in developments in the past. If implemented, this may stimulate infill and redevelopment in the neighborhood. Key sites where development is expected to occur in the study corridor in Stamford in the future include:

- Route 1 at Alvord Street, behind the relatively new Stop N Shop on Alvord/the Cytec site - this site is currently used by multiple building contractors. This area is expected to be redeveloped to some commercial use. A big-box development was proposed for the site. It has not been approved, however, and has been controversial. This form of development is not in keeping with the neighborhood priorities to minimize added traffic on Route1. With the recent opening of both Stop & Shop and Shop Rite, through traffic in the area has increased as has the volume of traffic on local streets. This is seen locally as negatively impacting neighborhood quality of life and access to West Main Street from the surrounding residential neighborhoods.
- Route 1 at Laddins Rock Road – potential for redevelopment in the vicinity of the underutilized ShopRite complex.
- New urban park along the Mill River- is being used more and has the potential for further enhancement. This could become a major asset, and draw more recreational users to the area.
- Harvard Street to Wilson Street area, and elsewhere throughout the corridor- infill development of tightly packed condominiums.
- Tresser Boulevard at Washington Boulevard – site of the Stamford Advocate has potential for redevelopment/infill

5.2 Zoning

Zoning designations reflect the intended activities and scale of development within specified geographic areas of a community. As such, it is intended to implement the local land use vision and policy. The zoning designations within the corridor are summarized below. ***Figure 5.2*** shows generalized zoning for the study area. More detailed zoning maps for Greenwich and Stamford are provided in ***Appendix G.***

Greenwich: Zoning in the corridor in Greenwich is a mix of residential and general business zones. The most common zoning is for GB-General Business and single-family residential at varying densities. The zones which occur within the study corridor include the following:

General Business

- CGBR - Central Greenwich Business- retail
- CGB - Central Greenwich Business- downtown commercial uses
- GB/GBO - General Business and General Business-Office uses
- LB/LBR-2 - Local Business (neighborhood scale commercial)
- WB - Waterfront Business- commercial activities falling within the coastal zone of Greenwich

Special –Use

- H-1/H-2 - Hospital zone
- P – Park

Single-Family Residential

- R-7 - Single family homes - 7,500 square foot minimum lot area
- R-12 - Single family homes - 12,000 square foot minimum lot area
- R-20 - Single family homes - 20,000 square foot minimum lot area
- R-C12/R-C20 - Residential conservation – single family
- RA-1/RA-2 - Single family homes - 1 acre minimum lot area

Single and Two-Family Residential

- R-6 - Single and two family homes – 7,500 square foot minimum lot area
- R-MF - Single and two-family residential

Planned Housing Developments

- R-PHD-E - Planned elderly housing with a minimum of 1,000 square feet per unit
- R-PHD-SU - Planned housing development – small units
- R-PR - Planned residential developments

Stamford: Zoning in the corridor in Stamford is a mix of residential and general business zones. The most common zoning is for commercial activity with the single largest zoning area designated CC-N for Central City North; a mixed-use commercial and residential activity zone. The zones which occur within the study corridor include the following;

General Business:

- C-I - Intermediate commercial (medium density)
- C-B - Community business (serves city-wide needs)
- C-G - General commercial
- C-L - Limited commercial
- C-N - Neighborhood business

Mixed-use

- CC-N - Central-City North mixed-use

Industrial

- M-G - General industrial
- M-L - Light industrial

Residential

- R-7 ½ - Single family homes - 7,500 square foot minimum lot area
- R-5 - Multi-family designed residential development – medium density
- R-6 - Single and two family homes
- R-MF - Multi-family designed residential development
- R-H - High density multi-family residences

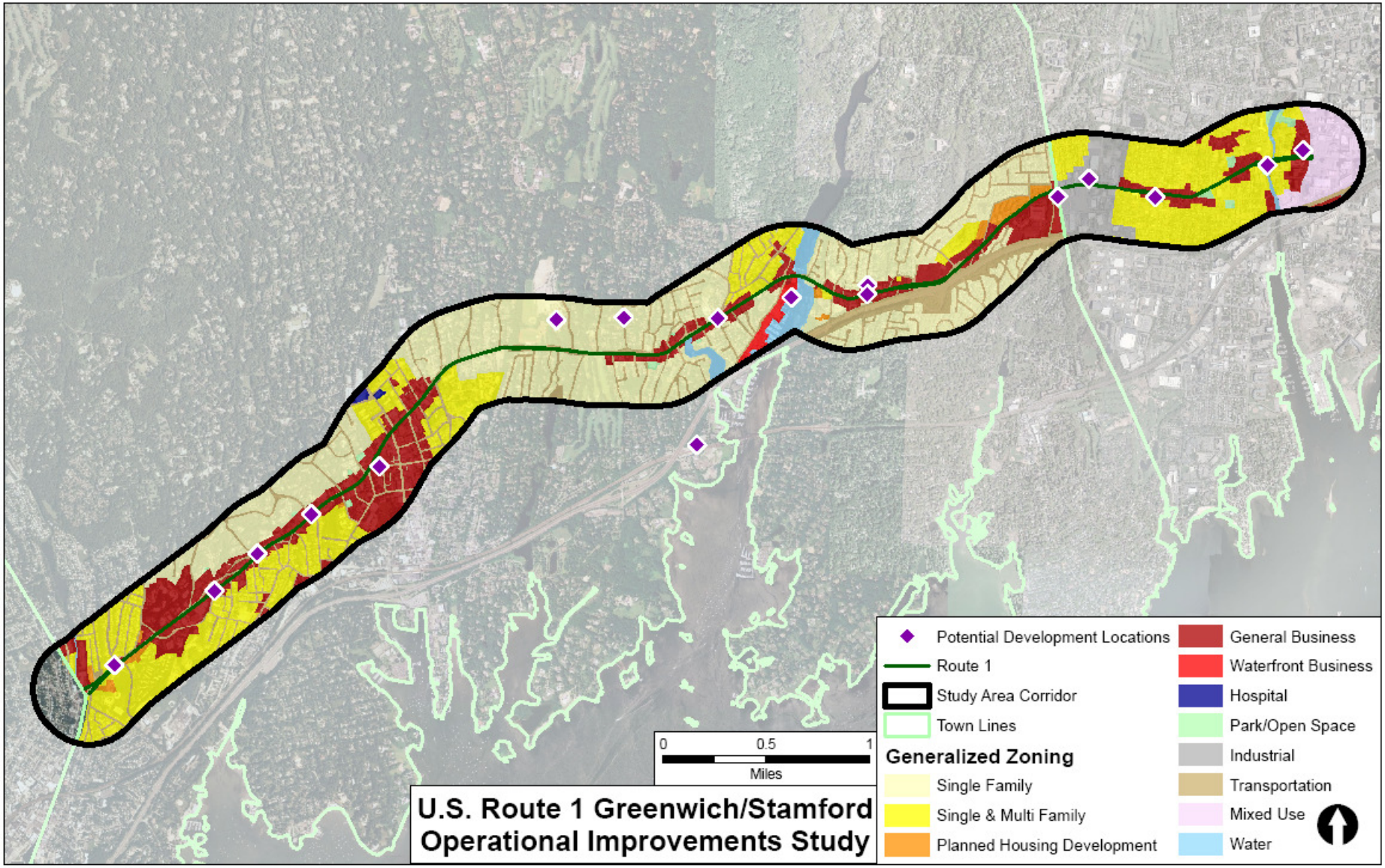


Figure 5.2: Generalized Zoning and Potential Development Sites on the Route 1 Corridor

Large Traffic Generators

Due to the urban and suburban nature of the Route 1 corridor, the cumulative effect of traffic generated by the dense development along the roadway makes it difficult to isolate particular high traffic generators of concern. Generally, high traffic generators in the study corridor include grocery stores, shopping plazas and retail centers, high-schools, and large office buildings. In addition, businesses with drive-through windows including banks, fast-food restaurants, and pharmacies encourage a high volume of traffic through the site. The planning office in each community has identified roadway segments with notable congestion. The locations where these likely relate, at least to some degree, to high traffic generators include:

Greenwich

- From the Library at Dearfield Drive to Maple Avenue – a confluence of commercial uses. A Whole Foods Market and multiple curb-cuts create a roadway bottleneck.
- Cos Cob Dunkin Donuts – traffic into this parking lot backs up into the road. Dunkin Donuts is located across the street from Cos Cob Elementary School.
- Greenwich High School (vicinity of Hillside Road) – traffic into and out of this area is heavy in the morning and afternoon when school is dismissed. Left turns and traffic are an issue there.
- Power plant / ballpark along Western Junior Highway – heavy traffic in this area influences traffic between Western Junior and Byram Streets on Route 1. This is also where the West Putnam Avenue Center retail complex is located.

Stamford

- Retail areas between Harvard and Laddins Rock Roads, including two supermarkets, are heavy traffic generators that occur in an area of roadway congestion.
- Downtown Stamford is situated just northeast of the study area and is a heavy traffic generator which adds a substantial number of vehicles including buses to Route 1. Traffic flowing from the Downtown contributes to congestion along Route 1 in the study area.

Land Use Policy

The local vision and policy for future land use can be expected to guide development decisions over time and in turn influence travel patterns and traffic on Route 1. The local vision and policy for Greenwich and Stamford as expressed in their plans of conservation and development are as follows:

Greenwich Plan of Conservation and Development 2009 (Greenwich Planning & Zoning Commission, 2009): The future land use policy map for Greenwich indicates a continuation of land use patterns along Route 1 with pockets of general commercial activity generally interspersed with multi-family and single family residential clusters.

Key goals that relate to land use and the transportation system in the Route 1 corridor in Greenwich are as follows:

1. Be and remain primarily a well-maintained residential community for all of our current and future residents.
2. Protect and enhance well-defined neighborhoods and village centers.
3. Protect and enhance overall community character and quality of life.
4. Encourage retail, residential, dining, cultural institutions, light business centers and other businesses that provide a variety and quality of goods and services for residents.
5. Continue, initiate and encourage renewed commitment for land-use regulation to underscore the importance of conservation and encourage development that preserves a sense of community around historic centers, schools and other institutions.
6. Development should be discouraged or prohibited when it is not compatible with and does not preserve existing land-use patterns. We need to provide alternate zoning opportunities to ensure that such development meets residents' needs.
7. Develop and implement a Town-wide traffic plan that emphasizes transport and access, rather than parking, to achieve a living and working environment that is controlled and focused on sustainability in terms of system design, environmental impact and energy-efficiency with the least amount of congestion.

Action steps as articulated in the plan which would have a bearing on the future of Route 1 in Greenwich are as follows:

Preserve and Enhance the Character of Cos-Cob

- Create a village plan based on future build-out analysis and explore using the Village District as a tool to manage land-use and building design.
- Review potential for additional mixed-use development (commercial and residential) along the Post Road.
- Evaluate existing traffic flows and road designs and explore re-designs for US Route 1 with the Connecticut Department of Transportation.
- Create a stronger pedestrian and bicycle link from the train station to the Hub and other activity centers, such as the Cos Cob Power Plant Park.

Enhance Putnam Avenue

- Encourage pedestrian-friendly mixed-use redevelopment, including mixed types of housing.
- Conduct a study of land-use and traffic issues to see where improvements can be made by reducing the number of curb cuts.

Traffic and Transportation Action Steps

- Implement traffic controls and pedestrian and bicyclist safety improvements on roads that meet the Town standards, especially near schools.
- Implement small adjustments to allow additional traffic capacity where appropriate, as recommended in the Fuss and O'Neil report.
- Study important intersections to determine if improvements can be made.
- Develop an access management strategy along main traffic routes and update the 2003 Traffic Management Study.
- Evaluate adequacy of parking at the rail stations, Town-owned lots and village areas.
- Update the Downtown Parking Study based on build-out projections.
- Evaluate, fund and implement the recommendations in the Bicycle Master Plan, where feasible.
- Work with current transit providers to develop a pilot project to extend hours of operation and shuttle services within Downtown and to businesses in Town.
- Consider ways to create additional incentives to use transit.
- Create Additional Bicycle Facilities; Greenwich has few dedicated bicycle facilities; Narrow, crowded roadways limit the ability to establish bicycle lanes and discourage use of bicycles. The Bicycle Master Plan identifies safe and convenient bicycle routes. Since that time, some bicycle facilities, including a bicycle route, have been designated in Old Greenwich.
- Bicycle usage should be anticipated when new road improvements are proposed.
- Greenwich already requires bicycle racks as part of site plans for commercial and large-scale residential projects. Greenwich should also take a leadership role in providing bicycle parking and installing racks at all municipal facilities.
- Provide bicycle racks at businesses, municipal facilities, train stations, schools and multi-family residences
- Maintain and enhance the sidewalk system in Greenwich, especially along busy roads, around schools and near the railroad stations.
- Consider adjusting sidewalk design standards to fit local neighborhoods.

*Stamford Master Plan 2002 (*Abeles Phillips Preiss & Shapiro, Inc., 2002): The Stamford Master Plan is comprised of a series of studies on different topics such as growth management in addition to a summary report which provides a comprehensive summary of all the individual study findings. Key relevant goals and action steps from the plan are noted below. The future land use map for the study corridor area in Stamford envisions it as predominantly residential from the border with Greenwich to the intersection with the Mill River Greenway. Then, traveling towards the city center, the corridor is envisioned as a mixed-use downtown environment.

Key goals that relate to land use and the transportation system in the Route 1 corridor in Stamford are as follows:

- Maintain and celebrate the diversity of Stamford's population and employment.
- Pursue a new "City Beautiful" movement, celebrating and enhancing the city's main corridors, greenways, waterfront, hills, historic buildings, gateways, and especially the unique qualities of Stamford's neighborhoods.
- Protect and enhance the quality of life of Stamford's neighborhoods, addressing land use transitions, community resources, traffic, and environmental conditions.
- Create a vibrant, seven-days-a-week, pedestrian-friendly Downtown focused both on the Transportation Center and the historic core area to its immediate north.

Relevant Strategies:

- Approximately 80 percent of new housing in Stamford should be directed to Downtown and the South End.
- Half of all businesses with 100 or more employees should institute "first level" Traffic Demand Management (TDM) measures such as telecommuting, guaranteed ride home or carpooling.
- All new office development in Downtown should institute "second level" TDM measures, such as lower parking ratios and higher densities near transit.
- There should be no more than a 20-minute gap in rush hour train service in either direction; and there should be no more than a 30-minute gap in evening train service.
- More than 75 percent of all bus to train connections should be coordinated to take place within a two- to nine-minute window.
- Parking along the New Haven line should, in aggregate, be increased by at least 20 percent.
- Approximately 70 percent of new office development should emphasize directing development to Downtown; mainly in the pedestrian-friendly "Core" area bounded by Grove Street, Hoyt Street and Washington Boulevard and along the Tresser Boulevard "Corridor" area.
- 10 percent of new office development should be directed as intermediate scale development to the surrounding "Collar" area—which includes portions of the South End immediately proximate to the train station.
- The design and identity of Downtown should be reinforced, recognizing the essential difference between the scale of the pedestrian-friendly Core and the Tresser Boulevard Corridor.
- Other initiatives should include managing transitions in scale between new and existing buildings; promoting attractive gateways; creating more and better open space and pedestrian amenities; and linking open and public spaces with an aggressive and comprehensive landscaping plan.
- The role that Long Ridge Road, High Ridge Road and the other major roadway corridors play in organizing the city should be highlighted—using streetscape, landscape, and building placement guidelines.
- Stamford will not be able to build its way out of its traffic problems—widening roads, reconfiguring intersections—without destroying the quality of life that is ultimately the foundation of Stamford's prosperity. Therefore, in order to stem the tide of commuters driving in from farther and farther away, Stamford must accommodate more housing for workers at all levels and make new housing and new employment centers accessible to transit.

5.3 Demographics

Beyond the issues for the roadway itself and travel experience of drivers, it is important to understand how improvements to US Route 1 may impact quality of life for nearby residents. Though US Route 1 is used by residents from throughout Greenwich, Stamford, and the South Western Region, conditions on the street have the greatest impact on neighborhoods in the immediate vicinity. Examining the demographic characteristics of residents in close proximity to the corridor helps to determine how improvements may benefit or negatively impact those neighborhoods. Consequently, the following summary overview of demographic trends in the Route 1 corridor considers population, income, housing, and environmental justice communities.

Though dated, 2000 Census data provides a reasonable baseline for understanding social conditions within the study corridor. It is also useful when considering a screening level assessment of impacts from proposed improvement projects upon communities in the corridor. This examination considers all Census Block Groups (CBG) for which some portion is within one-quarter mile of the US Route 1 corridor. All data was obtained from the 2000 Census of Population and Housing, Summary File 3 unless noted. There are 42 CBG within one-quarter mile of the corridor, including 33 in Greenwich and nine in Stamford. In some instances, where more current data was available, it was included as well.

Population and Housing

The following data tables summarize population and housing trends in Greenwich and Stamford by 2000 U.S. Census Block Groups (CBG) that fall all or partially within the US Route 1 corridor study area.

Approximately 60 percent of residents in the area are between the ages of 18 and 64. The percentage of persons aged 5 – 17 varies considerably by CBG, from 0 percent up to 27 percent. The median age in 2000 was 40 years old. There was an average of two children per household. This suggests the resident population in the study corridor at that time was primarily families with children, and which is likely to still be the case today. The percentage of elderly by census block group ranges from a minimum of 3.7 percent to a maximum of 48.2 percent.

The greatest population concentrations in the study corridor are in Stamford and adjacent areas in Greenwich. According to projections produced by the Connecticut Department of Transportation, the population in the study area is expected to grow by 11.5 percent between 2000 and 2025, with higher growth rates in Stamford (15%) than in Greenwich (9%). These projections were generated in 2001.

Table 5.1 Total Population

Tract	Block Group	2000	2025	Projected pop. growth, 2000-2025
102.01	2	1,165	1,267	8.8%
102.02	2	3,007	3,262	8.5%
103	1	733	794	8.3%
	2	1,074	1,163	8.3%
	3	710	776	9.3%
	4	731	818	11.9%
	5	872	976	11.9%
104	3	1,120	1,219	8.9%
	4	698	760	8.9%
	5	627	683	8.9%
	6	658	716	8.9%
105	1	674	734	8.9%
	2	859	935	8.9%
	3	730	795	8.9%
	4	761	828	8.9%
	5	1,050	1,144	9.0%
	6	1,567	1,707	9.0%
106	1	644	702	9.1%
	2	461	503	9.1%
	3	930	1,014	9.1%
107	1	822	896	8.9%
	4	674	734	8.9%
108	1	737	802	8.8%
	2	1,084	1,181	8.9%
	3	926	1,005	8.5%
	4	639	693	8.5%
109	1	1,353	1,479	9.3%
	2	1,531	1,673	9.3%
	4	892	975	9.3%
110	1	687	748	8.9%
111	1	1,389	1,511	8.8%
	4	1,576	1,714	8.8%
113	3	520	567	9.0%
Subtotal: Greenwich		**31,901**	**34,773**	**9.0%**
201	2	1,312	1,557	18.7%
	3	1,239	1,472	18.8%
214	2	1,272	1,551	21.9%
	3	1,170	1,335	14.1%
	5	2,632	3,209	21.9%
215	1	1,641	1,872	14.1%
	2	1,702	1,942	14.1%
	3	1,812	2,067	14.1%
	4	1,763	2,011	14.1%
Subtotal: Stamford		**14,543**	**17,017**	**17.0%**
Study Area		**46,444**	**51,790**	**11.5%**
Town of Greenwich		**61,101**	**66,720**	**9.2%**
City of Stamford		**117,083**	**135,060**	**15.4%**
South Western Region		**353,556**	**389,730**	**10.2%**

Source: 2000 Census of Population and Housing, Summary File 3;
CTDOT, Series 27 population and employment projections

Table 5.2: Population – Age Distribution

			Age 5-17		Age 18-64		Age 65+	
Tract	Block Group	2000 Total Population	Count	%	Count	%	Count	%
102.01	2	1,165	240	20.6%	697	59.8%	102	8.8%
102.02	2	3,007	601	20.0%	1,797	59.8%	424	14.1%
103	1	733	118	16.1%	468	63.8%	118	16.1%
	2	1,074	245	22.8%	625	58.2%	118	11.0%
	3	710	130	18.3%	450	63.4%	66	9.3%
	4	731	262	35.8%	381	52.1%	49	6.7%
	5	872	125	14.3%	443	50.8%	259	29.7%
104	3	1,120	240	21.4%	671	59.9%	171	15.3%
	4	698	105	15.0%	413	59.2%	131	18.8%
	5	627	54	8.6%	353	56.3%	132	21.1%
	6	658	55	8.4%	436	66.3%	151	22.9%
105	1	674	0	0.0%	443	65.7%	194	28.8%
	2	859	81	9.4%	720	83.8%	32	3.7%
	3	730	139	19.0%	466	63.8%	93	12.7%
	4	761	99	13.0%	505	66.4%	148	19.4%
	5	1,050	260	24.8%	555	52.9%	151	14.4%
	6	1,567	218	13.9%	1,010	64.5%	278	17.7%
106	1	644	65	10.1%	471	73.1%	51	7.9%
	2	461	31	6.7%	363	78.7%	44	9.5%
	3	930	68	7.3%	663	71.3%	194	20.9%
107	1	822	222	27.0%	429	52.2%	127	15.5%
	4	674	33	4.9%	303	45.0%	325	48.2%
108	1	737	101	13.7%	539	73.1%	70	9.5%
	2	1,084	174	16.1%	667	61.5%	157	14.5%
	3	926	164	17.7%	572	61.8%	111	12.0%
	4	639	120	18.8%	347	54.3%	117	18.3%
109	1	1,353	269	19.9%	781	57.7%	197	14.6%
	2	1,531	228	14.9%	919	60.0%	249	16.3%
	4	892	140	15.7%	559	62.7%	124	13.9%
110	1	687	135	19.7%	354	51.5%	114	16.6%
111	1	1,389	321	23.1%	711	51.2%	240	17.3%
	4	1,576	383	24.3%	869	55.1%	156	9.9%
113	3	520	63	12.1%	343	66.0%	76	14.6%
Subtotal: Greenwich		**31,901**	**5,489**	**17.2%**	**19,323**	**60.6%**	**4,969**	**15.6%**
201	2	1,312	222	16.9%	865	65.9%	174	13.3%
	3	1,239	104	8.4%	803	64.8%	302	24.4%
214	2	1,272	193	15.2%	866	68.1%	115	9.0%
	3	1,170	283	24.2%	691	59.1%	86	7.4%
	5	2,632	461	17.5%	1,442	54.8%	559	21.2%
215	1	1,641	270	16.5%	1,060	64.6%	140	8.5%
	2	1,702	254	14.9%	1,175	69.0%	112	6.6%
	3	1,812	355	19.6%	1,115	61.5%	157	8.7%
	4	1,763	389	22.1%	1,081	61.3%	165	9.4%
Subtotal: Stamford		**14,543**	**2,531**	**17.4%**	**9,098**	**62.6%**	**1,810**	**12.4%**
	Study Area	**46,444**	**8,020**	**17.3%**	**28,421**	**61.2%**	**6,779**	**14.6%**
Town of Greenwich		**61,101**	**11,243**	**18.4%**	**35,971**	**58.9%**	**9,658**	**15.8%**
City of Stamford		**117,083**	**17,937**	**15.3%**	**75,028**	**64.1%**	**16,249**	**13.9%**
South Western Region		**353,556**	**62,575**	**17.7%**	**217,103**	**61.4%**	**48,525**	**13.7%**

Source: 2000 Census of Population and Housing, Summary File 3

Table 5.3: Housing Tenure

Tract	Block Group	Total Housing Units	Owner occupied	Owner occupied, %	Renter occupied	Renter occupied, %	Median Year Built
102.01	2	382	278	77.2%	82	22.8%	1961
102.02	2	1,156	766	69.0%	344	31.0%	1961
103	1	252	219	90.5%	23	9.5%	1955
	2	418	230	58.7%	162	41.3%	1939
	3	267	200	80.3%	49	19.7%	1939
	4	239	175	78.8%	47	21.2%	1941
	5	421	250	66.8%	124	33.2%	1972
104	3	413	322	78.0%	91	22.0%	1952
	4	288	139	48.3%	149	51.7%	1951
	5	257	126	49.0%	131	51.0%	1954
	6	261	159	61.2%	101	38.8%	1959
105	1	375	129	34.4%	246	65.6%	1953
	2	349	96	28.5%	241	71.5%	1939
	3	311	133	44.8%	164	55.2%	1962
	4	318	128	40.3%	190	59.7%	1944
	5	399	52	13.0%	347	87.0%	1951
	6	761	169	22.8%	573	77.2%	1961
106	1	321	110	34.3%	211	65.7%	1942
	2	276	45	17.3%	215	82.7%	1940
	3	662	268	46.6%	307	53.4%	1949
107	1	256	221	86.3%	35	13.7%	1952
	4	461	403	87.4%	58	12.6%	1954
108	1	385	191	52.3%	174	47.7%	1971
	2	437	300	71.4%	120	28.6%	1939
	3	357	313	90.7%	32	9.3%	1939
	4	243	165	67.9%	78	32.1%	1939
109	1	530	431	84.5%	79	15.5%	1952
	2	690	447	67.1%	219	32.9%	1963
	4	350	248	73.8%	88	26.2%	1948
110	1	259	240	95.6%	11	4.4%	1950
111	1	489	410	87.8%	57	12.2%	1951
	4	535	418	79.9%	105	20.1%	1954
113	3	236	73	32.7%	150	67.3%	1940
Subtotal: Greenwich		**13,354**	**7,854**	**61.1%**	**5,003**	**38.9%**	
201	2	484	0	0.0%	484	100.0%	1973
	3	592	13	2.3%	559	97.7%	1973
214	2	443	134	30.2%	309	69.8%	1966
	3	405	84	20.7%	321	79.3%	1959
	5	1,069	313	32.3%	656	67.7%	1987
215	1	450	113	25.1%	337	74.9%	1950
	2	610	146	26.0%	416	74.0%	1971
	3	587	117	20.6%	451	79.4%	1956
	4	623	141	23.9%	448	76.1%	1969
Subtotal: Stamford		**5,263**	**1,061**	**21.0%**	**3,981**	**79.0%**	
Study Area		**18,617**	**8,915**	**49.8%**	**8,984**	**50.2%**	
Town of Greenwich		**24,511**	**15,988**	**68.8%**	**7,242**	**31.2%**	**1954**
City of Stamford		**47,317**	**25,716**	**56.6%**	**19,683**	**43.4%**	**1963**
South Western Region		**139,224**	**90,093**	**67.4%**	**43,482**	**32.6%**	**1959**

Source: 2000 Census of Population and Housing, Summary File 3

Table 5.4: Households and Density

Tract	Block Group	Households	Persons per Household	Total Housing Units	Housing Units per Acre
102.01	2	356	3.27	382	0.4
102.02	2	1,128	2.67	1,156	0.9
103	1	254	2.89	252	1.0
	2	388	2.77	418	1.3
	3	250	2.84	267	0.5
	4	231	3.16	239	0.3
	5	352	2.48	421	0.8
104	3	404	2.77	413	3.2
	4	297	2.35	288	4.8
	5	266	2.36	257	6.5
	6	274	2.40	261	5.4
105	1	427	1.58	375	5.5
	2	371	2.32	349	8.6
	3	307	2.38	311	5.0
	4	310	2.45	318	5.2
	5	380	2.76	399	8.6
	6	697	2.25	761	4.7
106	1	286	2.25	321	5.4
	2	250	1.84	276	4.1
	3	609	1.53	662	7.9
107	1	270	3.04	256	1.1
	4	437	1.54	461	5.8
108	1	355	2.08	385	5.1
	2	447	2.43	437	2.3
	3	358	2.59	357	2.2
	4	216	2.96	243	3.9
109	1	523	2.59	530	3.1
	2	670	2.29	690	3.7
	4	321	2.78	350	2.4
110	1	251	2.74	259	1.6
111	1	503	2.76	489	1.8
	4	509	3.10	535	1.7
113	3	208	2.50	236	6.8
Subtotal: Greenwich		**12,905**	**2.47**	**13,354**	**1.8**
201	2	496	2.65	484	4.5
	3	587	2.11	592	12.4
214	2	502	2.53	443	11.7
	3	330	3.55	405	4.2
	5	1,011	2.60	1,069	4.9
215	1	409	4.01	450	9.5
	2	628	2.71	610	14.0
	3	544	3.33	587	10.7
	4	583	3.02	623	14.9
Subtotal: Stamford		**5,090**	**2.86**	**5,263**	**7.6**
	Study Area	**17,995**	**2.58**	**18,617**	**2.3**
Town of Greenwich		**23,259**	**2.63**	**24,511**	**0.8**
City of Stamford		**45,454**	**2.58**	**47,317**	**1.9**
South Western Region		**133,633**	**2.65**	**139,224**	**1.0**

Source: 2000 Census of Population and Housing, Summary File 3

Employment/Income/Poverty

The following provides data on employment, income, and poverty levels, for residents within the study corridor CBGs.

The rate of unemployment in 2000 by CBG was comparatively low and median household and per capita income varied considerably within the study area. In general, the income of Greenwich residents living in the study area was higher than that of Stamford residents. In 2000, per capita income among Greenwich residents in the study area was $60,922 while among Stamford residents it was $17,924. These figures were both lower than for either municipality, respectively, as a whole. Combined, per capita income among all residents of the study area was $47,458, which is slightly lower than for the South Western Region as a whole ($51,462.)

Current data from the Connecticut Department of Labor estimates 2010 unemployment (as of July 2010) in Greenwich at 6.4 percent and in Stamford at 7.8 percent. Estimates by CBG are not available for 2010. Projections from the Connecticut Economic Resource Center place the 2009 median household income for Greenwich at $126,278 and for Stamford at $75,723. The data indicates both median household incomes and unemployment have risen substantially in the past decade. The median incomes have risen by about 25 percent while unemployment reflects current nation-wide economic conditions and has risen between 4 and 5 percent.

Overall, about 7.5 percent of the population in the study area lived in poverty, which includes 3.9 percent of Greenwich residents and 15.4 percent of Stamford residents. Poverty rates showed some variation among neighborhoods, with five CBGs out of 33 in Greenwich having poverty rates in excess of 10 percent. All but one block group in Stamford had poverty rates in excess of 10 percent with a high of 31.6 percent in one block group.

Table 5.5: Income and Poverty

Tract	Block Group	Income, 1999 ($)		Persons Below Poverty line	
		Median Household	Per Capita	Count	%
102.01	2	186,837	100,957	5	0.4%
102.02	2	82,300	59,184	83	2.8%
103	1	200,001	131,610	0	0.0%
	2	156,836	83,466	29	2.7%
	3	188,600	124,051	35	4.9%
	4	200,001	131,764	41	5.6%
	5	130,286	76,083	51	5.8%
104	3	78,654	33,977	0	0.0%
	4	71,908	38,389	17	2.4%
	5	61,689	52,523	0	0.0%
	6	78,882	38,772	9	1.4%
105	1	44,208	55,785	37	5.5%
	2	46,861	31,052	174	20.3%
	3	71,875	35,447	83	11.4%
	4	55,000	61,497	85	11.2%
	5	38,092	18,207	7	0.7%
	6	72,019	41,993	57	3.6%
106	1	63,571	50,591	89	14.0%
	2	78,942	68,862	19	4.1%
	3	76,414	82,521	26	2.8%
107	1	109,750	68,620	20	2.4%
	4	52,981	46,588	28	4.2%
108	1	79,126	47,565	65	8.8%
	2	86,435	62,562	9	0.8%
	3	118,335	58,716	32	3.5%
	4	73,452	36,297	0	0.0%
109	1	98,244	59,210	56	4.1%
	2	62,188	37,300	48	3.2%
	4	102,499	52,102	17	1.9%
110	1	111,083	56,308	7	1.0%
111	1	116,237	57,739	0	0.0%
	4	168,213	86,338	33	2.1%
113	3	71,250	34,449	70	13.5%
Subtotal: Greenwich			**60,922**	**1,232**	**3.9%**
201	2	32,778	21,350	225	17.1%
	3	10,673	12,385	388	31.6%
214	2	45,278	18,900	67	5.3%
	3	39,286	13,182	259	22.1%
	5	47,031	25,695	284	11.1%
215	1	43,942	11,421	254	15.5%
	2	30,991	14,712	236	13.9%
	3	45,000	22,778	240	13.2%
	4	32,350	14,277	271	15.4%
Subtotal: Stamford			**17,924**	**2,224**	**15.4%**
	Study Area		**47,458**	**3,456**	**7.5%**
Town of Greenwich		**99,086**	**74,346**	**2,436**	**4.0%**
City of Stamford		**60,556**	**34,987**	**9,194**	**7.9%**
South Western Region		**76,554**	**51,462**	**19,799**	**5.7%**

Source: 2000 Census of Population and Housing, Summary File 3

Mode to Work

Journey-to-work data from the 2000 Census shows residents living close to US Route 1 relied on a variety of modes to travel to work. Overall, approximately 62 percent of workers residing in Greenwich or Stamford drove alone to work. The percentage in Greenwich (66.3) is significantly higher than the percentage in Stamford (51.5). About 15.8 percent of workers residing in the study area used public transportation. Nearly all railroad riders (10.7%) resided in Greenwich and nearly all bus riders (5.1%) were resided in Stamford. About 10.1 percent of workers used carpools, more so in Stamford than in Greenwich. More than 10 percent of the residents in 34 out of the 42 CBGs took public transportation to work. The number using public transportation exceeded 20 percent in 13 of the CBG.

About 6.3 percent of workers residing in the study area walked or biked to work, about evenly split between Greenwich and Stamford. More than five percent of the residents in 17 out of the 42 CBGs walked or bicycled to work. The number walking and bicycling exceeded 10 percent in eight of the CBG. The percentage of workers who carpool, use public transportation or walk and bike to work was higher in the study area than it was in the South Western Region as a whole.

Mean travel time to work for workers residing in the study area was 24.9 minutes, which breaks down to 27 minutes for Greenwich residents and 20 minutes for Stamford residents. Mean travel time was highest in the CBG with greater percentages of railroad commuters and lowest in the CBG with greater percentages of walk and bike commuters.

The following table provides data transit-dependent populations for residents within the study corridor CBG. Transit dependent populations are households with no car available. Approximately 11.9 percent of households residing in the study area did not have a vehicle available. This breaks down to 6.2 percent of Greenwich residents and 26.3 percent of Stamford residents. About half of all households in the study area have access to one or no vehicles. More than ten percent of households do not have access to a vehicle in 17 CBG of the 42 CBG. The areas with the highest percentage of households without any vehicles available are Chickahominy, Downtown Greenwich and the West Side of Stamford.

The 2000 Census data on transit-dependent households correlates to that on income and employment. That is, the CBGs in the study corridor in Greenwich with the highest percentage of below-poverty households also have the highest percentage of transit-dependent households. Those Greenwich CBGs are located at the southern terminus of the study corridor at the border of Greenwich with Port Chester, New York. The largest concentration of transit-dependent households in the study area, overall, is in Stamford.

Table 5.6: Mode to Work

Tract	Block Group	Workers	Drove alone		Carpool		Bus		Railroad		Walk or Bike		Other means		Worked at home		Mean travel time to work	Households: 0 Vehicles Available		Households: 1 Vehicles Available		Households: 2+ Vehicles Available	
			Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Minutes	Count	%	Count	%	Count	%
102.01	2	498	315	63.3%	16	3.2%	0	0.0%	65	13.1%	68	13.7%	6	1.2%	28	5.6%	24.3	21	5.8%	49	13.6%	290	80.6%
102.02	2	1,314	938	71.4%	57	4.3%	7	0.5%	195	14.8%	27	2.1%	0	0.0%	90	6.8%	28.6	46	4.1%	303	27.3%	761	68.6%
103	1	302	116	38.4%	60	19.9%	0	0.0%	67	22.2%	12	4.0%	0	0.0%	47	15.6%	38.5	0	0.0%	14	5.8%	228	94.2%
	2	472	274	58.1%	0	0.0%	0	0.0%	94	19.9%	38	8.1%	0	0.0%	66	14.0%	26.5	0	0.0%	90	23.0%	302	77.0%
	3	296	159	53.7%	28	9.5%	0	0.0%	40	13.5%	14	4.7%	0	0.0%	55	18.6%	33.6	7	2.8%	43	17.3%	199	79.9%
	4	276	161	58.3%	8	2.9%	0	0.0%	63	22.8%	6	2.2%	0	0.0%	38	13.8%	33.6	0	0.0%	27	12.2%	195	87.8%
	5	283	171	60.4%	14	4.9%	0	0.0%	64	22.6%	0	0.0%	0	0.0%	34	12.0%	31.5	8	2.1%	116	31.0%	250	66.8%
104	3	526	440	83.7%	40	7.6%	0	0.0%	19	3.6%	8	1.5%	0	0.0%	19	3.6%	20.1	17	4.1%	124	30.0%	272	65.9%
	4	339	309	91.2%	12	3.5%	0	0.0%	11	3.2%	0	0.0%	7	2.1%	0	0.0%	17.5	34	11.8%	104	36.1%	150	52.1%
	5	238	195	81.9%	0	0.0%	0	0.0%	23	9.7%	0	0.0%	10	4.2%	10	4.2%	25.6	31	12.1%	87	33.9%	139	54.1%
	6	408	326	79.9%	8	2.0%	0	0.0%	49	12.0%	8	2.0%	0	0.0%	17	4.2%	21.6	18	6.9%	88	33.8%	154	59.2%
105	1	412	257	62.4%	0	0.0%	0	0.0%	96	23.3%	34	8.3%	0	0.0%	25	6.1%	32.3	39	10.4%	210	56.0%	126	33.6%
	2	504	291	57.7%	44	8.7%	0	0.0%	20	4.0%	136	27.0%	0	0.0%	13	2.6%	17.8	11	3.3%	137	40.7%	189	56.1%
	3	290	165	56.9%	56	19.3%	0	0.0%	69	23.8%	0	0.0%	0	0.0%	0	0.0%	30.8	11	3.7%	158	53.2%	128	43.1%
	4	378	308	81.5%	25	6.6%	35	9.3%	10	2.6%	0	0.0%	0	0.0%	0	0.0%	19.6	56	17.6%	84	26.4%	178	56.0%
	5	487	348	71.5%	70	14.4%	38	7.8%	5	1.0%	7	1.4%	0	0.0%	19	3.9%	23.8	62	15.5%	196	49.1%	141	35.3%
	6	858	645	75.2%	104	12.1%	0	0.0%	53	6.2%	24	2.8%	5	0.6%	27	3.1%	16.8	70	9.4%	283	38.1%	389	52.4%
106	1	356	269	75.6%	9	2.5%	5	1.4%	32	9.0%	25	7.0%	0	0.0%	16	4.5%	25.0	10	3.1%	171	53.3%	140	43.6%
	2	352	160	45.5%	7	2.0%	0	0.0%	73	20.7%	81	23.0%	9	2.6%	22	6.3%	34.8	45	17.3%	129	49.6%	86	33.1%
	3	574	283	49.3%	0	0.0%	0	0.0%	138	24.0%	106	18.5%	18	3.1%	29	5.1%	31.1	82	14.3%	392	68.2%	101	17.6%
107	1	311	185	59.5%	19	6.1%	0	0.0%	56	18.0%	0	0.0%	12	3.9%	39	12.5%	27.4	7	2.7%	51	19.9%	198	77.3%
	4	272	201	73.9%	9	3.3%	0	0.0%	41	15.1%	16	5.9%	0	0.0%	5	1.8%	23.4	75	16.3%	278	60.3%	108	23.4%
108	1	465	304	65.4%	11	2.4%	28	6.0%	68	14.6%	8	1.7%	6	1.3%	40	8.6%	31.0	8	2.2%	202	55.3%	155	42.5%
	2	564	347	61.5%	26	4.6%	5	0.9%	120	21.3%	14	2.5%	23	4.1%	29	5.1%	31.8	0	0.0%	174	41.4%	246	58.6%
	3	393	255	64.9%	32	8.1%	0	0.0%	57	14.5%	0	0.0%	0	0.0%	49	12.5%	25.8	16	4.6%	90	26.1%	239	69.3%
	4	261	172	65.9%	51	19.5%	0	0.0%	38	14.6%	0	0.0%	0	0.0%	0	0.0%	25.2	21	8.6%	83	34.2%	139	57.2%
109	1	655	484	73.9%	41	6.3%	6	0.9%	77	11.8%	6	0.9%	20	3.1%	21	3.2%	27.8	0	0.0%	113	22.2%	397	77.8%
	2	675	511	75.7%	38	5.6%	0	0.0%	77	11.4%	16	2.4%	13	1.9%	20	3.0%	28.6	6	0.9%	319	47.9%	341	51.2%
	4	469	306	65.2%	24	5.1%	0	0.0%	71	15.1%	4	0.9%	0	0.0%	64	13.6%	24.5	6	1.8%	108	32.1%	222	66.1%
110	1	316	166	52.5%	8	2.5%	0	0.0%	99	31.3%	26	8.2%	0	0.0%	17	5.4%	32.0	14	5.6%	90	35.9%	147	58.6%
111	1	579	336	58.0%	30	5.2%	0	0.0%	151	26.1%	0	0.0%	7	1.2%	55	9.5%	35.1	14	3.0%	113	24.2%	340	72.8%
	4	618	391	63.3%	0	0.0%	0	0.0%	188	30.4%	5	0.8%	5	0.8%	29	4.7%	32.9	29	5.5%	100	19.1%	394	75.3%
113	3	316	194	61.4%	57	18.0%	22	7.0%	23	7.3%	13	4.1%	7	2.2%	0	0.0%	24.8	37	16.6%	93	41.7%	93	41.7%
Subtotal: Greenwich		**15,057**	**9,982**	**66.3%**	**904**	**6.0%**	**146**	**1.0%**	**2,252**	**15.0%**	**702**	**4.7%**	**148**	**1.0%**	**923**	**6.1%**	**27.0**	**801**	**6.2%**	**4,619**	**35.9%**	**7,437**	**57.8%**
201	2	580	258	44.5%	110	19.0%	110	19.0%	0	0.0%	82	14.1%	6	1.0%	14	2.4%	22.5	135	27.9%	210	43.4%	139	28.7%
	3	498	158	31.7%	110	22.1%	72	14.5%	27	5.4%	83	16.7%	18	3.6%	30	6.0%	17.0	353	61.7%	155	27.1%	64	11.2%
214	2	728	375	51.5%	158	21.7%	109	15.0%	0	0.0%	67	9.2%	19	2.6%	0	0.0%	18.1	43	9.7%	261	58.9%	139	31.4%
	3	468	287	61.3%	63	13.5%	59	12.6%	0	0.0%	41	8.8%	18	3.8%	0	0.0%	17.0	153	37.8%	110	27.2%	142	35.1%
	5	1,026	715	69.7%	132	12.9%	69	6.7%	7	0.7%	47	4.6%	6	0.6%	50	4.9%	19.6	183	18.9%	557	57.5%	229	23.6%
215	1	745	270	36.2%	186	25.0%	238	31.9%	0	0.0%	51	6.8%	0	0.0%	0	0.0%	27.5	70	15.6%	199	44.2%	181	40.2%
	2	764	377	49.3%	154	20.2%	96	12.6%	0	0.0%	116	15.2%	21	2.7%	0	0.0%	18.8	147	26.2%	254	45.2%	161	28.6%
	3	770	346	44.9%	212	27.5%	131	17.0%	0	0.0%	73	9.5%	0	0.0%	8	1.0%	19.3	81	14.3%	275	48.4%	212	37.3%
	4	805	503	62.5%	130	16.1%	71	8.8%	0	0.0%	90	11.2%	0	0.0%	11	1.4%	20.8	160	27.2%	218	37.0%	211	35.8%
Subtotal: Stamford		**6,384**	**3,289**	**51.5%**	**1,255**	**19.7%**	**955**	**15.0%**	**34**	**0.5%**	**650**	**10.2%**	**88**	**1.4%**	**113**	**1.8%**	**20.3**	**1,325**	**26.3%**	**2,239**	**44.4%**	**1,478**	**29.3%**
Study Area		**21,441**	**13,271**	**61.9%**	**2,159**	**10.1%**	**1,101**	**5.1%**	**2,286**	**10.7%**	**1,352**	**6.3%**	**236**	**1.1%**	**1,036**	**4.8%**	**24.9**	**2,126**	**11.9%**	**6,858**	**38.3%**	**8,915**	**49.8%**
Town of Greenwich		**27,659**	**17,813**	**64.4%**	**1,672**	**6.0%**	**178**	**0.6%**	**4,395**	**15.9%**	**1,036**	**3.7%**	**440**	**1.6%**	**2,125**	**7.7%**	**30.3**	**1,221**	**5.3%**	**7,039**	**30.3%**	**14,970**	**64.4%**
City of Stamford		**59,868**	**41,951**	**70.1%**	**6,372**	**10.6%**	**2,765**	**4.6%**	**3,397**	**5.7%**	**2,339**	**3.9%**	**749**	**1.3%**	**2,295**	**3.8%**	**24.0**	**4,711**	**10.4%**	**17,299**	**38.1%**	**23,389**	**51.5%**
South Western Region		**171,458**	**118,474**	**69.1%**	**14,403**	**8.4%**	**4,431**	**2.6%**	**16,896**	**9.9%**	**5,178**	**3.0%**	**2,005**	**1.2%**	**10,071**	**5.9%**	**28.5**	**9,472**	**7.1%**	**42,774**	**32.0%**	**81,329**	**60.9%**

Source: 2000 Census of Population and Housing, Summary File 3

Environmental Justice

Title VI of the Civil Rights Act of 1964 specifies that no person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, issued in 1998, states that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

The method for identifying environmental justice (EJ) communities employed in this study is identical to the one used to analyze EJ populations by the South Western Region Metropolitan Planning Organization's transportation planning program. In order to identify EJ communities, the following four categories of 2000 Census data are evaluated at the CBG level:

- percent of minority population (all persons except those identifying themselves as White, not Hispanic);
- per capita income;
- percent of persons below the poverty level; and
- percent of households receiving public assistance income.

Environmental justice is considered to be a potential issue when there is a concentration of minority or low-income populations in the study area. The criteria are satisfied if they exceed a designated threshold in a CBG. In the case of per capita income, the criterion is satisfied if it does not exceed a designated threshold in a CBG. The threshold for each criterion is set at the regional mean or in the case of per capita income, the regional per capita income. If an area meets all four of the criteria, it is highlighted as an EJ community of concern.

Table 5.7 shows which criteria are exceeded (shaded cells) for each block group and which CBG qualify as an EJ community. Four of 33 CBGs in Greenwich and all nine CBGs in Stamford exceed the threshold for percentage of minority population. Thirteen of 33 CBG in Greenwich and all nine CBGs in Stamford exceed the threshold for low income. Seven of the CBGs in Greenwich and eight in Stamford exceed the threshold for percentage of population living below the poverty level. Eight of of the CBGs in Greenwich and seven in Stamford exceed the threshold for percentage of households receiving public assistance income. Overall, seven CBGs in Stamford exceed designated thresholds for all four criteria and are therefore considered EJ communities of concern. These communities merit greater attention to EJ principles when considering benefits and adverse impacts from recommended improvements to US 1.

Figure 5.3 also displays the findings of this assessment.

Table 5.7: Environmental Justice Communities

Tract	Block Group	EJ Community	Population	Minority Population	Minority Population, %	Per Capita Income	Pop. for Whom Poverty Status is Determined	Pop. Below Poverty Level	Pop. Below Poverty Level, %	Total Households	Public Assistance Households	Public Assistance Households, %
102.01	2		1,165	102	8.8%	100,957	1,165	5	0.4%	356	0	0.0%
102.02	2		3,007	409	13.6%	59,184	3,007	83	2.8%	1,128	15	1.3%
103	1		733	41	5.6%	131,610	733	0	0.0%	254	0	0.0%
	2		1,074	109	10.1%	83,466	1,074	29	2.7%	388	0	0.0%
	3		710	72	10.1%	124,051	710	35	4.9%	250	0	0.0%
	4		731	57	7.8%	131,764	731	41	5.6%	231	0	0.0%
	5		872	148	17.0%	76,083	872	51	*5.8%*	352	0	0.0%
104	3		1,120	133	11.9%	*33,977*	1,120	0	0.0%	404	0	0.0%
	4		698	97	13.9%	*38,389*	698	17	2.4%	297	8	*2.7%*
	5		627	0	0.0%	52,523	627	0	0.0%	266	0	0.0%
	6		658	114	17.3%	*38,772*	658	9	1.4%	274	10	*3.6%*
105	1		674	120	17.8%	55,785	674	37	5.5%	427	0	0.0%
	2		859	423	*49.2%*	*31,052*	859	174	*20.3%*	371	0	0.0%
	3		730	237	*32.5%*	*35,447*	730	83	*11.4%*	307	0	0.0%
	4		761	276	*36.3%*	61,497	756	85	*11.2%*	310	11	*3.5%*
	5		1,050	518	*49.3%*	*18,207*	1,050	7	0.7%	380	28	*7.4%*
	6		1,567	147	9.4%	*41,993*	1,567	57	3.6%	697	8	1.1%
106	1		644	128	19.9%	*50,591*	637	89	*14.0%*	286	11	*3.8%*
	2		461	95	20.6%	68,862	461	19	4.1%	250	0	0.0%
	3		930	160	17.2%	82,521	930	26	2.8%	609	17	*2.8%*
107	1		822	167	20.3%	68,620	822	20	2.4%	270	7	*2.6%*
	4		674	22	3.3%	*46,588*	674	28	4.2%	437	0	0.0%
108	1		737	161	21.8%	*47,565*	737	65	*8.8%*	355	0	0.0%
	2		1,084	168	15.5%	62,562	1,084	9	0.8%	447	2	0.4%
	3		926	73	7.9%	58,716	926	32	3.5%	358	0	0.0%
	4		639	48	7.5%	*36,297*	639	0	0.0%	216	0	0.0%
109	1		1,353	245	18.1%	59,210	1,353	56	4.1%	523	8	1.5%
	2		1,531	383	25.0%	*37,300*	1,521	48	3.2%	670	13	*1.9%*
	4		892	97	10.9%	52,102	886	17	1.9%	321	0	0.0%
110	1		687	85	12.4%	56,308	687	7	1.0%	251	0	0.0%
111	1		1,389	79	5.7%	57,739	1,389	0	0.0%	503	6	1.2%
	4		1,576	256	16.2%	86,338	1,574	33	2.1%	509	0	0.0%
113	3		520	115	22.1%	*34,449*	520	70	*13.5%*	208	0	0.0%
Subtotal: Greenwich			**31,901**	**5,285**	**16.6%**	**60,922**	**31,871**	**1,232**	**3.9%**	**12,905**	**144**	**1.1%**
201	2	***Yes***	1,312	888	*67.7%*	*21,350*	1,312	225	*17.1%*	496	17	*3.4%*
	3	***Yes***	1,239	999	*80.6%*	*12,385*	1,227	388	*31.6%*	587	66	*11.2%*
214	2		1,272	1,032	*81.1%*	*18,900*	1,262	67	5.3%	502	0	0.0%
	3	***Yes***	1,170	891	*76.2%*	*13,182*	1,170	259	*22.1%*	330	31	*9.4%*
	5	***Yes***	2,632	1,613	*61.3%*	*25,695*	2,548	284	*11.1%*	1,011	58	*5.7%*
215	1	***Yes***	1,641	1,312	*80.0%*	*11,421*	1,641	254	*15.5%*	409	19	*4.6%*
	2		1,702	1,626	*95.5%*	*14,712*	1,702	236	*13.9%*	628	7	1.1%
	3	***Yes***	1,812	1,553	*85.7%*	*22,778*	1,812	240	*13.2%*	544	29	*5.3%*
	4	***Yes***	1,763	1,634	*92.7%*	*14,277*	1,763	271	*15.4%*	583	62	*10.6%*
Subtotal: Stamford			**14,543**	**11,548**	**79.4%**	**17,924**	**14,437**	**2,224**	**15.4%**	**5,090**	**289**	**5.7%**
Study Area			**46,444**	**16,833**	**36.2%**	**47,458**	**46,308**	**3,456**	**7.5%**	**17,995**	**433**	**2.4%**
Town of Greenwich			**61,101**	**8,846**	**14.5%**	**74,346**	**60,561**	**2,436**	**4.0%**	**23,259**	**217**	**0.9%**
City of Stamford			**117,083**	**45,609**	**39.0%**	**34,987**	**115,851**	**9,194**	**7.9%**	**45,454**	**1,188**	**2.6%**
South Western Region			**353,556**	**89,689**	**25.4%**	**51,462**	**350,357**	**19,799**	**5.7%**	**133,633**	**2,507**	**1.9%**

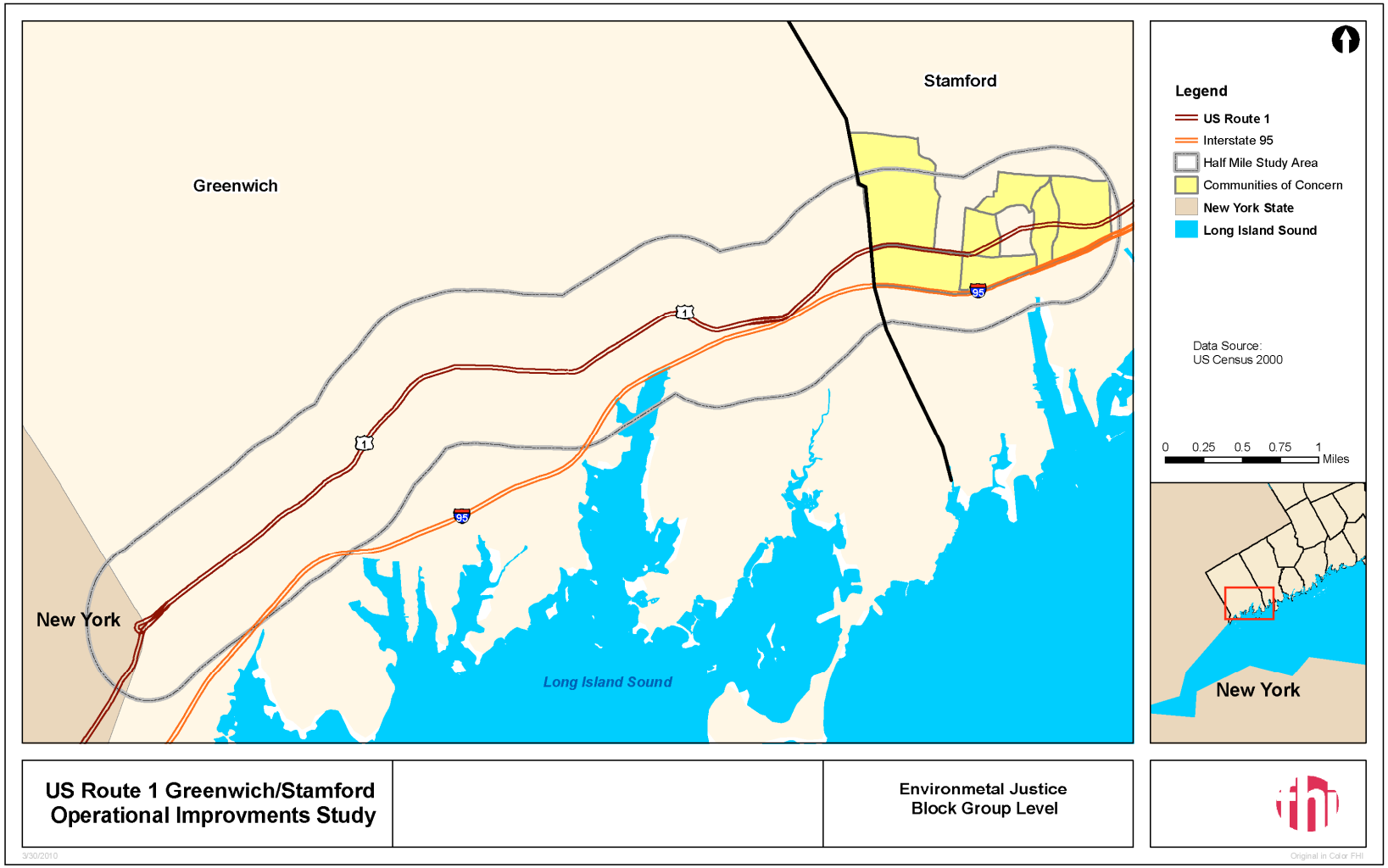


Figure 5.3: Environmental Justice Communities of Concern

5.4 History

The area that is today Greenwich and Stamford was originally inhabited by Native American Siwanoy, a band of the Wappingers[1]. The area's first European settlers were English Puritans who were part of the New Haven Colony. Both Greenwich and Stamford were settled in 1640. The area changed hands between the Dutch and English until 1650, when it was officially recognized under the New Haven Colony. In 1665 as part of the consolidated Connecticut Colony, Greenwich was disaggregated from Stamford by the General Assembly[2].

The Boston Post Road, the primary land route between New York and Boston, was first established in the 1670s though many portions of the road existed previously as foot paths used by Native Americans. During the Revolutionary War, General Israel Putnam used this route to escape British forces that were sacking Greenwich and warn Stamford of their impending arrival[3]. Today, US 1 in Greenwich is named in his honor. In the late 18th and early 19th century, the Greenwich Road and Connecticut Turnpike, both tolled, were built along the path of the Boston Post Road. Some sections of this road survive today as Old Post Roads in Greenwich[4]. In 1849, the New York and New Haven railroad was completed.

In 1926, the road was included in the US route numbering system as US 1, which was then the primary highway between Maine and Florida. By 1940, the Merritt Parkway was completed and in 1958, I-95 was opened to traffic. The Merritt Parkway and especially I-95 replaced US 1 as the inter-city and through routes in Greenwich and Stamford. Today, US 1 is primarily a local business route and Main Street as well as a relief route to I-95 during incidents on the highway. During the twentieth century, the railroad, expressways and proximity to New York helped transform Greenwich and Stamford into suburban communities. As these communities have matured, they have become economic centers in their own right that today have a greater in-flow than out-flow of commuters.

[1] http://www.bwpowell.com/archeology/indianfield/field1.html
[2] http://www.ctgenweb.org/county/cofairfield/pages/greenwich/greenwich_hstry.htm
[3] *ibid*
[4] http://www.kurumi.com/roads/ct/us1.html

Historic Resources

Along US 1, there are six buildings and two districts listed on the National Register of Historic Places, all in Greenwich (***Table 5.8***). This list includes three houses dating from the 17th and 18th century (including the oldest house in Greenwich) and several community institutions including a church, school (now senior housing) and the YMCA. The Thomas Lyon House at the intersection of West Putnam Avenue and Byram Road, constructed around 1690, is purported to be the oldest house in Greenwich. It is also one of the first buildings a traveler sees after crossing the New York State line into Connecticut on US 1. Knapp Tavern (Putnam Cottage) on East Putnam Avenue near Park Place, dating to the 1690s or 1730s, is one of the oldest homes in Greenwich. It holds significance as General Israel Putnam is alleged to have fled this building down "Put's Hill" whilst Greenwich was sacked to regroup at Stamford and form an army to counter the British. Other historic structures include the Samuel Ferris House on Putnam Avenue in Riverside near the Mianus River, which dates to about the 1760s, the Methodist Episcopal Church on East Putnam Avenue which dates to 1868, and the Greenwich YMCA and Byram School, which date to 1916 and 1925 respectively.

There are two historic districts listed on the National Register of Historic Places. The Greenwich Avenue Historic District includes portions of East and West Putnam Avenue from just west of the Greenwich Avenue intersection to about the Church St / Mason St intersection. This district encompasses the YMCA of Greenwich and is adjacent to the Methodist Episcopal Church, which are both independently included on the National Register. Most of this district focuses on properties along Greenwich Avenue south of its intersection with Putnam Avenue. The Putnam Hill Historic District includes a portion of East Putnam Avenue from about the Maple Avenue intersection to the Old Church Road intersection. This district encompasses Knapp Tavern (Putnam Cottage), which is independently listed on the National Register. Neither the Greenwich Avenue Historic District nor the Putnam Hill Historic District are local historic districts. Therefore, they do not fall under the authority of the Greenwich Historic District Commission. ***Figure 5.4*** graphically depicts the historic districts and properties within the study area.

Table 5.8: Study Area Historic Districts and Properties

	Town	Name	Address	Built	Listed
Buildings	Greenwich	Byram School	Vinci Drive	1925	2-Aug-90
	Greenwich	Ferris, Samuel, House	E Putnam Ave & Cary Rd	c. 1760	10-Aug-89
	Greenwich	Greenwich YMCA	50 E Putnam Ave	1916	7-Nov-96
	Greenwich	Knapp Tavern (Putnam Cottage)	243 E Putnam Ave	c. 1690	15-Sep-77
	Greenwich	Lyon, Thomas, House	W Putnam Ave & Byram Rd	c. 1695	24-Aug-77
	Greenwich	Methodist Episcopal Church	61 E Putnam Ave	1868	25-Aug-88
Districts	Greenwich	Greenwich Avenue Historic District	1-55 E Putnam Ave; 1-30 W Putnam Ave 2-414 Greenwich Ave; 2-4 Lafayette Ct; 18 Lafayette Pl;	1878 - 1940	31-Aug-89
	Greenwich	Putnam Hill Historic District	139-279 E Putnam Ave 23-48 Maple Ave; 25-42 Old Church Rd; 7 Park Pl	c. 1690 - 1909	24-Aug-79

A preliminary review by the State Historic Preservation Office (SHPO) concluded that this study "has the potential to have an adverse effect on cultural resources listed on the National Register of Historic Places."[5] The SHPO "will require an in-depth review of the proposed project design to ensure that the work meets the Secretary of the Interior's Standards for the Treatment of Historic Properties."[6] The preliminary review by SHPO also identifies several properties which though not currently listed, may be eligible for listing in the future. These include a theatre on West Main Street in Stamford as well as the Conde Nast site and the Cos Cob School in Greenwich.

[5] See appendix G
[6] Ibid.

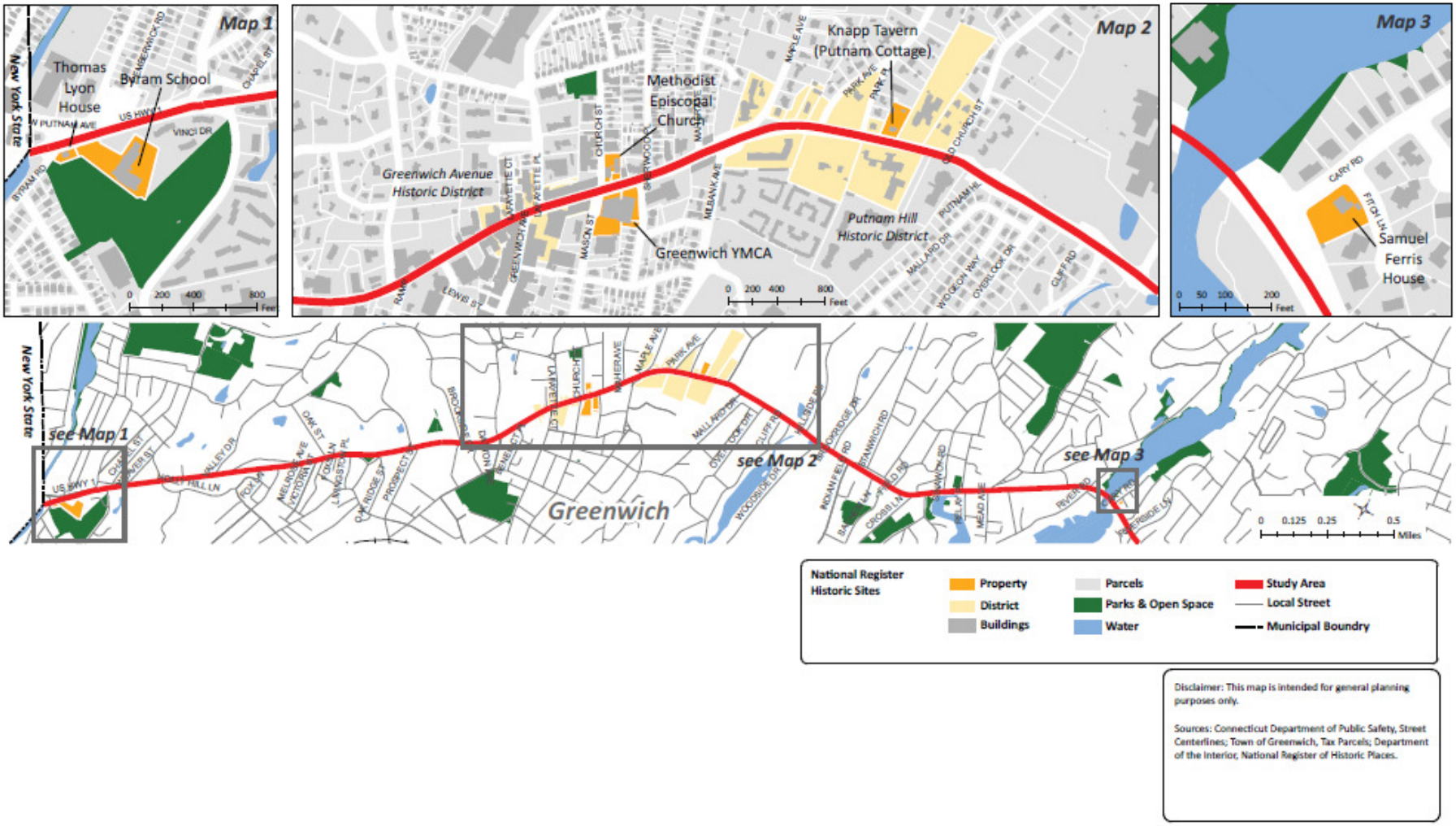


Figure 5.4: Historic Properties

5.5 Environment

Although US 1 between Greenwich and Stamford can generally be described as urban and developed, it traverses numerous locations that merit greater attention and sensitivity to the natural environment. Within one-quarter mile of the study area, there are approximately thirty-five acres of fresh and tidal wetlands, 290 acres of flood plains, and 168 acres of open space and protected land. ***Figure 5.5*** provides information on environmental features throughout the study area.

Most important among these locations are the numerous river and stream crossings. These are environmentally significant in terms of US 1's impact on the natural environment as well as the impact of the natural environment on the built environment. Runoff from the highway and associated development can degrade water quality and increase the intensity of stormwater flows. Similarly, a flooded river or stream can overrun the highway, impede travel and cause property damage to nearby residences and businesses.

The section of US 1 between Cos Cob and the Mianus River contains the greatest number of environmentally significant features. This section begins approximately one mile west of the Mianus River around the Field Road intersection, continues one-third mile east of the Mianus to about the Lockwood Lane intersection, and extends roughly one-quarter mile north. The area contains open space properties, floodplains, fresh and tidal wetlands, and the only natural diversity area within a quarter mile of US 1. Natural diversity areas are locations identified by the Connecticut Department of Environmental Protection (CTDEP) that may contain endangered or threatened species, species of special concern, or a significant natural community.

Water Resources

As is common along the Connecticut coast, US 1 crosses numerous rivers and streams and their associated watersheds and floodplains. Beginning at the western end of the study area, US 1 crosses the Byram River, followed by Horseneck Brook, Greenwich Creek, Brothers Brook, Mianus River/Mianus Pond, and finally the Mill (Rippowam) River near the eastern end of the study area. All of these rivers and streams drain to Long Island Sound, which is south of the study area. Between Greenwich and Stamford, US 1 passes though three significant sub-watersheds: Byram River, Mianus River and Rippowam (Mill) River. SWRPA is currently developing a watershed based management plan for the Mianus River watershed, which aims to minimize the impacts of non-point source pollution on water quality in the Mianus River. Similar work is also being conducted in the Byram River Watershed by the Byram River Watershed Coalition and in Mill (Rippowam) River by the Mill River Collaborative.

Based on spatial data from DEP, there are numerous locations where US 1 crosses the 100- or 500-year floodplain, always in close proximity to a river or stream. The longest stretch of US 1 in the 100-year flood plain is a 0.31 mile segment in Cos Cob from about the Taylor Drive intersection to the Robertson Lane intersection. Other locations in Greenwich where US 1 crosses a floodplain are at the Byram River near the New York State line, Horseneck Brook between Prospect Street and Brookside Drive, Greenwich Creek between Brother Drive and Woodside Drive, and around Ferris Drive. In Stamford, US 1 crosses a floodplain at the Mill (Rippowam) River between Greenwich Avenue and Clinton Avenue.

Stormwater

Much of the US 1 corridor through Greenwich and Stamford has been developed with a variety of commercial and residential uses. With more than 34% of the land area within a quarter mile of US 1 corridor covered by impervious surfaces (***Figure 5.6***), stormwater management is an important consideration. Impervious surfaces have been shown to increase the volume and rate of stormwater runoff and have been identified as one of the major contributors of non-point source contamination. Rivers and streams may be impacted when as little as 10% impervious cover is present in the watershed. Impervious cover has also been attributed to increased flooding in urban areas. Roadways, parking lots and rooftops account for a majority of impervious land cover in the US 1 corridor; however compacted soils form playing fields, yards and patios also limit infiltration of stormwater contributing to stormwater runoff in the area.

Stormwater management is an important component in reducing the amount of water conveyed to rivers and streams during a storm event. Stormwater management focuses on directing water off of roadways and controlling the amount and direction of rain fall and melting snow. Both the

Town of Greenwich and City of Stamford have taken an active role in incorporating stormwater management into the local land use decision making process as well as addressing issues of stormwater quantity and quality. The Town of Greenwich recently completed a Stormwater Drainage Manual. The drainage manual establishes guidelines for the selection, design, and maintenance of stormwater management and drainage facilities, and provides information on Low Impact Development and other techniques for integrating stormwater and drainage into the site design. The City of Stamford has also developed an educational program focused on stormwater, as part of the Water Pollution Control Authority's public outreach program.

Wetlands

In Connecticut, wetlands are protected by the Inland Wetlands and Watercourses Act (C.G.S. § 22a-36 through 22a-45.) The act, passed by the legislature in 1972, requires each municipality to regulate activities in wetlands and watercourses. Locally, wetlands regulations are overseen by the Inland Wetlands and Watercourses Agency in Greenwich and the Environmental Protection Board in Stamford. Regulation of activities in a wetland or watercourse also includes review of activities in an upland area, which constitutes an area from 100 to 200 feet beyond the boundary of a wetland. CTDEP alone conducts reviews of actions proposed by state agencies.

Wetland soils are found in several locations along the US 1 corridor study, usually in the vicinity of rivers and streams. According to spatial data from CTDEP, US 1 passes near areas of wetland soils between Prospect Street and Brookside Drive intersections, near Brothers Brook in Cos Cob, and around the Ferris Drive and Old Kings Highway intersections, all in Greenwich. Most of these locations are classified as having Poorly Drained and Very Poorly Drained Soil with the remainder classified as having Alluvial and Floodplain Soils. Although US 1 does not directly cross any areas of wetland soils, some portion of the highway may be within 200 feet of a wetland, which may be in the upland review area.

Coastal Zone

All land within the coastal zone management boundary is subject to the regulatory, development and planning requirements of the Connecticut Coastal Management Act (C.G.S. § 22a-90 through 22a-112.) Coastal zone management falls under the purview of CTDEP. Perhaps most relevant to the scope of this study, the Coastal Nonpoint Source Pollution Program attempts to manage runoff from a variety of different land uses, including roads and highways within the coastal zone boundary.

Although US 1 is generally a mile distant from the Long Island Sound shore, the highway traverses Connecticut's coastal boundary in three separate locations. Approximately 0.21 miles of US 1 passes through the Coastal Zone from the southern terminus of the study area at the Byram River (New York State line) north to the end of the divided highway alignment. The longest segment in the Coastal Zone, in the area of the Mianus River bridge, extends 1.14 mile from about the Field Road intersection in Cos Cob to past the Riverside Lane intersection in Riverside. In Stamford, US 1 traverses the Coastal Zone for about 0.41 miles from the Hazel Street / Spruce Street intersection to the northern terminus of the study area at Washington Boulevard. Overall, about one-quarter of US 1 is within the coastal zone boundary.

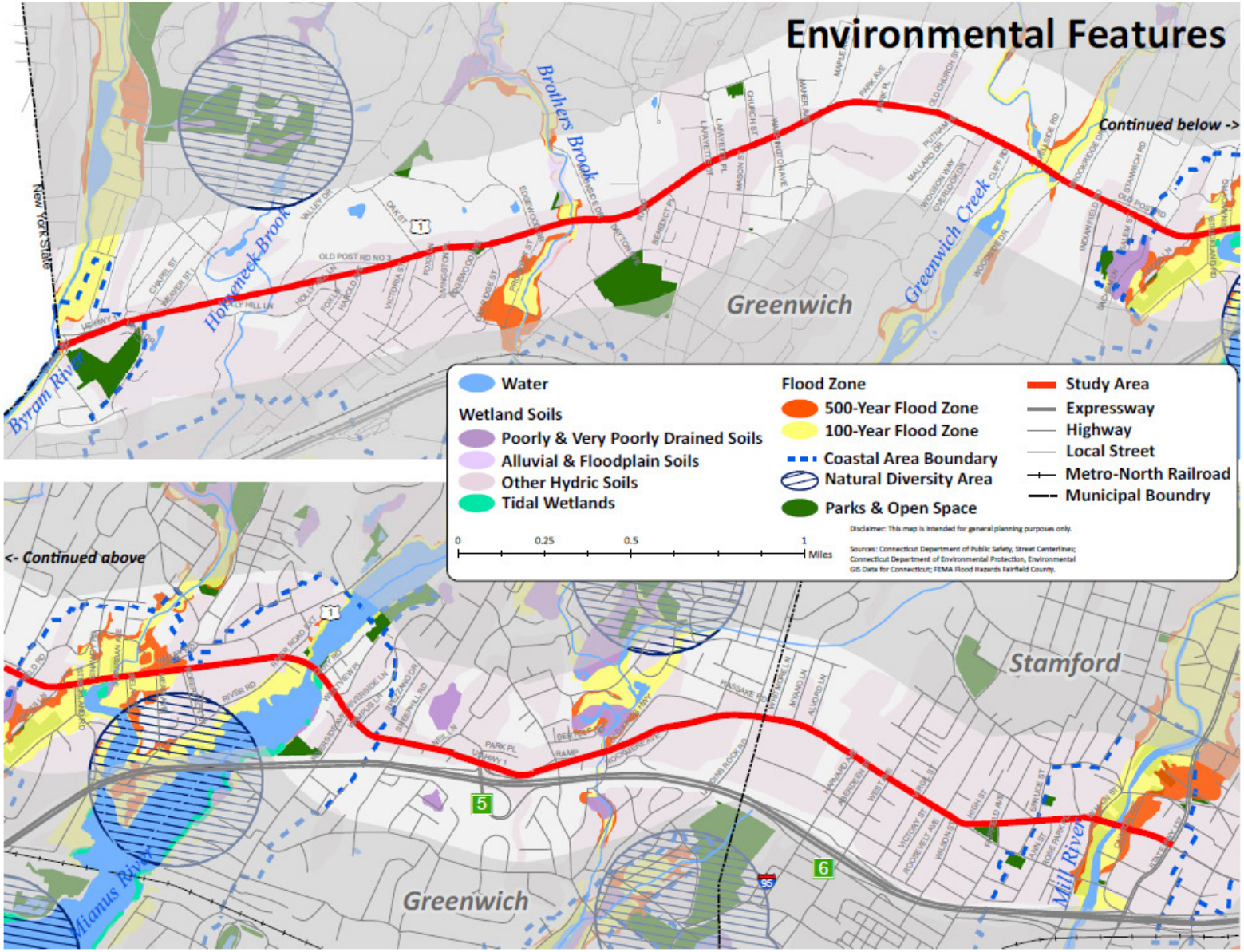


Figure 5.5: Environmental features

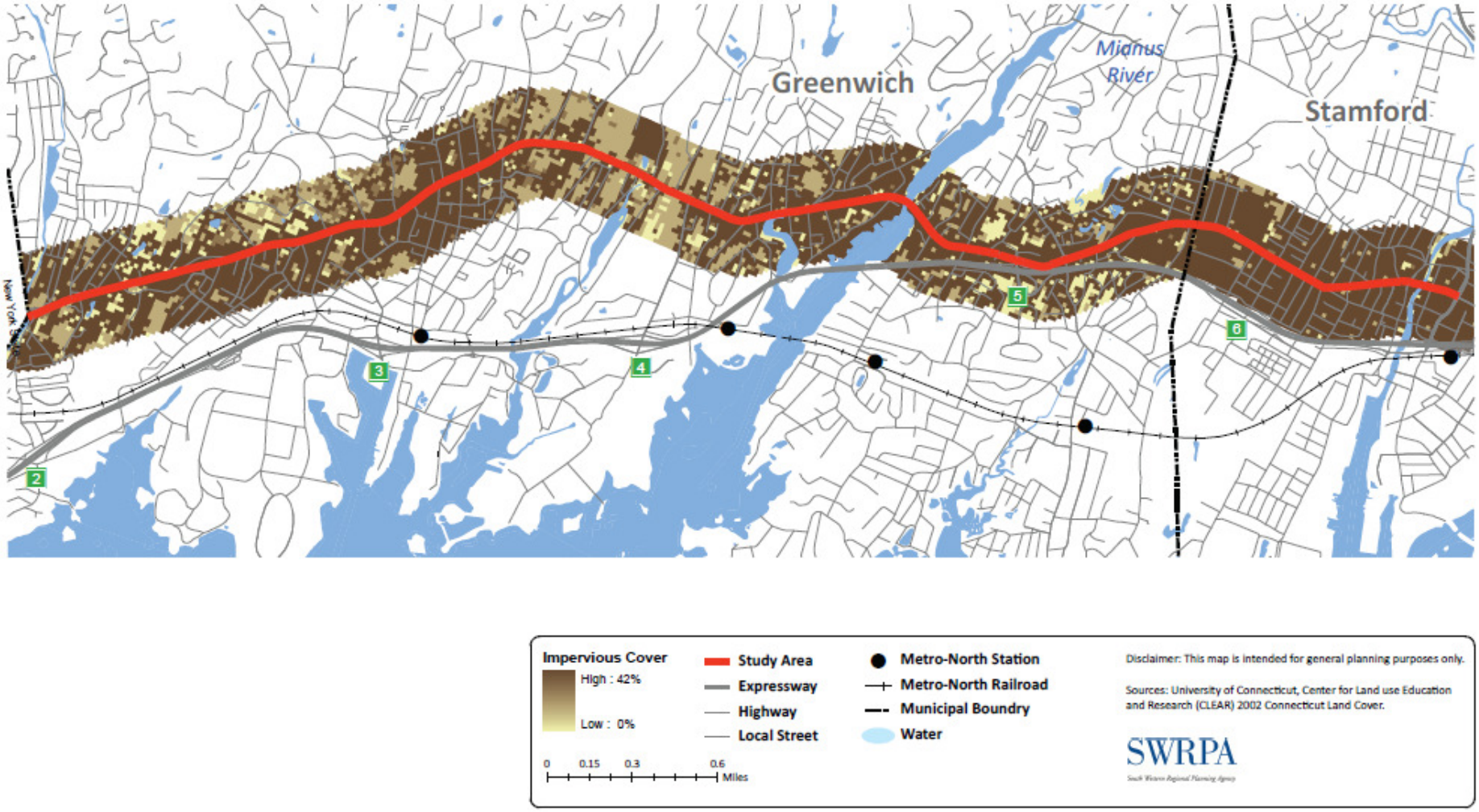


Figure 5.6: Impervious Surfaces

5.6 Open Space and 4(f) Land Uses

There are numerous open space and conservation properties located on or adjacent to the US 1 corridor study area. The most significant among these are Edgewood Park, Cos Cob Mill Pond Area, and Mianus Pond in Greenwich as well as Jackie Robinson Park and Mill River Greenway in Stamford. Within one-quarter mile of the US 1 corridor study area, there are approximately one-hundred protected land and related properties, which total approximately 383.5 acres, or 16.3% of all land within one-quarter mile. Of this total, about 197.5 acres are protected open space (either land trust, municipal, private or state), 112.5 acres are public or private school lands (including Greenwich High School), and 60.8 acres is a private club. Only fifteen of these properties have frontage on US 1. Three of the open space properties (Cos Cob Mill Pond Area, Mianus Pond, and Mill River Greenway) are located where US 1 crosses a river or stream, resulting in scenic vistas.

According to a federal law commonly referred to as Section 4(f), United States Department of Transportation (USDOT) does not permit use of land from public parks, recreation areas, and wildlife or waterfowl refuges, and historic sites for projects that receive USDOT funding or require USDOT approval. The only exceptions to this rule are actions where there is no feasible alternative and where all possible planning to minimize harm has been made, subject to the determination of USDOT. Actions considered for a 4(f) determination include:

1. When land is permanently incorporated into a transportation facility;
2. When there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose; and
3. When there is a constructive use (a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired.)[7]

Actions that have a de minimis impact are also exempted pursuant to a determination by FHWA.

Abutting US 1, there are approximately fifty properties that should be considered as part of any 4(f) determination. These properties include about fifteen parcels that are part of public parks and open spaces as well as thirty-six properties listed under National Register of Historic Places. ***Figure 5.7*** depicts the locations of these properties.

[7] http://www.environment.fhwa.dot.gov/4f/4fAtGlance.asp

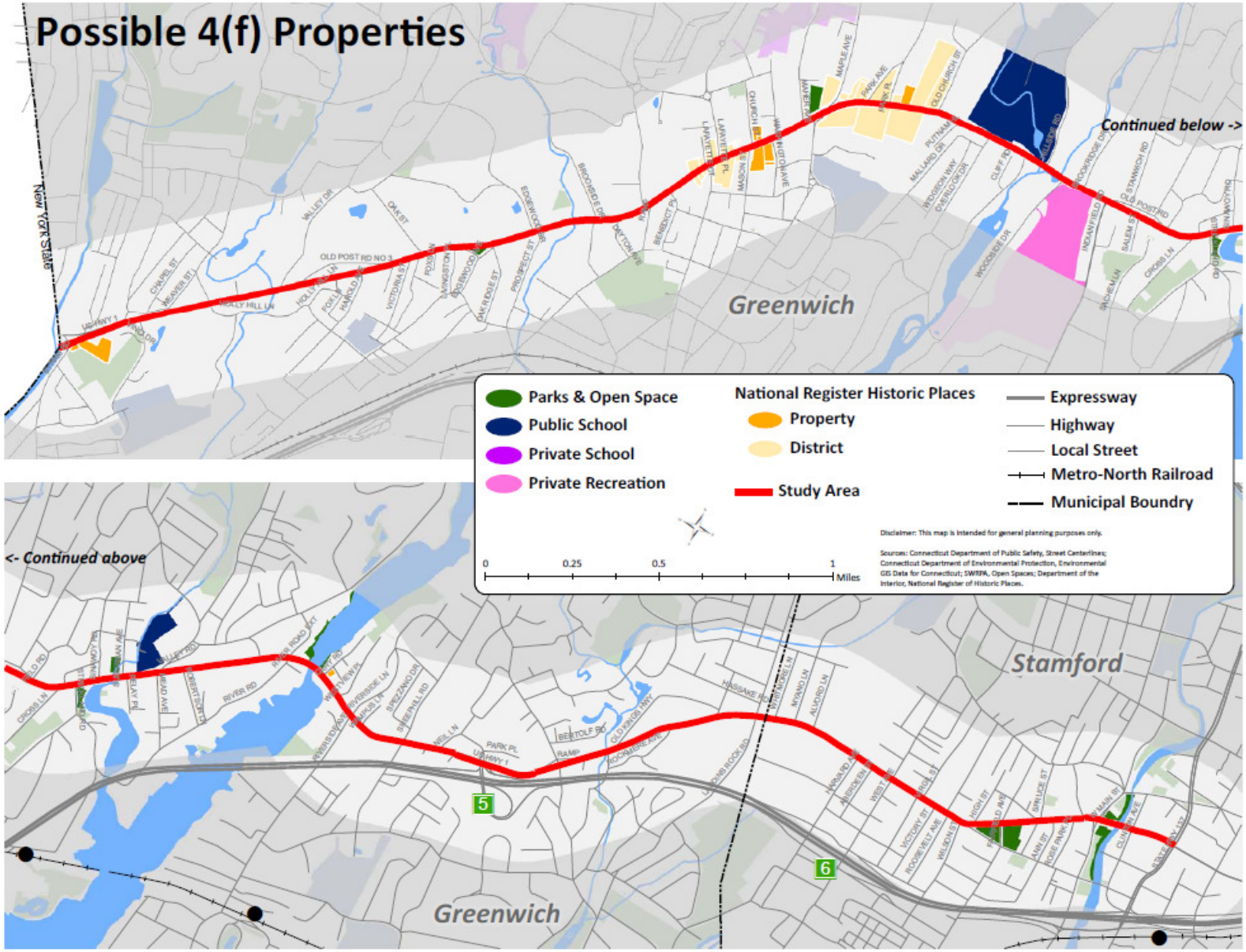


Figure 5.7: Possible 4(f) Properties

Crash Data Summary and Analysis

6.1 Vehicular Crashes

SWRPA obtained crash records for US 1 from CTDOT's Traffic Accident Viewing System (TAVS). The crash records cover the latest three-year time period: 2006-2008. Each record was geo-referenced and added to a GIS shapefile. This data was reviewed from corridor- and district-sized perspective. Location specific collision diagrams were also provided by SWRPA and the Town of Greenwich.

Throughout the corridor, a total of 1803 crashes occurred between 2006 and 2008 with the following breakdown of key crash types:

- Rear-end 665 37%
- Sideswipe 313 17%
- Angle 65 4%

The high number of rear-end crashes is consistent with the congested peak hour conditions found throughout the signalized corridor, and the significant sideswipe crashes is indicative of this four-lane corridor where there are no left turn pockets at many intersections resulting in queuing and increased vehicle lane changes.

Included in this chapter is a summary of the crash data by district. The crash summary for each section includes the number of crashes, noteworthy crash types, and key crash locations. More detailed information for all crash types is provided in ***Table 6.1***.

Greenwich District

The Greenwich district spans from MP 0.00 to MP 3.20 and contained 813 of the 1803 (45%) crashes. The bulk of the crashes were rear-end (296), sideswipe (139), and turning movements (264). ***Figure 6.1*** shows that the majority of crashes occurred in downtown Greenwich between Brookside Drive (MP 1.59) and Maher Avenue/Millbank Avenue/Maple Avenue (MP 2.30).

Cos Cob District

The Cos Cob district spans from MP 3.21 to MP 4.27 and contained 255 of the 1803 (14%) crashes. The bulk of the crashes were rear-end (102) and sideswipe (54). ***Figure 6.2*** shows that the majority of crashes occurring between Indian Field Road (MP 3.21) and Orchard Street/Mead Avenue (MP 3.78) with the highest concentrations at Indian Field Road and Orchard Street/Mead Avenue.

Riverside District

The Riverside district spans from MP 4.28 to MP 5.00 and contained 148 of the 1803 (8%) crashes. The bulk of the crashes were rear-end (65), sideswipe (25), and turning movements (46). ***Figure 6.2*** shows that the majority of crashes were concentrated at four locations including the signalized intersections of Riverside Lane, Lockwood Lane/Sheep Hill Road, I-95 Exit 5, and the unsignalized Neil Lane intersection just south of the I-95 Exit 5 intersection.

Old Greenwich District

The Old Greenwich district spans from MP 5.01 to MP 5.70 and contained 116 of the 1803 (7%) crashes. The bulk of the crashes were rear-end (49) and turning movements (33). ***Figure 6.3*** shows that the majority of crashes occurred at the signalized intersections of Sound Beach Avenue (MP 5.05) and Havemeyer Lane/Laddins Rock Road (MP 5.64).

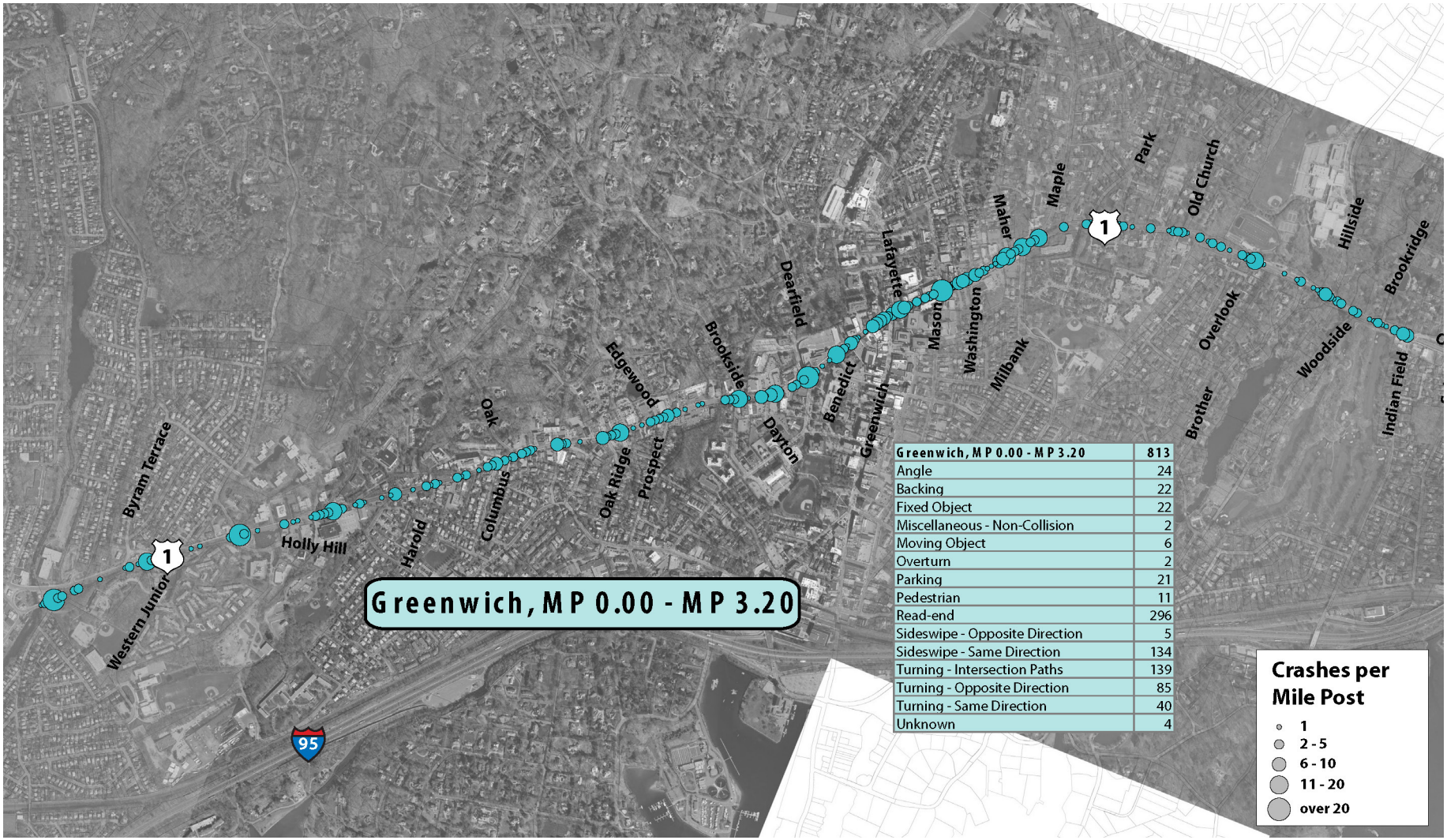
Stamford District

The Stamford district spans from MP 5.71 to MP 6.96 and contained 471 of the 1803 (26%) crashes. The bulk of the crashes were rear-end (153), sideswipe (81), and turning movements (149). ***Figure 6.3*** shows that the majority of crashes occurred between Harvard Avenue (MP 5.97) and Greenwich Avenue/West Main Street (MP 6.71) with the highest concentrations at West Avenue, Roosevelt Avenue/Liberty Street, Fairfield Avenue, and Stillwater Avenue/Greenwich Avenue/West Main Street.

Table 6.1: CTDOT Traffic Accident Viewing System (TAVS) Summary From 2006-2008

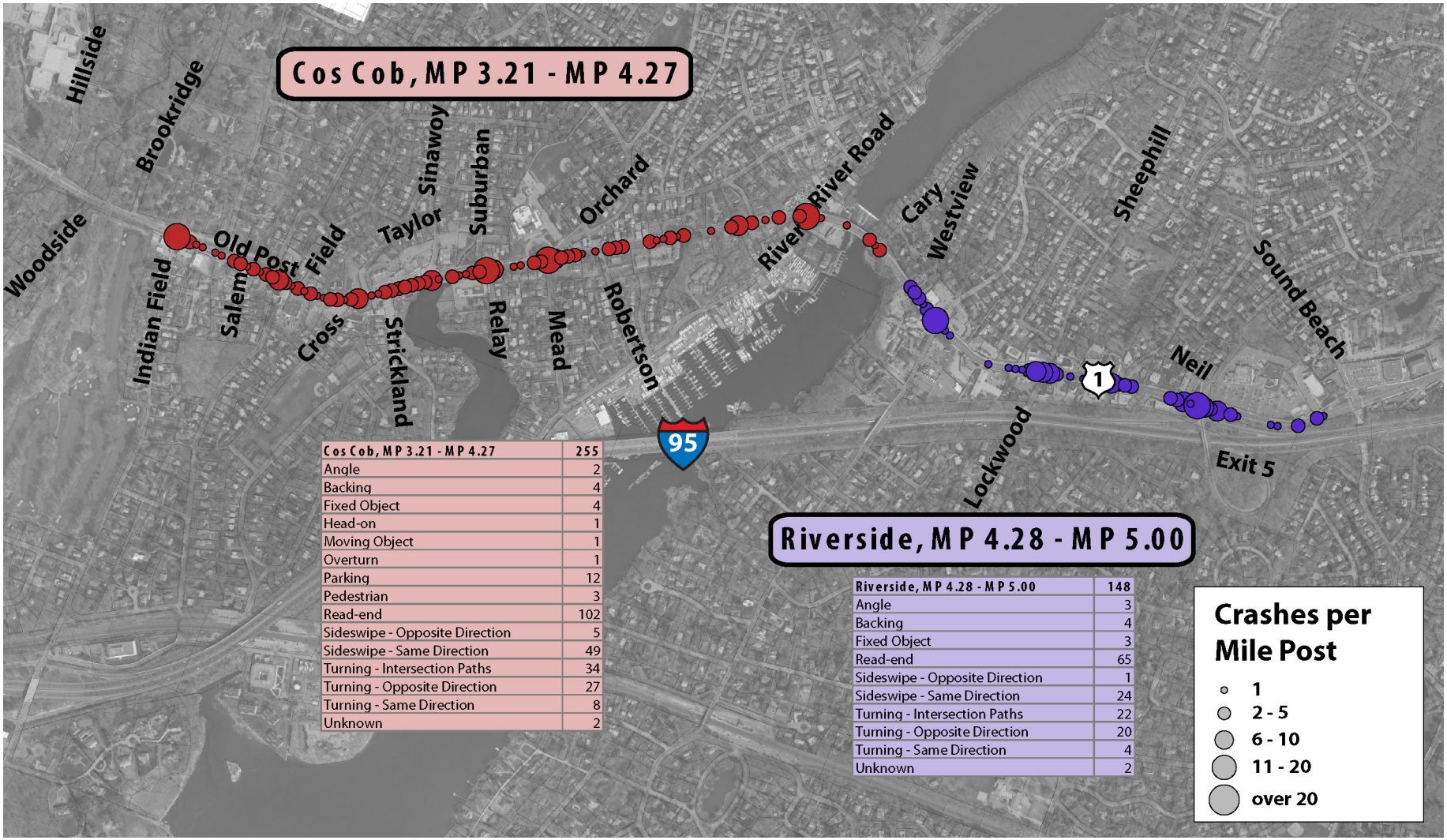
District	Milepoint	Total Crashes	Crash Type							
			Angle	Sideswipe	Rear End	Parking	Turning	Fixed Object	Backing	Pedestrian
Greenwich	0.00 – 3.20	813	24	139	296	21	264	22	22	11
Cos Cob	3.21 – 4.27	255	2	54	102	12	69	4	4	3
Riverside	4.28 – 5.00	148	3	25	65	0	46	3	4	0
Old Greenwich	5.01 – 5.70	116	6	14	49	1	33	6	1	2
Stamford	5.71 – 6.96	471	30	81	153	14	149	17	12	9
	Totals	**1803**	**65**	**313**	**665**	**48**	**561**	**52**	**43**	**25**

Note: Several minor crash type categories were removed; therefore, total crashes above will not be the sum of crash types.



Greenwich, MP 0.00 - MP 3.20	813
Angle	24
Backing	22
Fixed Object	22
Miscellaneous - Non-Collision	2
Moving Object	6
Overturn	2
Parking	21
Pedestrian	11
Read-end	296
Sideswipe - Opposite Direction	5
Sideswipe - Same Direction	134
Turning - Intersection Paths	139
Turning - Opposite Direction	85
Turning - Same Direction	40
Unknown	4

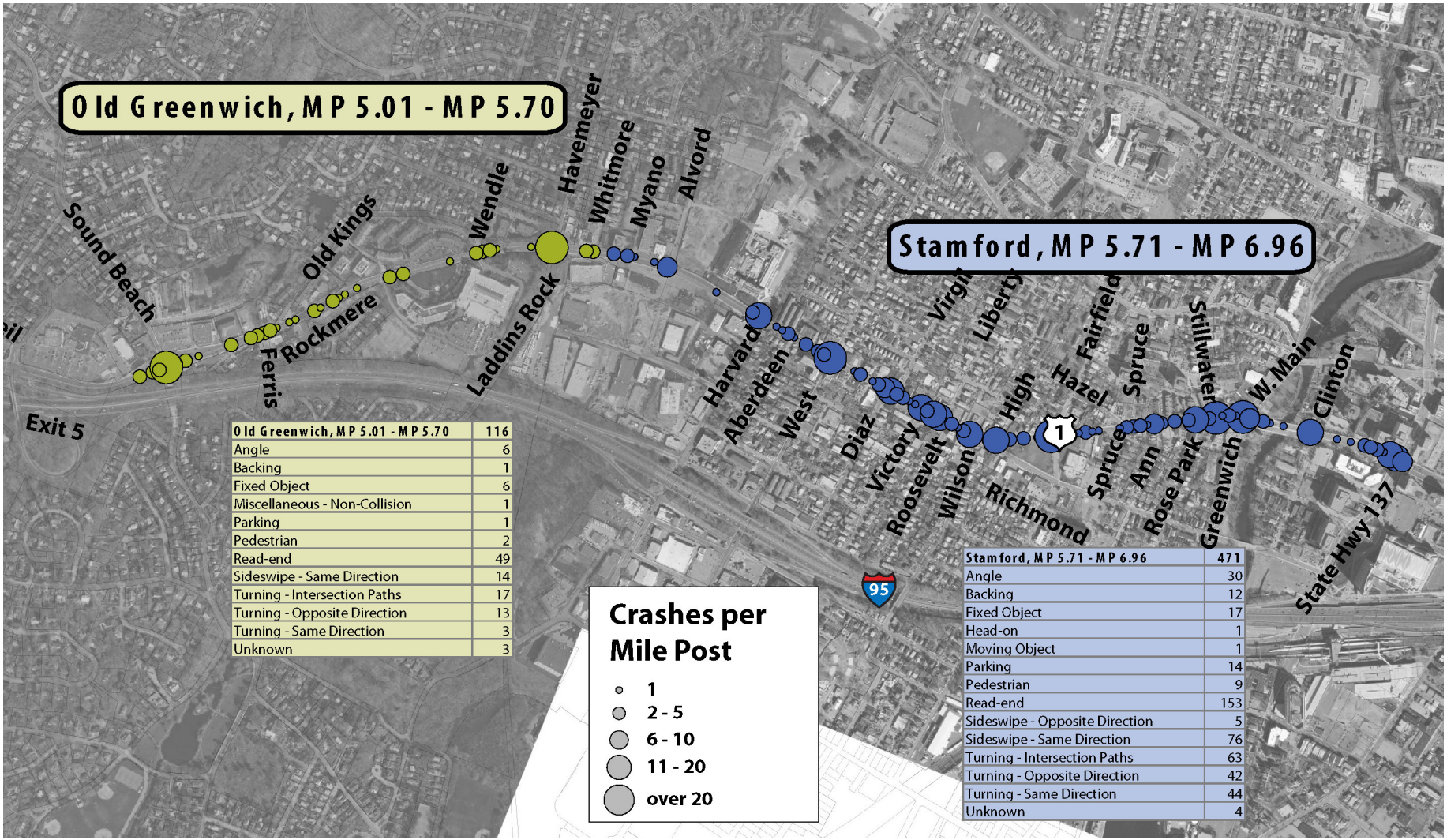
Figure 6.1: Greenwich Crash Data



Cos Cob, MP 3.21 - MP 4.27	255
Angle	2
Backing	4
Fixed Object	4
Head-on	1
Moving Object	1
Overturn	1
Parking	12
Pedestrian	3
Read-end	102
Sideswipe - Opposite Direction	5
Sideswipe - Same Direction	49
Turning - Intersection Paths	34
Turning - Opposite Direction	27
Turning - Same Direction	8
Unknown	2

Riverside, MP 4.28 - MP 5.00	148
Angle	3
Backing	4
Fixed Object	3
Read-end	65
Sideswipe - Opposite Direction	1
Sideswipe - Same Direction	24
Turning - Intersection Paths	22
Turning - Opposite Direction	20
Turning - Same Direction	4
Unknown	2

Figure 6.2: Cos Cob and Riverside Crash Data



Old Greenwich, MP 5.01 - MP 5.70	116
Angle	6
Backing	1
Fixed Object	6
Miscellaneous - Non-Collision	1
Parking	1
Pedestrian	2
Read-end	49
Sideswipe - Same Direction	14
Turning - Intersection Paths	17
Turning - Opposite Direction	13
Turning - Same Direction	3
Unknown	3

Stamford, MP 5.71 - MP 6.96	471
Angle	30
Backing	12
Fixed Object	17
Head-on	1
Moving Object	1
Parking	14
Pedestrian	9
Read-end	153
Sideswipe - Opposite Direction	5
Sideswipe - Same Direction	76
Turning - Intersection Paths	63
Turning - Opposite Direction	42
Turning - Same Direction	44
Unknown	4

Figure 6.3: Old Greenwich and Stamford Crash Data

GREENWICH KEY LOCATIONS

SWRPA and the Town of Greenwich compiled available crash data for the study area and identified locations with high crash rates or other notable occurrences of crashes.

Riverside Lane to I-95 Exit 5

The Town of Greenwich provided detailed crash diagrams and a crash summary sheet at these locations for the time period covering January 2007 to December 2009 when 154 crashes occurred resulting in 29 injuries. The majority of these crashes were rear-end (72), sideswipe (31), and turning movement (35) crashes which are typical for signalized intersections with intermittent congestion (***See Appendix E, Figure E-1***). On US Route 1, between Riverside Lane and I-95 Exit 5, the highest crash clusters occurred at the intersections with Riverside Lane (23), Sheephill Road/Lockwood Lane (34), Neil Lane/Breezemont Avenue (23), and I-95 Exit 5 (65).

The crashes reported at Riverside Lane and Sheephill Road/Lockwood Lane were mostly rear-end crashes which are typical for a signalized intersection with intermittent congestion (***See Appendix E, Figures E-2, E-4, and E-6***). Potential improvements include reducing/removing the number of curb cuts and on-street parking near intersections, and construction of left turn pockets where possible. Neil Lane/Breezemont Avenue are two, offset "T" unsignalized intersections with frequent curb cuts for commercial businesses. Rear-end and turning movement crashes account for most of the collisions. Details for the crashes were not available, but a likely contributing factor would be multiple access points to commercial properties and queuing from the signal at the I-95 interchange. Just north of Breezemont Avenue is the I-95 Exit 5 intersection where there were 35 rear-end, 12 sideswipe, and 14 turning movement/angle crashes (***See Appendix E, Figures E-3, E-5, and E-7***). The rear-end and sideswipe collisions are typical for this type of intersection, and the turning movement/angle crashes in the middle of the intersection are likely due, in part, to the atypical intersection configuration. Potential safety improvements at this location include signal phasing, timing or geometric changes.

Edgewood Avenue to Edgewood Drive/Prospect Street

The Town of Greenwich provided crash reports and a crash diagram for the time period covering January 2007 to December 2009 when a total of 35 crashes occurred resulting in 9 injuries (***See Appendix E, Figure E-8***). The majority of crashes were rear-end collisions (15). The highest crash cluster in this area occurred just prior to or between the offset intersection of Edgewood Drive/Prospect Street where a total of 24 crashes occurred most of which were rear-end. While not clear from the crash reports, field visits indicated that possible contributing factors include steep grades, skewed sidestreet approaches, and clearance intervals. It was also noted that four angle crashes occurred at the Edgewood Avenue/Oak Ridge Street unsignalized intersection which, although not defined in the crash reports, could have been caused, in part, by the sharp angle of the side streets or sight distance issues from the combined horizontal and vertical curve in the northbound US Route 1 direction (***See Appendix E, Figure E-13***).

Indian Field Road and Old Post Road #6

The Town of Greenwich provided crash reports and a crash diagram for the time period covering January 2006 to November 2008 when a total of 42 crashes occurred resulting in 4 injuries(***See Appendix E, Figure E-14***). The majority of crashes were rear-end collisions (23). The two highest crash cluster areas included northbound and southbound US Route 1, with 13 and 6 rear end collisions, respectively. These crash types are considered typical for a signalized intersection with intermittent congestion and varying queues. Some potentially unsafe maneuvers were also observed at this location with vehicles cutting through each of the gas stations to avoid queues. It should also be noted that two pedestrian and one bicyclist crash occurred on US Route1 in this section with one pedestrian requiring hospitalization (***See Appendix E, Figure E-20***).

Orchard Street and Mead Avenue

The Town of Greenwich provided crash reports and a crash diagram for the time period covering January 2006 to November 2008 when a total of 34 crashes occurred resulting in 6 injuries (***See Appendix E, Figure E-21***). The majority of crashes were turning movement (12), sideswipe (9), and rear-end (8). The highest crash cluster area was within the intersection where 13 crashes occurred most of which involved turning vehicles. (***See Appendix***

E, Figure E-26). The cause of these crashes is not defined in the crash reports, but possible contributing factors include offset geometry, permitted left turns from side streets with opposing traffic coming from an offset leg, southbound US Route 1 right turning vehicles having to slow down significantly to make a right turn onto Orchard Street causing rear-end crashes, and vehicles attempting to change lanes around left turning vehicles causing sideswipe collisions. Potential solutions include left turn pockets on US Route 1 and/or changes to signal phasing and timings.

Valley Drive

The Town of Greenwich provided crash reports and a crash diagram for the time period covering January 2006 to November 2008 when a total of 17 crashes occurred resulting in 1 injury (***See Appendix E, Figures E-27 and E-30***).

The majority of crashes were turning movement (7), rear-end (5), and sideswipe (4). When compared to other crash clusters along the corridor, the number of crashes reported here is noticeably lower with no obvious patterns.

Maher Avenue/Millbank Avenue/Maple Avenue

The Town of Greenwich provided a crash diagram for the time period covering January 2004 to December 2006 when a total of 85 crashes occurred resulting in 13 injuries (***See Appendix E, Figure E-31***). The majority of crashes were turning movement (37), sideswipe (25), and rear-end (20). The key crash cluster areas in this section are shown on ***Figure 6.4***. This figure details the number of crashes in each of the six key locations along with possible contributing factors. The key issues with this intersection include offset geometry, intermittent congestion, shadowing, vehicles attempting to go around left turners, and vehicles sneaking through on the clearance intervals.

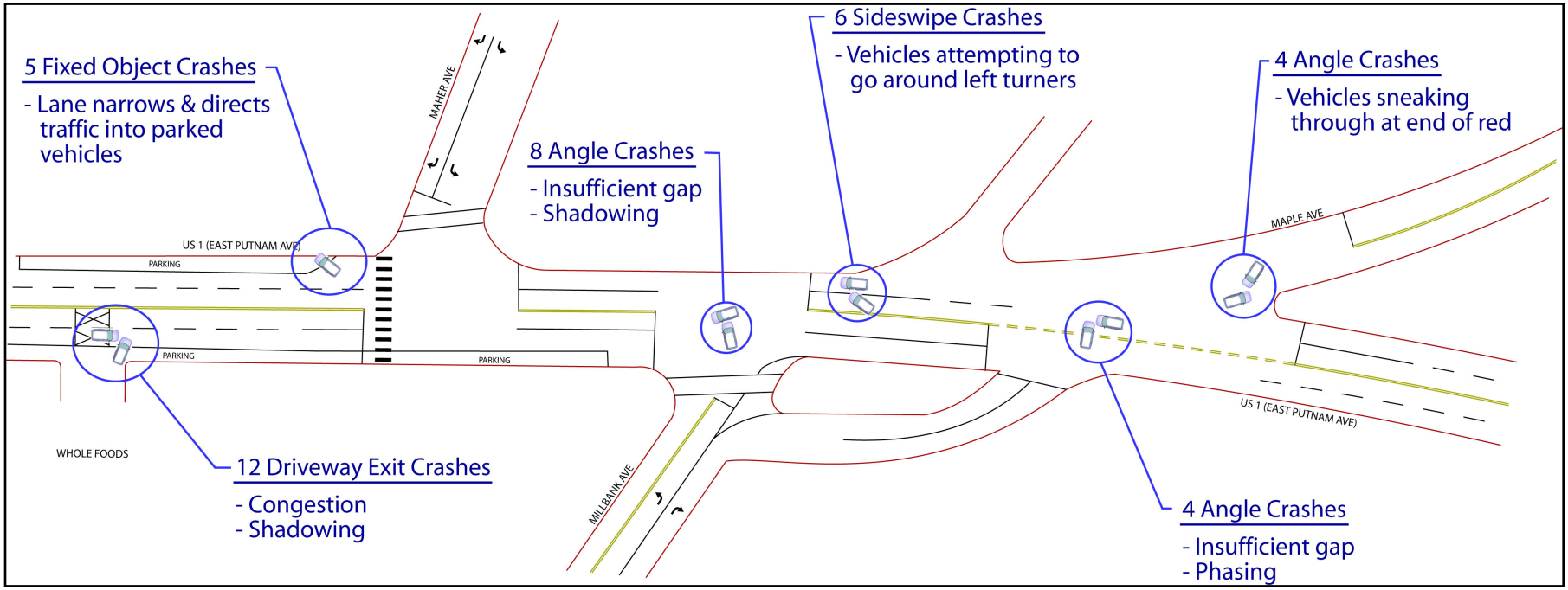


Figure 6.4: Crash Clusters with Possible Contributing Factors Maher Avenue/Millbank Avenue/Maple Avenue

Lafayette Place

The Town of Greenwich provided a crash diagram for the time period covering January 2007 to March 2010 when a total of 16 crashes occurred resulting in 6 injuries (***See Appendix E, Figure E-32***). The majority of crashes were sideswipe (8), turning movement (4), and rear-end (3). One pedestrian crash requiring hospitalization occurred on northbound US Route 1 between Greenwich Avenue and Lafayette Place. The two highest crash cluster areas included three angle crashes from the northbound left turn onto Lafayette Place, and three sideswipe crashes at Lafayette Place from southbound traveling vehicles attempting to move around queued vehicles waiting to make the left turn onto Greenwich Avenue (***See Appendix E, Figure E-37***). When compared to other crash clusters along the corridor, the number of crashes reported is noticeably lower.

STAMFORD KEY LOCATIONS

SWRPA and the City of Stamford compiled available crash data for the study area and provided crash diagrams and crash reports for every intersection between the Greenwich/Stamford municipal line and the US Route 1 and West Main Street/Greenwich Avenue intersection. The data was generally reported from 2006 to 2009 and included total crashes, injuries, fatalities, property damage only, and crash type (e.g., right angle, sideswipe, rear end).

West Avenue

The City of Stamford provided detailed crash diagrams and a crash summary sheet at West Avenue for the time period covering September 2006 to July 2009 when 44 crashes occurred. One crash resulted in an injury and there were no fatalities (***See Table 6.2***). The majority of these crashes were rear-end (20) and sideswipe (12) which are typical for signalized intersections that lack turn pockets and have intermittent congestion. At the US Route 1 and West Avenue intersection the highest crash clusters occurred on the West Avenue approaches with 12 and 15 crashes in the eastbound and westbound directions, respectively (***See Appendix E, Figure E-82***). These crash results correspond with field conditions that showed shadowing effects on US Route 1, general lane confusion, and near accidents from vehicles changing lanes or “squeaking by” queued vehicles.

Potential improvements include construction of left turn pockets where possible, split phasing on West Avenue, and removal of on-street parking directly adjacent to the intersection.

Victory Street to Wilson Street

The City of Stamford provided detailed crash diagrams and crash summary sheets for the intersections between Victory Street and Wilson Street, including Liberty Street, for the time period covering September 2006 to July 2009 when 44 crashes occurred with only two resulting in injury and no fatalities (***See Table 6.2***). The majority of these crashes were rear-end (17), sideswipe (9), and right angle (10) which are typical for signalized intersections with intermittent congestion. The highest crash cluster areas between Victory Street and Wilson Street are the US Route 1 approaches at the Victory Street and Liberty Street intersections where 21 of the 44 crashes occurred most of which were rear-end and sideswipe (***See Appendix E, Figure E-47 and E-79***). These high crash cluster areas are consistent with peak hour field conditions showing queuing extending along US Route 1 from the US Route 1 and Roosevelt Avenue/Wilson Street intersection.

Potential improvements include “left turn only” lane striping on southbound US Route 1 between Wilson Street and High Street and northbound US Route 1 striping between Victory Street and Wilson Street creating lane definition and distinct lanes for vehicles destined for either US Route 1 or Richmond Hill Avenue.

Fairfield Avenue

The City of Stamford provided detailed crash diagrams and a crash summary sheet at Fairfield Avenue for the time period covering December 2006 to July 2009 when 27 crashes occurred, nearly 11 crashes per year, with five resulting in injury and no fatalities (***See Table 6.2***). The majority of these crashes were right angle (9) and rear-end (7) with three of the five injuries resulting from angle crashes occurring in the middle of the intersection. At the US Route 1 and Fairfield Avenue intersection the highest crash cluster occurred in the middle of the intersection where 11 crashes occurred (***See Appendix E, Figure E-42***). Possible contributing factors to this crash cluster

could be the concurrent, permitted only phasing, lack of dedicated left turn lanes, and slightly skewed geometry at this intersection.

Potential improvements include construction of left turn pockets where possible, protected/permitted left turn movements and split phasing on Fairfield Avenue.

Rose Park Avenue and Stillwater Avenue

The City of Stamford provided detailed crash diagrams and crash summary sheets for the intersections of Rose Park Avenue and Stillwater Avenue for the time period covering September 2006 to May 2009 when 34 crashes occurred with only one resulting in injury and no fatalities (***See Table 6.2***). The majority of these crashes were rear-end (13), sideswipe (10), and right angle (7) with four of the seven angle crashes resulting from vehicles exiting Rose Park Avenue (unsignalized) making a left turn onto US Route 1 southbound. The highest crash cluster area is the US Route 1 approaches at Stillwater Avenue where 16 crashes occurred all of which were rear-end and sideswipe (***See Appendix E, Figure E-76***). Possible contributing factors to this crash cluster could be the 20-foot wide single lane southbound approach and on-street parking adjacent and through the northbound approach.

Potential improvements include a re-striping effort from Greenwich Avenue to Rose Park Avenue creating one lane in the southbound direction and a northbound left turn storage pocket at Stillwater Avenue. Removing on-street parking in the northbound direction from Rose Park Avenue through Stillwater Avenue will provide additional sight distance for vehicles exiting Rose Park Avenue, additional room for the northbound left turn lane at Stillwater Avenue, and a more pedestrian friendly crossing at Stillwater Avenue.

Table 6.2: Stamford Crash Summary

US Route 1 and Intersecting Street	Time Period	Crashes	Injuries	Crashes per Year	Crash Type							
					Right Angle	Sideswipe	Rear End	Head On	Turning	Fixed Object	Backing	Ped / Cyclist
Whitmore Lane	02/07 – 04/09	5	1	1.5	2	0	0	2	0	1	0	0
Myano Lane	03/08 – 04/08	1	0	2.3	0	0	0	1	0	0	0	0
Alvord Lane	12/08 – 05/09	3	1	10.5	0	1	0	2	0	0	0	0
Harvard Avenue	10/06 – 05/09	15	2	1.9	3	3	5	1	1	1	0	1
Aberdeen Street	11/06 – 06/09	4	0	5.3	1	0	1	0	2	0	0	0
West Ave	09/06 – 07/09	44	1	7.2	3	12	20	6	1	2	0	0
Diaz Street	08/07 – 06/09	5	0	5.0	2	1	0	0	0	1	1	0
Virgil Street	10/06 – 04/09	8	1	3.8	4	0	0	2	0	2	0	0
Victory Street	11/06 – 07/09	18	2	3.2	4	2	7	0	0	3	1	1
Liberty Street	09/06 – 07/09	15	0	2.3	2	3	7	1	0	2	0	0
Roosevelt Avenue	06/08 – 05/09	4	3	7.2	0	0	2	2	0	0	0	0
Wilson Street	11/06 – 07/09	11	0	2.7	4	4	3	0	0	0	0	0
Richmond Hill Ave	07/08 – 12/08	3	1	5.8	0	0	1	1	0	0	0	1
High Street	03/07 – 05/09	8	1	3.7	2	0	5	0	0	0	0	1
Fairfield Avenue	12/06 – 07/09	27	5	1.0	9	4	7	0	3	2	2	0
Hazel Street	12/06 – 01/09	4	0	4.4	0	2	0	0	0	1	1	0
Ann Street	12/06 – 06/09	6	1	8.4	0	2	3	0	0	1	0	0
Rose Park Avenue	09/06 – 04/09	13	1	6.8	5	3	2	0	1	0	2	0
Stillwater Avenue	11/06 – 05/09	21	0	15.5	2	7	11	0	1	0	0	0
Tresser Blvd	10/06 – 06/09	10	0	4.1	2	2	6	0	0	0	0	0
	Totals	**225**	**20**	**-**	**45**	**46**	**80**	**18**	**8**	**16**	**7**	**4**

Note: No fatalities occurred at any locations.

6.2 Pedestrian and Bicyclist Crashes

A review of the SWRPA crash records from CTDOT's Traffic Accident Viewing System (TAVS) for 2006 to 2008 revealed 12 bicyclist crashes and 25 pedestrian crashes in the study corridor. Of these 12 bicyclist crashes, six resulted in injuries, but none were fatal or incapacitating (***See Table 6.3***). Of the 25 pedestrian crashes, 23 resulted in injuries, one was fatal and two resulted in incapacitating injuries (***See Table 6.4***). The fatal pedestrian crash occurred at 6:31 PM on Monday, August 20, 2007 at the US Route 1 and Stillwater Avenue intersection (MP 6.67). The crash record showed the weather was dry, lighting condition was dark but lit, the pedestrian was not in the road, and alcohol was involved. The first of the two incapacitating injuries occurred just south of the US Route 1 and Indian Field Road intersection (MP 3.19) at 7:35 AM on Tuesday, October 10, 2006 with dry conditions and the pedestrian crossing between intersections. The second incapacitating injury occurred between Clinton Avenue and Route 137 (MP 6.89) at 6:32 PM on Wednesday, July 16, 2008 with dry conditions and the pedestrian crossing between intersections.

Table 6.3: Bicycle Crashes by Year

Year	Bicycle Crashes	Injury	Fatal	Lighting Conditions		
				Daylight	Dark/lit	Dark/unlit
2006	3	3	-	2	1	-
2007	4	2	-	3	1	-
2008	5	1	-	3	2	-

Table 6.4: Pedestrian Crashes by Year

Year	Ped Crashes	Injury	Fatal	Lighting Conditions		
				Daylight	Dark/lit	Dark/unlit
2006	6	6	-	5	1	-
2007	13	11	1	10	2	1
2008	6	6	-	4	1	1

KEY LOCATIONS

Downtown Greenwich

The downtown area beginning at Greenwich Avenue (MP 1.96) and ending at Maher Avenue/Millbank Avenue/Maple Avenue (MP 2.30) contained five pedestrian crashes and two bicyclist crashes between 2006 and 2008. This section of the study area has the highest amount of pedestrian activity and does not have shoulders for bicycle use. Of the five pedestrian crashes three were classified as "unsafe use of highway by pedestrian". Both of the bicyclist crashes were classified as the "bicyclists fault".

Downtown Stamford

The downtown Stamford area beginning at Stillwater Avenue (MP 6.67) and ending at Route 137 (MP 6.95) had a total of 6 pedestrian crashes and 4 bicyclist crashes between 2006 and 2008. All pedestrian crashes occurred under dry conditions with three being classified as "unsafe use of highway by pedestrian". All four bicyclist crashes were classified as the "bicyclists fault" with two occurring due to "defective equipment".

Three of the pedestrian crashes occurred at the US Route 1 and Stillwater Avenue intersection (MP 6.67). Possible improvements at this location include the following:

- Crosswalk striping on the Stillwater Avenue approach;
- Eliminate and/or enforce no on-street parking between crosswalks on the southern side of northbound US Route 1
- Better define all parking areas adjacent to the intersection; and
- Provide ADA compliant ramps.

Existing Conditions Operational Analysis

7.1 Traffic Volumes Base Network

The Town of Greenwich provided Urban with AM, MIDDAY and PM peak hour Synchro 6 files developed by DKS Associates based on 2007 turning movement counts. This project, titled *Town of Greenwich Traffic Signal Timing Implementation & Benefits Report*, analyzed 26 signalized intersections along US Route 1 within the Town of Greenwich. These 2007 counts along US Route 1 in Greenwich were combined with the 2010 counts conducted by Urban to develop the final base volumes for the Greenwich section of the project area. No previous weekday counts, other than Friday PM, were available for the Stamford section of the project; therefore, the seven intersections counted in Stamford during Urban's 2010 counts were utilized to develop the Stamford final base volumes.

In general the 2010 counts were lower than the 2007 counts within Greenwich except at the following areas:

AM Peak

- Greenwich Ave to Millbank Ave
- Sound Beach Ave to Riverside Ave (SB Only)

MIDDAY Peak

- Around Riverside Ave

PM Peak

- Riverside Ave to Church St/Mason St (SB Only)

The basis for the volume balancing was to blend the 2010 counts with 2007 counts at surrounding intersections by favoring the 2010 counts in most locations unless field conditions showed congestion and possible unmet demand issues with low turning movement counts. ***Appendix C*** contains turning movement information for each peak hour and each section (Greenwich West End, Greenwich East End and Stamford) of the project area.

7.2 Synchro/SimTraffic Model Development

The operational analysis was performed utilizing Synchro 7 and its simulation component SimTraffic. The base Synchro model for each peak period is setup with proper input data including geometric information, signal phasing and timing, volume information, truck percentage and peak hour factors and run in SimTraffic for multiple, separate one-hour simulations to account for the variability in traffic that occurs on a daily basis. The Initial model run provides output data including travel time, average delay per vehicle, and total network delay to facilitate the calibration process.

The DKS Associates Synchro 6 files provided by the Town of Greenwich were converted to Synchro 7 and developed into the 2010 base models. The first step in creating calibrated existing models was to ensure all intersection geometry including storage and taper lengths, approach grade percentages, and speed limits were coded properly. The next step was to input the current signal timings and phasing including coordination offsets, detector settings, and pedestrian intervals as provided by the Town of Greenwich's Traffic Engineering Department and the City of Stamford's Signal Systems Engineer. Many of the intersections in the model operated differently than observed in the field and had to be corrected for actual conditions.

The following sets of tightly spaced intersections within the project area each operated as one intersection on a single traffic signal controller

- Maher Avenue / Millbank Avenue / Maple Avenue
- Taylor Drive / Cross Lane / Strickland Road
- Wilson St / Richmond Hill Ave / Liberty St / Roosevelt Ave

The last step in setting up the base models was to enter the 2010 base network volumes as outlined in Section 7.1 along with peak hour factors (PHF) and heavy vehicle (HV) percentages. The DKS Synchro 6 files had default values for PHF and HV percentages; therefore, the 2010 Urban counts were utilized to develop appropriate values for 2007 DKS count locations where no data was available. The four zones setup in the DKS Synchro files were maintained for the 2010 base models with the addition of a "Stamford" zone encompassing all intersections in the Stamford project area. Once the base filed was established, the AM, MIDDAY and PM peak

hour base models were setup and each model was simulated in SimTraffic and visually checked for any unusual or unreasonable operations.

Modeling a 7-mile corridor with intermittent congestion at multiple locations poses various challenges. A firehouse is located at Sinawoy Road in the Cos Cob Hub area where frequent pre-emption calls force timing plans out of coordination and require time to get back into step and regain proper coordination with the surrounding network. The impact of pre-emption calls on a simulated coordinated network in Synchro cannot be modeled. Another field condition found throughout Greenwich was the over-utilization of the right most lane in each direction along US Route 1. This effect is as a result of most intersections not having left turn pockets, and the resulting queue from left turning vehicles waiting for an acceptable gap in opposing traffic. The last challenge was modeling the congested areas of I-95 Exit 5, Maher Ave/Millbank Ave/Maple Ave, and the Cos Cob Hub area.

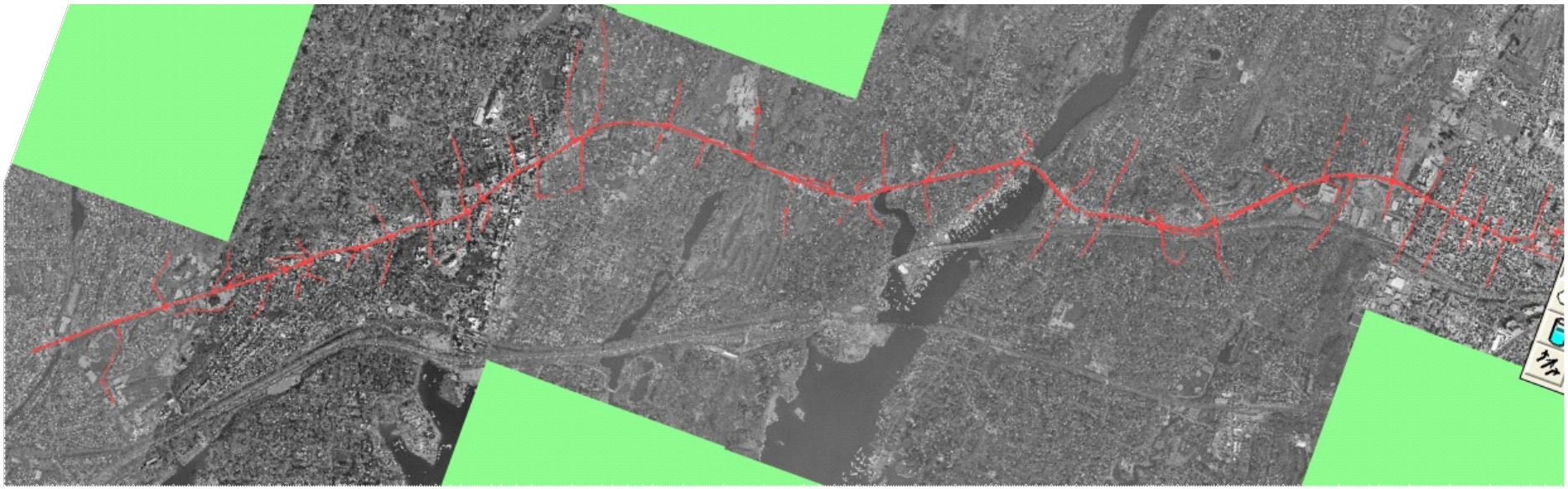


Figure 7.1: Snap Shot Overview of Synchro Model of Route 1 through Greenwich and Stamford

7.3 Calibration

Calibration is an iterative process where differences between field and model data are identified and resolved based on further investigation of the field data. Specific model parameters have an impact on the simulation and can generate a more realistic driver behavior including lane alignment through an intersection, turning speeds, lane change distances, headway factors and entering blocked intersections. Adjustment of these parameters helps bridge the gap between field and model data to enable model calibration.

The key measure of effectiveness (MOE) utilized for calibration of this corridor is travel time. Travel time data by mile point for the AM, MIDDAY, and PM peak periods were supplied by SWRPA and was based on an average of several travel time runs from the beginning to end of the 7-mile corridor (further discussed in Section 4c). The full travel time runs were divided into five sections as follows:

1) Western Junior Highway ⟷ Brookside Drive
2) Brookside Drive ⟷ Old Church Road
3) Old Church Road ⟷ River Road
4) River Road ⟷ Havemeyer Lane
5) Havemeyer Lane ⟷ West Main Street

After the five sections were developed travel time data was created and output for each of the AM, MIDDAY, and PM peak SimTraffic models. This is where the iterative calibration process begins and input data is reviewed for accuracy and model parameters are adjusted based on field information and model results.

When comparing multiple field travel time runs from the same day and peak hour the data fluctuates by 5 to 35%. The average fluctuation of 20% was utilized as the acceptable target for modeled travel times. In general, the model travel time runs are within 20% of those recorded in the field; however, in certain locations, a higher difference was recorded. These differences were considered acceptable as they were due to the field travel run vehicles not encountering red traffic signals in a particular section during the five runs. However, the model will always account for vehicles experiencing delay at traffic signals as it averages travel times and delays for an hour period.

Table 7.1: Model Calibration Travel Time Comparison

a. Results for AM Peak Hour

Direction	Section	Distance (miles)	Avg Speed (mph)	Travel Time (seconds)		
				Model	Field	Delta
NB	1	1.34	22	223	202	-10%
	2	1.08	16	241	214	-13%
	3	1.49	16	330	271	-22%
	4	1.49	16	342	321	-6%
	5	1.07	17	227	255	11%
SB	1	1.34	25	196	229	15%
	2	1.08	13	298	206	-45%
	3	1.49	18	293	315	7%
	4	1.49	19	288	275	-5%
	5	1.17	15	250	270	7%

b. Results for MIDDAY Peak Hour

Direction	Section	Distance (miles)	Avg Speed (mph)	Travel Time (seconds)		
				Model	Field	Delta
NB	1	1.34	22	217	180	-21%
	2	1.08	13	305	269	-14%
	3	1.49	17	326	286	-14%
	4	1.49	18	300	291	-3%
	5	1.07	15	254	275	8%
SB	1	1.34	25	191	170	-12%
	2	1.08	14	285	277	-3%
	3	1.49	15	353	299	-18%
	4	1.49	20	271	280	3%
	5	1.17	17	223	258	14%

c. Results for PM Peak Hour

Direction	Section	Distance (miles)	Avg Speed (mph)	Travel Time (seconds)		
				Model	Field	Delta
NB	1	1.34	21	231	175	-32%
	2	1.08	11	357	318	-12%
	3	1.49	14	394	335	-18%
	4	1.49	17	324	337	4%
	5	1.07	13	311	423	26%
SB	1	1.34	27	179	164	-9%
	2	1.08	11	361	245	-47%
	3	1.49	13	400	343	-17%
	4	1.49	17	318	300	-6%
	5	1.17	15	256	268	5%

7.4 Analysis Results

The calibrated base file results consist of an average of five SimTraffic runs each being seeded for 20 minutes followed by 60 minutes of data recording time. The results are divided into the five sections described in **Section 7.3** and key locations are discussed in detail. The 2010 SimTraffic existing conditions results for all three peak periods are tabulated for each section on an intersection movement and overall intersection basis for each signalized intersections. The results shown are the intersection Level of Service (LOS) (See ***Appendix F*** for explanation of levels of service) and, in cases of LOS E and LOS F, the average overall delay (seconds per vehicle).

Section 1: *Western Junior Highway to Brookside Drive*

The simulation results for Section 1 indicate that Suburban Greenwich has generally uncongested traffic conditions with overall intersection LOS C or better at all intersections with the exception of the Edgewood Drive/Prospect Street intersection which operates at LOS D in the AM and PM peak periods. Brookside Drive operates at LOS E during the AM and MIDDAY peak periods, and Weaver Street operates at LOS E and LOS F during the PM and MIDDAY peak periods, respectively.

The travel time results in minutes traveled from beginning to end of Section 1 are shown in ***Table 7.2***. The simulation travel time results indicate that Section 1 has relatively consistent travel times throughout all three peak periods ranging from approximately 3-4 minutes with average travel speeds of 21-27 mph (which includes delay at signals).

Table 7.2: Section 1 Simulated Travel Time Results

Peak	Direction	Time (min)	Speed (mph)
AM	NB	3.7	21.6
	SB	3.3	24.6
MID	NB	3.6	22.2
	SB	3.2	25.3
PM	NB	3.9	20.9
	SB	3.0	26.9

Table 7.3: 2010 Existing Conditions Section 1 LOS Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Western Jr Highway	A	A	B	-	A
Weaver St / Holly Hill Ln	C	B	C	C	C
Valley Dr	B	A	-	C	B
Old Post Rd #3	-	-	-	B	-
Harold Ave	A	A	C	B	A
Old Post Rd #2 / Josephine Evaristo Ave	-	-	C	D	-
Oak St / Columbus Ave	-	-	B	C	-
Edgewood Dr / Prospect St	C	C	D	C	C
Brookside Dr	B	B	E (57)	D	C

b. Results for MIDDAY Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Western Jr Highway	A	A	C	-	A
Weaver St / Holly Hill Ln	B	B	C	F (88)	C
Valley Dr	A	A	-	C	A
Old Post Rd #3	-	-	-	B	-
Harold Ave	A	A	B	B	A
Old Post Rd #2 / Josephine Evaristo Ave	-	-	C	C	-
Oak St / Columbus Ave	-	-	B	B	-
Edgewood Dr / Prospect St	E (56)	D	D	D	D
Brookside Dr	B	B	E (67)	E (57)	C

c. Results for PM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Western Jr Highway	A	A	C	-	A
Weaver St / Holly Hill Ln	B	B	D	E (60)	C
Valley Dr	A	A	-	C	B
Old Post Rd #3	-	-	-	A	-
Harold Ave	A	A	B	B	A
Old Post Rd #2 / Josephine Evaristo Ave	-	-	B	D	-
Oak St / Columbus Ave	-	-	C	C	-
Edgewood Dr / Prospect St	E (59)	C	D	D	D
Brookside Dr	C	B	D	D	C

Section 2: ***Dearfield Drive/Field Point Drive to Old Church Road***

The simulation results for Section 2 indicate that Downtown Greenwich has generally heavier traffic with various movements and overall intersections operating near or at capacity. The key area in Section 2 is the Whole Foods Market area between the Church St/Mason St and Maher Avenue/Millbank Avenue/Maple Avenue intersections. The Maple Avenue/Millbank Avenue intersection operates at LOS E during the AM and PM peak periods, and the Church Street/Mason Street intersection operates at LOS E during the PM peak period. Heavy left turning moves with no turn pockets and offset intersection geometry with multiple intersections operating as one intersection cause significant queuing at the Maher Avenue/Millbank Avenue/Maple Avenue intersection. In the northbound direction this queuing can extend back to the Church Street/Mason Street intersection creating periods of failing conditions. The Church Street/Mason Street intersection operates at LOS F in the southbound direction during the PM peak period.

The Greenwich Avenue/Lafayette Place intersection generally operates well with minor queuing in the northbound direction during the MIDDAY and PM peak periods. The Benedict Place intersection operates generally well during all peak periods due to minor sidestreet volume. The intersection of US Route 1 and Dearfield Drive/Field Point Drive operates well on all approaches with the exception of Field Point Drive. The Field Point Drive approach operates at LOS E during the AM and PM peak periods, and LOS F during the MIDDAY peak period.

Table 7.4: Section 2 Simulated Travel Time Results

Peak	Direction	Time (min)	Speed (mph)
AM	NB	4.0	16.1
	SB	5.0	13.0
MID	NB	5.1	12.7
	SB	4.8	13.6
PM	NB	6.0	10.9
	SB	6.0	10.8

The travel time results in minutes traveled from beginning to end of Section 2 are shown in ***Table 7.4***. The simulation travel time results indicate that Section 2 has travel times that generally increase throughout the day with the PM peak period having the highest travel times and slowest average speeds (11mph).

Table 7.5: 2010 Existing Conditions Section 2 Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Dearfield Dr / Field Point Dr	B	C	E (57)	E (57)	D
Benedict Place	A	A	E (57)	D	B
Greenwich Ave / Lafayette Place	C	C	-	E (62)	D
Church St / Mason St	C	C	D	D	D
Maher Ave	C	A	-	E (70)	B
Maple Ave / Millbank Ave	C	E (78)	E (71)	D	E (60)
Old Church Rd	A	B	D	C	B

b. Results for MIDDAY Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Dearfield Dr / Field Point Dr	C	C	F (81)	D	D
Benedict Place	A	B	D	D	B
Greenwich Ave / Lafayette Place	E (59)	C	-	E (65)	D
Church St / Mason St	D	D	E (55)	E (57)	D
Maher Ave	C	A	-	E (75)	B
Maple Ave / Millbank Ave	C	D	E (57)	D	D
Old Church Rd	A	C	E (70)	D	B

c. Results for PM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Dearfield Dr / Field Point Dr	D	C	E (75)	D	D
Benedict Place	B	A	D	D	B
Greenwich Ave / Lafayette Place	E (68)	D	-	E (55)	D
Church St / Mason St	D	F (81)	D	D	E (62)
Maher Ave	D	A	-	E (66)	C
Maple Ave / Millbank Ave	E (70)	E (79)	E (79)	D	E (73)
Old Church Rd	B	C	E (70)	C	C

Section 3: ***Overlook Drive to River Road***

The simulation results for Section 3 indicate that the Cos Cob area has significant congestion in the Hub area at the intersection of Strickland Road/Taylor Drive/Cross Lane during the PM peak period. This intersection operates at LOS E and LOS F during the PM peak period for the northbound and southbound US Route 1 directions, respectively, and at an overall intersection LOS E (75 sec/veh). In the southbound direction vehicle queuing reaches through the Sinawoy Road intersection causing additional delay.

The intersection with Hillside Road operated fairly well (LOS D or better) when considering average vehicle delay for the whole peak hour. However, in the AM peak hour there is a 15-20 minute period spike in traffic due to the High School traffic. This spike in traffic also occurs in the simulation where southbound queues on Route 1 extend to Indian Field Road, and northbound left turning vehicles experience delay trying to turn onto Hillside Road.

The travel time results in minutes traveled from beginning to end of Section 3 are shown in ***Table 7.6***. The simulation travel time results indicate that Section 3 has travel times that generally increase throughout the day with the PM peak period having the highest travel times and lowest average speeds.

Table 7.6: Section 3 Simulated Travel Time Results

Peak	Direction	Time (min)	Speed (mph)
AM	NB	5.5	16.3
	SB	4.9	18.3
MID	NB	5.4	16.5
	SB	5.9	15.2
PM	NB	6.6	13.6
	SB	6.7	13.4

Table 7.7: 2010 Existing Conditions Section 3 Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	NW	ALL
Overlook Dr	A	A	C	-	-	A
Hillside Rd	C	C	-	C	-	C
Old Post Rd #6 / Indian Field Rd	D	C	C	E (68)	-	D
Strickland Rd / Taylor Dr / Cross ln	D	C	C	D	E (58)	D
Sinawoy Rd	A	B	-	C	-	B
Orchard St / Mead Ave	C	D	D	D	-	C
River Rd	C	C	C	D	-	C

b. Results for MIDDAY Peak Hour

Intersecting Street	NB	SB	WB	EB	NW	ALL
Overlook Dr	A	A	C	-	-	A
Hillside Rd	B	B	-	D	-	B
Old Post Rd #6 / Indian Field Rd	C	D	C	D	-	C
Strickland Rd / Taylor Dr / Cross ln	D	D	C	E (59)	E (56)	D
Sinawoy Rd	B	C	-	C	-	B
Orchard St / Mead Ave	C	C	D	D	-	C
River Rd	B	C	C	D	-	C

c. Results for PM Peak Hour

Intersecting Street	NB	SB	WB	EB	NW	ALL
Overlook Dr	A	A	C	-	-	A
Hillside Rd	B	B	-	C	-	B
Old Post Rd #6 / Indian Field Rd	C	D	C	E (57)	-	C
Strickland Rd / Taylor Dr / Cross ln	E (68)	F (83)	D	E (73)	F (97)	E (75)
Sinawoy Rd	B	D	-	D	-	C
Orchard St / Mead Ave	C	D	D	D	-	D
River Rd	C	D	C	C	-	C

Section 4: Riverside Lane to Havemeyer Lane/Laddins Rock Road

The simulation results for Section 4 indicate that the I-95 Exit 5 interchange is the primary problem area within the section, operating at LOS E for all three peak periods. The Neil Lane/Shopping Center approach operates at LOS F for all three peak periods with more than three minutes of delay during the PM peak period. The southbound US Route 1 approach operates well with the exception of the left turn move onto I-95 which sporadically extends to the end of the 450 foot turn pocket. The northbound US Route 1 approach operates well with the heavy northbound right turn onto I-95 having an overlap phase. The SB Exit 5 ramp (SW approach in Table) generally operates well in all peak periods with the exception of the MIDDAY peak and the NB Exit 5 ramp (WB approach in Table) generally operates well in all peak periods with the exception of the AM peak. Sheep Hill Road operates at LOS E in the MIDDAY and PM peak periods, and LOS F in the AM peak period. The intersection with Havemeyer Lane operates at LOS E in the AM and PM peak periods with queuing on the side street approaches to that generally clears each cycle.

The travel time results in minutes traveled from beginning to end of Section 4 are shown in ***Table 7.8***. The simulation travel time results indicate that Section 4 has travel times that are generally consistent throughout all three peak periods ranging from 4.5 to 5.5 minutes. The average speeds of 16-20 mph indicate that traffic is experiencing some delay at the signalized intersections in the corridor although they remain higher than those in Sections 2 and 3.

Table 7.8: Section 4 Simulated Travel Time Results

Peak	Direction	Time (min)	Speed (mph)
AM	NB	5.7	15.7
	SB	4.8	18.6
MID	NB	5.0	17.9
	SB	4.5	19.8
PM	NB	5.4	16.6
	SB	5.3	16.9

Table 7.9: 2010 Existing Conditions Section 4 Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	SW	ALL
Riverside Ln	D	C	C	D	-	C
Sheep Hiill Rd / Lockwood Ln	C	C	D	F (103)	-	D
I-95 Exit 5 NB/SB/ Neil Ln	D	E (58)	E (76)	F (115)	D	E (63)
Sound Beach Ave	B	C	C	E (56)	-	C
Rockmere Ave	A	A	D	C	-	A
Wendle Place	A	A	D	B	-	A
Havemeyer Ln / Laddins Rock	C	C	C	E (76)	-	D

b. Results for MIDDAY Peak Hour

Intersecting Street	NB	SB	WB	EB	SW	ALL
Riverside Ln	C	B	C	D	-	C
Sheep Hiill Rd / Lockwood Ln	B	B	D	E (71)	-	C
I-95 Exit 5 NB/SB/ Neil Ln	D	E (60)	D	F (96)	E (79)	E (63)
Sound Beach Ave	B	B	D	D	-	C
Rockmere Ave	A	A	D	C	-	A
Wendle Place	A	A	D	B	-	A
Havemeyer Ln / Laddins Rock	C	C	C	C	-	C

c. Results for PM Peak Hour

Intersecting Street	NB	SB	WB	EB	SW	ALL
Riverside Ln	D	C	C	D	-	C
Sheep Hiill Rd / Lockwood Ln	B	B	D	E (66)	-	B
I-95 Exit 5 NB/SB/ Neil Ln	E (62)	E (72)	E (59)	F (197)	D	E (76)
Sound Beach Ave	C	C	D	E (56)	-	C
Rockmere Ave	A	A	D	B	-	A
Wendle Place	A	A	D	B	-	A
Havemeyer Ln / Laddins Rock	D	D	D	E (58)	-	D

Section 5: Alvord Lane to W. Main Street / Greenwich Ave

The simulation results for Section 5 indicate that during the MIDDAY peak all intersections operate at LOS D or better, and during the AM peak all intersections operate at LOS C or better, but the Virgil Street approach does operate at LOS F. During the PM peak period the West Avenue intersection operates at LOS F with approach delays of between 1-3 minutes of delay per vehicle. Queuing is extensive at this intersection due to heavy turning moves onto US Route 1 and no turn pockets. The northbound US Route 1 approach operates at LOS E with queuing due to left turners blocking the leftmost lane. The results of the PM peak period analysis indicates that the approaches of Virgil Street and Diaz Street operate at LOS F, and the Wilson Street and Richmond Hill Avenue approaches operate at LOS E.

The travel time results in minutes traveled from beginning to end of Section 5 are shown in ***Table 7.10***. The simulation travel time results indicate that Section 5 has southbound travel times approximately 4 minutes throughout all three peak periods, and northbound travel times that increase from under 4 to more than 5 minutes throughout the day. The lowest average speed (12.4 mph) was noted as occurring in the northbound direction during the PM peak hour. This reduced speed is as a result of the congestion at West Avenue as well as mid block left turning vehicles onto some minor side streets.

Table 7.10: Section 5 Simulated Travel Time Results

Peak	Direction	Time (min)	Speed (mph)
AM	NB	3.8	17.0
	SB	4.2	15.4
MID	NB	4.2	15.2
	SB	3.7	17.3
PM	NB	5.2	12.4
	SB	4.3	15.0

Table 7-11: 2010 Existing Conditions Section 5 Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Alvord Lane	B	B	D	D	B
Harvard Lane	B	B	C	-	B
West Ave	C	C	D	D	C
Virgil St / Diaz St	-	-	D	F (64)	-
Wilson St	B	A	D	-	A
Richmond Hill Ave / High St	A	B	D	-	B
Stillwater Ave	A	A	-	C	B
W. Main St / Greenwich Ave	A	B	B	C	B

b. Results for MIDDAY Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Alvord Lane	B	A	D	D	C
Harvard Lane	B	A	C	-	B
West Ave	D	B	D	D	D
Virgil St / Diaz St	-	-	C	C	-
Wilson St	A	A	D	-	A
Richmond Hill Ave / High St	A	A	D	-	A
Stillwater Ave	A	A	-	C	A
W. Main St / Greenwich Ave	A	A	B	C	B

c. Results for PM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Alvord Lane	B	B	D	D	C
Harvard Lane	B	A	D	-	B
West Ave	E (62)	C	F (203)	F (97)	F (96)
Virgil St / Diaz St	-	-	F (54)	F (72)	-
Wilson St	A	A	E (59)	-	A
Richmond Hill Ave / High St	A	A	E (78)	-	A
Stillwater Ave	C	A	-	C	B
W. Main St / Greenwich Ave	B	B	C	C	B

Next Steps

8.1 Next Steps

This report covers the first phase of the project and is intended to provide a thorough and clear understanding of the issues in the corridor from traffic to land use to safety to multimodal mobility. It provides the foundation for understanding the rest of the plan.

In some sections of the report, in addition to identifying key issues are suggestions of potential solutions. These "solutions" were meant as starter ideas, which were explored along with many other options in the subsequent phases of the project.

The results of the existing conditions analysis correlate well with project objectives, and helped provide the project team with initial areas to focus on in the next phases of the project.

The study was divided into the following phases:

1. Existing Conditions Analysis
2. Visioning Workshop
3. Design Workshop
4. Implementation Plan and Final Report

Sample Artistic Rendering from Visioning Workshop

Phase 2: Visioning Workshop

The next phase in the project was the Visioning Workshop. The Visioning Workshop was conducted the week of June 14-17, 2010 and was intended to provide the community the opportunity to help shape the transportation improvements projects and land use policies that will impact future development along the Route 1 corridor.

Example of Visioning Workshop

The Visioning Workshop focused on the following topics, which collectively formed a Corridor Framework Plan that guided the development of more detailed design concepts and transportation strategies.

- Character Areas: These character areas are based on the information gathered from the stakeholders, public, field observations, land use patterns and jurisdictional boundaries and helped guide the type and character of potential transportation projects.
- Local Community Goals and Objectives: Based on existing plans, TAG meetings, stakeholder interviews, and public input, identify important areas to protect and their long-term land use vision.
- Economic Development/Redevelopment Opportunities: Identify where land use or urban form changes are likely based on local community plans, developer initiatives, and underutilized properties.
- New Street Network & Connectivity: Based on local community plans and redevelopment opportunities, identify a range of new street networks possible for further testing and evaluation.
- Multi-modal Strategies: Identify needed connections and facilities for pedestrians, cyclists, and transit; and key area destinations such as parks, schools, employment centers, etc.

Phase 3: Design Workshop

The Design Workshop, held on October 26-28, 2010, focused on developing, designing and testing a range of potential projects and design concepts for the corridor. The purpose of this workshop was to establish a range of physical road design, land use, and the urban design approaches/solutions that are targeted to the key technical issues while meeting the overall "vision" for the corridor and each subarea or district.

Example of Design Workshop

During the Design Workshop, the project team and community investigated and documented the results for a wide-range of transportation improvement alternatives including:

- Intersection Modifications
- Signage Improvements
- Safety
- Driveway and Access
- Transit
- Complete Streets & Multi-modal street design
- Roadway design opportunities
- Land Use and Redevelopment opportunities

The goal of the second workshop was to work with the community to develop a comprehensive community supported plan.

Phase 4: Implementation Plan and Final Report

In the last phase of the project, Implementation Plan and Final Report, the project team worked to produce a final plan and supporting document.