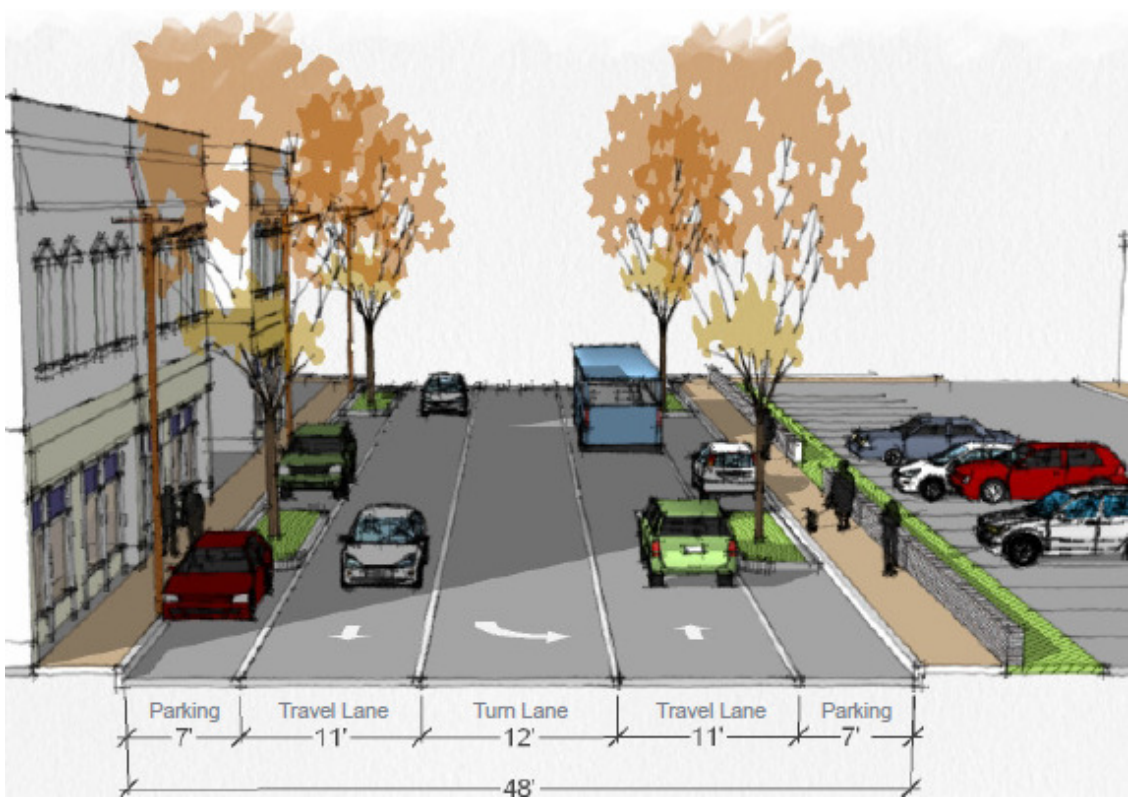

US Route 1

Greenwich/Stamford Operational Improvements Study

Volume Three: Future Conditions and Implementation Plan

October 2011

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Introduction

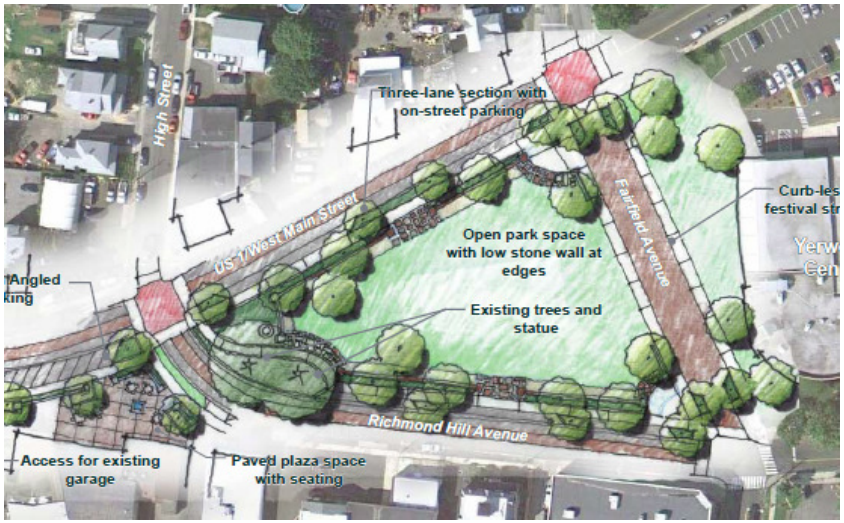
1.1 Introduction

The third volume of the US Route 1 Greenwich/Stamford Operational Improvements Study focuses on the Future Conditions Operational Analysis and an Implementation Plan for the Route 1 corridor. Anticipated future conditions were tested using the traffic simulation model developed during the existing conditions assessment phase of the project. The intent of this final phase of the project was to present an implementation plan of recommended improvements, that are feasible and reasonable and have community support for each section of the corridor.

Section 2: Future Conditions Operational Analysis includes a summary of the development of Design volumes, the No Build analysis, and the Build analysis. The Design volumes are used for the No Build and Build operations analyses. Results are provided in summary tables with details in the appendices.

Section 3: Evaluation Matrix and the Implementation Plan include analysis and prioritization of the design concepts from an implementation perspective. The evaluation matrix identifies the strengths and weaknesses of each proposed concept based on four categories: benefits, impacts, traffic analysis and implementation. The evaluation matrix identifies a next step for each concept. The implementation plan organizes and prioritizes the concepts

The purpose of the study and the proposed implementation plan is to develop a community supported, coordinated plan to improve traffic operations on Route 1, improve pedestrian safety, manage access, accommodate transit and enhance the corridor's economic potential.



Project 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.*

Future Conditions Operational Analysis

2.1 Future Conditions Methodology

Design traffic volumes were developed for use in the analysis of future traffic conditions for the study corridor. The Design Volumes were developed using multiple sets of available data including 2007 intersection turning movement counts, 2008 ConnDOT Automatic Traffic Recorder (ATR) counts, 2010 intersection turning movement counts and anticipated development information. The process used to develop the traffic volumes is outlines below and in ***Figure 2.1***.

STEP 1: Existing Volumes - 2010 turning movement counts were combined with 2007 counts conducted by DKS Associates (see ***Volume 1: Section 7.1*** for detailed description).

STEP 2: Base Volumes – Existing Volumes were combined with 2008 ConnDOT ATR counts. The balancing effort was a conservative approach where Existing Volumes were utilized unless 2008 ConnDOT counts showed higher volumes. This procedure was developed in coordination with ConnDOT, at a meeting held on August 4th, 2010 (see ***Appendix A*** for meeting notes). In locations where 2008 ConnDOT counts were higher, the surrounding intersections were balanced upwards distributing the excess volume based on 2010 turning movement split percentages. In Stamford, the Existing Volumes were generally higher than the 2008 ConnDOT counts; therefore, no adjustments were necessary. See ***Appendix A*** for a memorandum with a detailed explanation of the Base Volumes development titled *Base Traffic Volumes*, and Base Volume figures.

STEP 3: Design Volumes - Investigation into proposed developments within the study area was conducted and site generated volumes were added to the Base Volumes to create the Design Volumes. ***Appendix A*** contains information on the proposed developments in the project area. These Design Volumes (see ***Appendix A***) will be used to conduct the No Build and Build alternatives analysis. Examples of the difference between the existing traffic volumes and design traffic volumes are provided in ***Table 2.1***. A more comprehensive comparison of traffic volumes is included in ***Appendix A***.

Table 2.1: Sample Traffic Volume Comparison

Peak	Intersecting Street	Direction	Existing Volume	Design Volume	% Increase
AM	Indian Field Dr	NB	701	854	22
	Edgewood St	SB	739	822	11
MID	Old Church St	NB	788	851	8
	Maple Ave	SB	945	1065	13
PM	Overlook Dr	NB	1250	1350	8

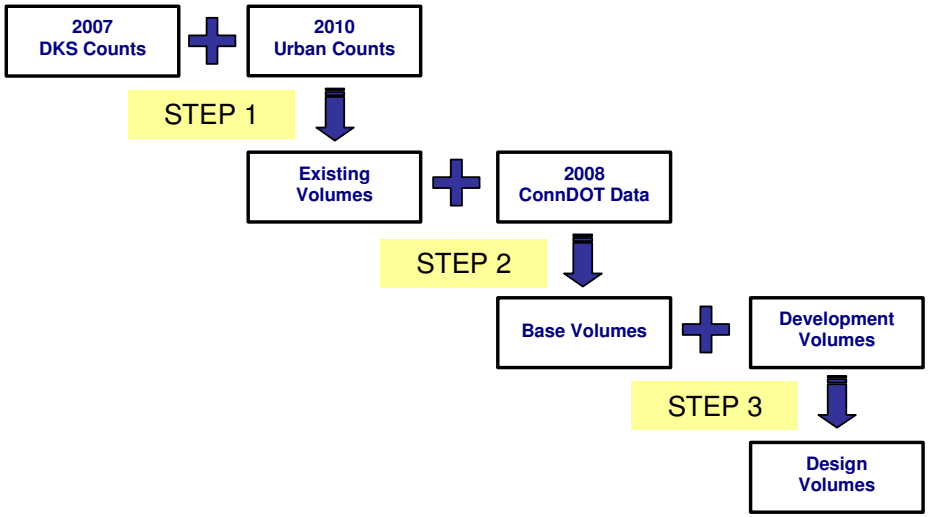


Figure 2.1: Future Traffic Volumes Development Steps

2.2 No Build Conditions Operational Analysis

The Existing conditions simulation model, developed and calibrated during Phase 1 of the project, was used as a basis for creating the No Build traffic model. The model was updated to include the Design Volumes, and minor traffic signal timing improvements. There are no infrastructure improvements included in this model, and all locations with exclusive pedestrian phasing remain. The No Build traffic model results are based on an average of five one-hour SimTraffic simulation runs. The results of the simulations were compiled and summarized by roadway section (as described in **Volume 1: Section 7.3**). The simulation Level of Service (LOS) results for all three peak periods (AM, Midday and PM) are tabulated by roadway section, intersection approach and overall intersection for each signalized intersection (See ***Appendix B*** for explanation of levels of service). ***Appendix B*** contains detailed LOS, delay, travel time and network results for each peak hour.

Section 1: ***Western Junior Highway to Brookside Drive***

The No Build simulation results for Section 1 indicate that Suburban Greenwich would be expected to operate with generally acceptable traffic conditions with overall intersection LOS D or better at all intersections with the exception of the Edgewood Drive/Prospect Street intersection which would operate at LOS F in the AM peak period. This intersection changed from a LOS D (54 sec/veh) in the existing model to a LOS F (89 sec/veh) in the No Build model.

The Section 1 travel time results for the Existing and No Build conditions are shown in ***Table 2.2***. A comparison of the simulation travel time results indicate that Section 1 would experience a significant increase in northbound travel time during the AM peak hour.

Table 2.2: Section 1 Existing & No Build Travel Time Results

Peak	Direction	Existing		No Build	
		Time (min)	Speed (mph)	Time (min)	Speed (mph)
AM	NB	3.7	21.6	5.0	16.1
	SB	3.3	24.6	3.7	21.6
MID	NB	3.6	22.2	3.7	22.1
	SB	3.2	25.3	3.3	24.7
PM	NB	3.9	20.9	3.6	22.3
	SB	3.0	26.9	3.4	23.8

Table 2.3: No Build Conditions Section 1 LOS Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Western Jr Highway	A	A	C	-	A
Weaver St / Holly Hill Ln	C	B	C	E (72)	C
Valley Dr	B	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	-	-	C	B	-
Edgewood Dr / Prospect St	F (99)	F (95)	E (58)	E (57)	F (89)
Brookside Dr	B	B	E (58)	E (57)	C

b. Results for MIDDAY Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Western Jr Highway	A	A	B	-	A
Weaver St / Holly Hill Ln	C	B	B	C	C
Valley Dr	B	A	-	C	B
Old Post Rd #3	-	-	-	B	-
Harold Ave	A	A	B	C	A
Old Post Rd #2 / Josephine Evaristo Ave	-	-	C	E (40)	-
Oak St / Columbus Ave	-	-	A	D	-
Edgewood Dr / Prospect St	C	C	D	C	C
Brookside Dr	B	B	D	D	C

c. Results for PM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Western Jr Highway	A	A	B	-	A
Weaver St / Holly Hill Ln	B	B	D	E (62)	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	-	-	C	D	-
Oak St / Columbus Ave	-	-	B	C	-
Edgewood Dr / Prospect St	D	E (56)	E (57)	D	D
Brookside Dr	B	B	D	E (57)	C

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

The No Build simulation results for Section 2 indicate that Downtown Greenwich has generally heavier traffic than Section 1, with various movements and intersections operating near or at capacity. The key problem area in Section 2 is the Whole Foods Market area between the Church St/Mason St and Maher Avenue/Millbank Avenue/Maple Avenue intersections. When comparing the Existing conditions analysis to the No Build analysis, the Chuch Street/Mason Street intersection increased from LOS D to LOS E during the Midday peak hour with all approaches operating at LOS E with the exception of the northbound direction. During the PM peak hour the Maple Avenue/Millbank Avenue intersection increased from LOS E to LOS F with the southbound direction operating at almost two minutes of delay. Also during the PM peak hour the Church Street/Mason Street intersection increased from LOS D to LOS E.

The Section 2 travel time results for the Existing and No Build conditions are shown in ***Table 2.4***. The simulation travel time results indicate that Section 2 experienced an increase in southbound travel time during the PM peak hour which is consistent with the increased delay results seen at several intersections.

Table 2.4: Section 2 Existing & No Build Travel Time Results

Peak	Direction	Existing		No Build	
		Time (min)	Speed (mph)	Time (min)	Speed (mph)
AM	NB	4.0	16.1	4.1	15.9
	SB	5.0	13.0	4.7	13.9
MID	NB	5.1	12.7	5.3	12.3
	SB	4.8	13.6	5.3	12.3
PM	NB	6.0	10.9	5.6	11.6
	SB	6.0	10.8	6.8	9.6

Table 2.5: No Build Conditions Section 2 Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Dearfield Dr / Field Point Dr	C	C	D	D	D
Benedict Place	A	A	E (56)	D	B
Greenwich Ave / Lafayette Place	C	C	-	E (58)	C
Church St / Mason St	C	D	D	D	D
Maher Ave	B	A	-	E (73)	B
Maple Ave / Millbank Ave	C	D	E (77)	D	D
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	E (63)	D	D
Benedict Place	A	B	D	D	C
Greenwich Ave / Lafayette Place	E (67)	C	-	E (64)	D
Church St / Mason St	D	E (66)	E (57)	E (68)	E (58)
Maher Ave	C	A	-	E (67)	B
Maple Ave / Millbank Ave	D	D	E (64)	D	D
Old Church Rd	A	C	C	C	B

c. Results for PM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Dearfield Dr / Field Point Dr	D	C	E (76)	D	D
Benedict Place	A	A	D	D	B
Greenwich Ave / Lafayette Place	D	C	-	E (56)	D
Church St / Mason St	D	F (107)	E (56)	E (61)	E (71)
Maher Ave	E (57)	A	-	E (70)	C
Maple Ave / Millbank Ave	E (75)	F (104)	E (75)	D	F (82)
Old Church Rd	B	C	F (85)	D	C

Section 3: *Overlook Drive to River Road*

The No Build simulation results for Section 3 indicate that the Cos Cob area would continue to experience congestion in the Hub area particularly at the intersection of Strickland Road/Taylor Drive/Cross Lane during the PM peak period. Traffic volumes through this area did not noticeably increase between the Existing conditions traffic volumes and the No Build (Design) traffic volumes. Signal timing changes helped improve operations in some locations; however, other locations experienced a noticeable increase in delay, for example, Indian Field Road and Strickland Road/Taylor Drive/Cross Lane intersections during the AM peak hour where the southbound Route 1 direction increased from LOS C to LOS D, and Taylor Drive increased from LOS D to LOS E.

The Section 3 travel time results for the Existing and No Build conditions are shown in ***Table 2.6***. The simulation travel time results indicate that Section 3 has a minor increase in travel time during the AM peak hour which is likely due to the increased delay results at the Indian Field Road and Strickland Road/Taylor Drive/Cross Lane intersections.

Table 2.6: Section 3 Existing & No Build Travel Time Results

Peak	Direction	Existing		No Build	
		Time (min)	Speed (mph)	Time (min)	Speed (mph)
AM	NB	5.5	16.3	5.8	15.5
	SB	4.9	18.3	5.4	16.7
MID	NB	5.4	16.5	5.7	15.6
	SB	5.9	15.2	5.8	15.3
PM	NB	6.6	13.6	6.2	14.4
	SB	6.7	13.4	5.1	17.7

Table 2.7: No Build 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	-	D	-	C
Old Post Rd #6 / Indian Field Rd	D	D	C	E (69)	-	D
Strickland Rd / Taylor Dr / Cross ln	D	D	C	E (70)	E (59)	D
Sinawoy Rd	A	B	-	C	-	B
Orchard St / Mead Ave	C	D	D	D	-	D
River Rd	D	C	C	D	-	C

b. Results for MIDDAY Peak Hour

Intersecting Street	NB	SB	WB	EB	NW	ALL
Overlook Dr	A	A	B	-	-	A
Hillside Rd	B	B	-	D	-	B
Old Post Rd #6 / Indian Field Rd	C	D	C	C	-	C
Strickland Rd / Taylor Dr / Cross ln	E (61)	D	C	E (58)	E (57)	D
Sinawoy Rd	B	C	-	C	-	B
Orchard St / Mead Ave	C	D	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	B	C	-	-	B
Hillside Rd	B	B	-	D	-	B
Old Post Rd #6 / Indian Field Rd	D	C	C	D	-	C
Strickland Rd / Taylor Dr / Cross ln	D	D	D	E (73)	F (107)	D
Sinawoy Rd	B	A	-	C	-	B
Orchard St / Mead Ave	D	A	E (56)	E (60)	-	C
River Rd	D	C	D	D	-	D

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

The No Build 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 with failing approaches during each peak. Section 4 in the No Build condition generally operates similar to the Existing conditions with minor increases in travel time results for the AM and MID peak periods (***Table 2.8***).

Table 2.8: Section 4 Existing & No Build Travel Time Results

Peak	Direction	Existing		No Build	
		Time (min)	Speed (mph)	Time (min)	Speed (mph)
AM	**NB**	5.7	15.7	6.0	14.8
	SB	4.8	18.6	4.8	18.6
MID	**NB**	5.0	17.9	4.9	18.2
	SB	4.5	19.8	4.7	19.2
PM	**NB**	5.4	16.6	5.3	16.8
	SB	5.3	16.9	5.2	17.4

Table 2.9: No Build Conditions Section 4 Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	SW	ALL
Riverside Ln	D	C	C	D	-	D
Sheep Hiill Rd / Lockwood Ln	C	C	C	D	-	C
I-95 Exit 5 NB/SB/ Neil Ln	D	E (64)	F (92)	E (78)	E (60)	E (66)
Sound Beach Ave	B	C	C	E (59)	-	C
Rockmere Ave	A	A	D	B	-	A
Wendle Place	A	A	D	B	-	A
Havemeyer Ln / Laddins Rock	C	C	E (56)	E (73)	-	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	C	C	D	E (68)	-	C
I-95 Exit 5 NB/SB/ Neil Ln	D	E (68)	D	F (116)	E (63)	E (64)
Sound Beach Ave	B	B	C	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	C	C	C	D	-	C
Sheep Hiill Rd / Lockwood Ln	B	B	D	F (155)	-	C
I-95 Exit 5 NB/SB/ Neil Ln	E (61)	E (76)	D	F (176)	D	E (74)
Sound Beach Ave	C	C	D	D	-	C
Rockmere Ave	A	A	D	B	-	A
Wendle Place	A	A	D	B	-	A
Havemeyer Ln / Laddins Rock	C	C	C	C	-	C

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

The No Build simulation results for Section 5 indicate that the during the PM peak period the West Avenue intersection would operate at LOS F with approach delays of between 1-3 minutes per vehicle, which is similar to Existing conditions. Section 5 in the No Build condition operates similar to the Existing conditions due to no volume adjustments being made between the Existing and No Build conditions. ***Table 2.10*** shows the Section 5 Existing and No Build condition travel time results, and ***Table 2.11*** shows the Section 5 No Build LOS results.

Table 2.10: Section 5 Existing & No Build Travel Time Results

Peak	Direction	Existing		No Build	
		Time (min)	Speed (mph)	Time (min)	Speed (mph)
AM	NB	3.8	17.0	3.9	16.6
	SB	4.2	15.4	4.2	15.4
MID	NB	4.2	15.2	4.2	15.2
	SB	3.7	17.3	3.8	17.0
PM	NB	5.2	12.4	4.8	13.5
	SB	4.3	15.0	3.8	16.8

Table 2.11: No Build Conditions Section 5 Results

a. Results for AM Peak Hour

Intersecting Street	NB	SB	WB	EB	ALL
Alvord Lane	A	B	D	D	B
Harvard Lane	B	A	D	-	B
West Ave	C	C	D	D	C
Virgil St / Diaz St	-	-	C	F (62)	-
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	B	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	C	C	C
Harvard Lane	C	A	C	-	B
West Ave	E (64)	B	F (115)	F (99)	E (74)
Virgil St / Diaz St	-	-	E (41)	E (44)	-
Wilson St	A	A	D	-	A
Richmond Hill Ave / High St	A	A	E (62)	-	A
Stillwater Ave	C	A	-	C	B
W. Main St / Greenwich Ave	B	B	B	B	B

2.3 Build Conditions Operational Analysis

The Build traffic model includes project Design Volumes, infrastructure changes and signal modifications based on the concepts developed during the Design Workshop (see ***Volume 2: Public Involvement***, for detailed descriptions of the concepts and visual renderings). The Build analysis was conducted for the highest daily peak hour (PM Peak), using the same methodology as was used for the Existing and No Build. Results of the analysis were compiled and summarized for each study area section. ***Appendix C*** contains detailed LOS and delay results for the PM peak hour Build condition.

Section 1: *Western Junior Highway to Brookside Drive*

The proposed concept for Section 1 includes a three-lane section comprised of a single through lane in each direction, with dedicated left turn lanes at the intersections (***Figure 2.2***), and a center turn lane between intersections. Additionally, the concept includes revising pedestrian phasing from exclusive to concurrent at all intersections within the section. This concept extends the entire length of the section from Western Junior Highway to Brookside Drive before returning to the existing cross-section. It should be noted the Design Workshop Summary Report includes a concept to redevelop the Byram Circle, located a quarter-mile southwest of the Route 1 and Western Junior Highway intersection, but was not operationally analyzed due to Byram Circle not being included in the project limits and lack of available traffic data.

The Section 1 travel time results in ***Table 2.12*** show a nine percent increase and one percent increase in travel time in the northbound and southbound directions, respectively, when comparing the Build and No Build simulation results.

Table 2.12: Section 1 - PM Peak Hour Travel Time Results

Travel Time Limits	Direction	Simulated Travel Time (Seconds)		
		Existing	No Build	Build
Western Jr. Highway to Brookside Drive	NB	231	217	236
	SB	179	204	207

The Section 1 LOS and delay results in ***Table 2.13*** indicate that Build LOS and delay would be consistent with Existing and No Build conditions with overall intersection LOS D or better at all intersections during the PM peak hour.

Table: 2.13 Section 1 - PM Peak Hour LOS and Delay Results

Intersecting Street	Existing	No Build	Build
Western Jr. Highway	A (6)	A (6)	A (7)
Weaver Street / Holly Hill Lane	C (24)	C (24)	C (28)
Valley Drive	B (12)	B (12)	B (19)
Harold Ave	A (2)	A (2)	A (4)
Edgewood Drive / Prospect Street	D (44)	D (53)	D (41)
Brookside Drive	C (21)	C (21)	B (19)

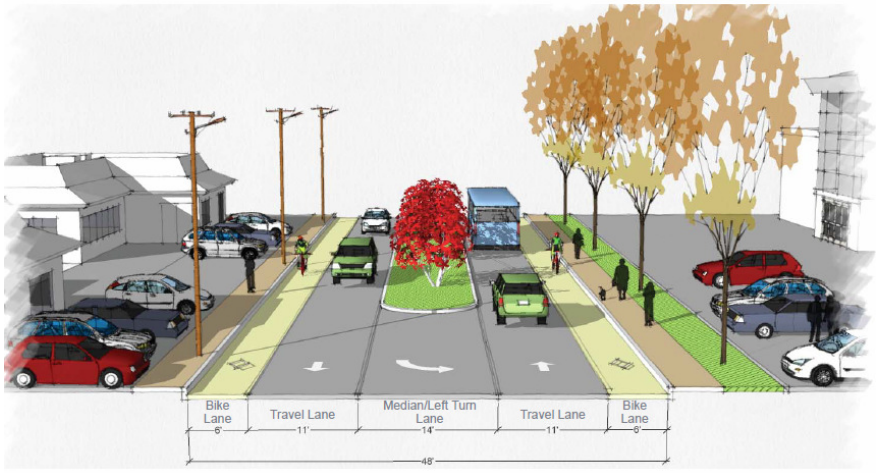


Figure 2.2: Proposed Cross Section (Dearfield to State Line)

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

Preliminary traffic analysis for a three-lane section through the Downtown Greenwich district indicated significant increases to delay and was therefore considered infeasible. However, while the existing four-lane section is proposed to remain under Build conditions, pedestrian improvements including intersection bulb-outs (***Figure 2.4***) and a new pedestrian connection at the Maher/Millbank/Maple intersection are proposed. These pedestrian enhancements were not operationally analyzed due to limited impacts to traffic operations; however, the shorter crossing distance and reduction in time needed for pedestrians to cross would be expected to increase the green time available for traffic flow.

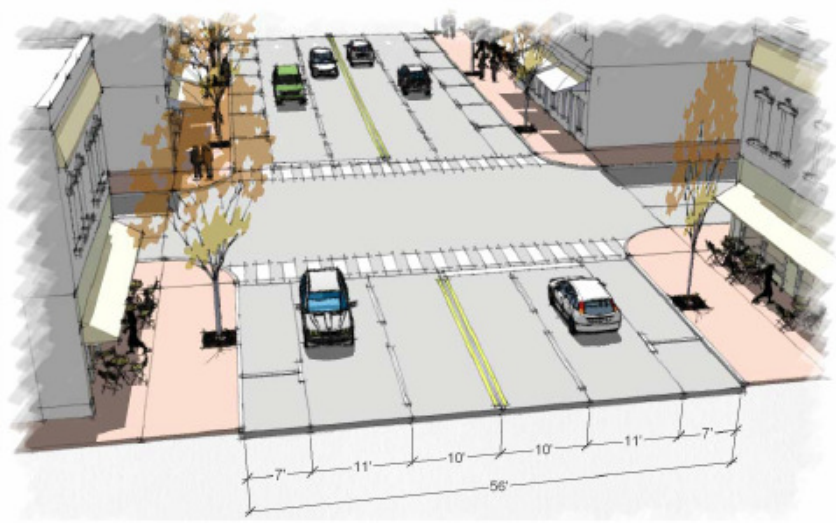


Figure 2.3: Existing Cross Section with 56' Crossing Distance

Figure 2.4: Proposed Cross Section with 42' Crossing Distance

Section 3: *Overlook Drive to River Road*

The Cos Cob district contains several concepts with varying degrees of impact to this section of the corridor. For the most part, this section consists of a three-lane cross-section comprised of a single through lane in each direction, with a center turn lane between intersections. However, Section 3, in addition to the three-lane cross-section, also has intersection specific improvements as described below:

Indian Field Road and US 1 Intersection

- At the Indian Field Road/US 1 Intersection, the concept includes moving left turns from northbound Route 1 at Indian Field Road to a new signalized intersection 800 feet to the north.

Cross Lane / Taylor Drive to Sinawoy Road

- Realign Cross Lane with Taylor Dr.
- Redesign Sinawoy Road to bring right turning vehicles to the intersection and reduce pedestrian crossing widths.

Orchard Street / Mead Avenue and US 1 Intersection

- Construct pedestrian blub-outs.

The Section 3 travel time results provided in ***Table 2.14*** indicate a 19 percent decrease and three percent decrease in travel time in the northbound and southbound directions, respectively, when comparing the Build and No Build simulation results. The three primary reasons for the favorable results are: (1) the use of concurrent pedestrian operations, (2) the realignment of Cross Lane and Taylor Drive, (3) the changes at Indian Field Road and US 1 intersection.

Table 2.14: Section 3 - PM Peak Hour Travel Time Results

Travel Time Limits	Direction	Simulated Travel Time (Seconds)		
		Existing	No Build	Build
Hillside Road to Sinawoy Road	NB	367	345	280
	SB	323	222	216

The largest improvement is realized at the Strickland/Taylor/Cross intersection where realigning Taylor Drive with Cross Lane, and creating dedicated left turn lanes results in LOS B operations under Build conditions (See ***Table 2.15***). The LOS and delay results for Section 3 indicate that the Cos Cob area would be expected to operate with generally acceptable traffic conditions with overall intersection LOS D or better at all intersections during the PM peak hour.

Table 2.15: Section 3 - PM Peak Hour LOS and Delay Results

Intersecting Street	Existing	No Build	Build
Hillside Rd	B (17)	B (19)	C (26)
Indian Field Rd / Old Post Rd #6	C (35)	C (33)	C (24)
Strickland Rd / Taylor Dr / Cross Ln	E (75)	D (42)	B (19)
Sinawoy Rd	C (30)	B (15)	B (11)
Orchard St / Mead Ave	D (42)	D (40)	D (36)
River Rd	C (35)	D (40)	C (27)

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

The Riverside district contains several concepts with varying degrees of impact to this section of the corridor. Section 4 concepts include the following:

Riverside Lane to Sheep Hill Road

- No changes.

I-95 Exit 5/Neil Lane to Sound Beach Avenue

- Reconfiguration including extension of Neil Lane to Sound Beach Avenue, two roundabouts replacing signals, and new shopping center access along Route 1.

Rockmere Avenue to Havemeyer Lane / Laddins Rock Road

- Three-lane section comprised of a single through lane in each direction, with dedicated left turn lanes at the intersections, and a center turn lane between intersections.

Conceptual analysis of the Exit 5 two-lane roundabout showed potential; however, queuing issues on the southbound and northbound I-95 exit ramp approaches as well as on Neil Lane indicate more comprehensive traffic analysis will need to be conducted for this roundabout that incorporates the traffic impacts (i.e., travel pattern changes) of the design concept (extension of Neil Lane) as well as the overall network wide traffic operations. Further details on this design concept can be found in the Design Workshop Summary Report (see ***Volume 2: Public Involvement***).

The Section 4 travel time results in ***Table 2.16*** show a nine percent increase in travel time in the northbound and southbound directions when comparing the Build and No Build simulation results between Rockmere Avenue and Havemeyer Lane.

Table 2.16: Section 4 - PM Peak Hour Travel Time Results

Travel Time Limits	Direction	Travel Time (Seconds)		
		Existing	No Build	Build
Rockmere Avenue to Havemeyer Lane	NB	90	85	93
	SB	92	76	83

The Section 4 LOS and delay results in ***Table 2.17*** indicate that the Rockmere Ave to Havemeyer Lane section of Riverside would be expected to operate with generally acceptable traffic conditions with overall intersection LOS D or better at all intersections during the PM peak hour for the Build condition.

Table 2.17: Section 4 - PM Peak Hour LOS and Delay Results

Intersecting Street	Existing	No Build	Build
Rockmere Avenue	A (9)	A (7)	A (7)
Wendle Place	A (8)	A (7)	A (8)
Havemeyer Lane / Laddins Rock Rd	D (43)	C (30)	D (37)

Figure 2.5: Proposed Midblock Cross Section

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

The Stamford district contains several concepts with varying degrees of impact to this section of the corridor. Section 5 concepts include the following:

Alvord Lane Roundabout

- Single lane roundabout (***Figure 2.6***).

Harvard Lane to Richmond Hill Avenue

- Three-lane section is comprised of a single through lane in each direction, with dedicated left turn lanes at the intersections, and a center turn lane between intersections, and
- Reconfigure Jackie Robinson Park including realigning Richmond Hill Avenue with High Street and removing the signal at Wilson Street.

West Main Street / Greenwich Avenue Roundabout

- Modified single lane roundabout.

The Section 5 travel time results in ***Table 2.18*** show a nine percent increase and two percent increase in travel time in the northbound and southbound directions, respectively, when comparing the Build and No Build simulation results.

Table 2.18: Section 5 - PM Peak Hour Travel Time Results

Travel Time Limits	Direction	Simulated Travel Time (Seconds)		
		Existing	No Build	Build
Alvord Lane to West Main Street	NB	311	286	313
	SB	205	191	194

The Section 5 LOS and delay results in ***Table 2.19*** indicate that traffic operations at the key intersection would be expected to operate with overall intersection LOS D or better at all intersections during the PM peak hour for the Build condition. The initial analysis for the two roundabouts was completed is VISSIM as isolated facilities; therefore, impacts on the surrounding network are unknown.

Table 2.19: Section 5 - PM Peak Hour LOS and Delay Results

Intersecting Street	Existing	No Build	Build
Alvord Lane	C (26)	C (20)	B (15)
Harvard Lane	B (17)	B (15)	C (26)
West Avenue	F (96)	E (74)	D (38)
Virgil Street / Diaz Street	C (16)	B (10)	A (7)
Wilson Street / Richmond Hill Ave	A (5)	A (5)	A (4)
High Street / Richmond Hill Ave	A (5)	A (6)	A (2)
Stillwater Ave	B (18)	B (16)	C (30)
West Main Street / Greenwich Ave	B (17)	B (15)	B (12)

Figure 2.6: Proposed Roundabout at Alvord Lane

2.4 Long Term 2030 Analysis

In addition to analyzing the concepts for the build conditions (see ***Section 2.1: Future Conditions Methodology***, for a detailed description of how the traffic volumes used in the build analysis were developed), the project team was asked to conduct additional traffic analysis using CTDOT-developed 2030 traffic volumes. This was done to assess potential long-term conditions. It should be noted that the 2030 traffic volumes used for the analysis are not constrained by the current capacity of the roadway (i.e., in some sections of the corridor the 2030 traffic volumes exceed the amount of traffic that could be accommodated by the existing roadway width).

The project team conducted long-term analysis for the following three conditions: 2030 No Build, 2030 Fix and 2030 Proposed.

- ***2030 No Build:*** This scenario includes optimized signal timings and cycle lengths but no geometric changes from Existing conditions.
- ***2030 Fix:*** This scenario optimized the signal timings and cycle lengths for each intersection examined in the 2030 No Build scenario and added geometric improvements in order for the intersection to operate at LOS D or better.
- ***2030 Proposed:*** This scenario analyzed the proposed geometric design concepts and signal timing changes outlined in the previous section using the 2030 traffic volumes.

The analysis for these three conditions and corresponding 2030 traffic volumes are located in ***Appendix D***.

Evaluation Matrix and Implementation Plan

3.1 Evaluation Matrix

The project team and SWRPA have developed an evaluation matrix that identifies the strengths and weaknesses of each concept and recommends next steps. The design concepts analyzed in the matrix emerged from the Design Workshop held October 26-28, 2010 in Greenwich, Connecticut and are presented in more detail in the Design Workshop Summary Report (see ***Volume 2: Public Involvement***). The concepts are organized by study area section and intersection to show where each begins and ends, and are compared across four categories: *benefits*, *impacts*, *traffic analysis*, and *implementation*.

Each category, with the exception of traffic analysis, contains criteria which assesses each alternative based on its positive or negative impact, and the scale of this impact from minimal to significant. The traffic analysis category compares the Level of Service (LOS) and travel time for the 2010 Existing Conditions, No Build and Build alternatives. The implementation category contains several columns summarizing the benefits, impacts and traffic analysis, as well as overall anticipated project timeframe, order of magnitude cost estimates, and recommended next steps for each concept.

The following is a description of the evaluation criteria found within the matrix:

● **Positive Impact**	Design concept positively enhances the corridor. Size of the circle indicates the scale (minimal to significant) of the impact.
● **Negative Impact**	Design concept diminishes or causes complications to the corridor. Size of the circle indicates the scale (minimal to significant) of the impact.

Benefits

Parking	Anticipated impacts to parking design and/or change in the number of parking spaces.
Multi-Modal	Anticipated impacts to bicycle, pedestrian, and transit accommodations including dedicated bicycle lanes, multi-use trails and pedestrian bump-outs.
Community Vision	Consistent with the public vision developed during the Visioning Workshop including community character, mix of land use, traffic mobility, and multi-modal function.
Safety	Anticipated impact to safety including pedestrian enhancements, speed reduction, bicycle lanes, dedicated left turn lanes, and type and number of crashes.

Impacts

Environmental	Expected impacts (positive and/or negative) to environmental features including cultural/historical resources, stormwater, wetlands, etc.
Access	Anticipated impacts (positive and/or negative) to access including relocation and/or removal of business and residential access points.
ROW	Anticipated impact to properties.
Utilities	Expected impacts to surface and sub-surface utilities including utility poles, drainage, and lighting, and any signal modification including foundation relocation, signal head modifications, and mast arm adjustments.

Traffic Analysis

LOS (Delay)	PM peak hour LOS based on average vehicle delay in seconds per vehicle for design volumes.
Travel Time	PM peak hour travel time in minutes. Percent comparison is Build condition compared to No Build condition.

Implementation

Overall Benefits	Overall anticipated benefit based on the four criteria within the benefits category.
Overall Impacts	Overall anticipated impact based on the four criteria within the impacts category.
Overall Transportation	Overall anticipated transportation impact/benefit based on the LOS and travel time criteria within the traffic analysis category.
Timeframe	Estimated project completion time including analysis, design and construction. The anticipated timeframe is impacted by the issues within benefits, impacts and traffic analysis categories.

Timeframe:

Short = 0-2 years,
Medium = 2-5 years,
Long = 5+ years.

Implementation

Estimated Construction Cost — Order of magnitude cost estimates.

Recommended Next Phase — The recommended next phase for each concept based on the anticipated benefits, impacts, traffic analysis and estimated construction costs. Next phase of project development includes Design, Concept Refinement, and Concept Development.

Design (D) - Concepts with minimal impacts and remaining issues that could move to design.

Concept Refinement (CR) - A preferred concept is defined, and focus shifts to furthering the details of the concept so that impacts/issues can be identified and resolved.

Concept Development (CD) - Initial concepts have been developed, but more analysis and concept design needs to be completed to better understand the benefits and issues so a preferred concept can be identified. .

The intent of the evaluation matrix is (1) to provide an evaluation for each concept to help prioritize the concepts in the implementation plan and (2) identify the next step for each concept.

US 1 Greenwich-Stamford Operational Improvements Plan

Evaluation Matrix

Section	Intersection	Design Modification	BENEFITS: Parking	BENEFITS: Multi-Modal	BENEFITS: Community Vision	BENEFITS: Safety	IMPACTS: Environmental	IMPACTS: Access	IMPACTS: ROW	IMPACTS: Utility	TRAFFIC ANALYSIS: LOS (Delay): Existing	LOS (Delay): No Build**	LOS (Delay): Build***	Travel Time (minutes): Existing	Travel Time (minutes): No Build**	Travel Time (minutes): Build***	IMPLEMENTATION: Overall Benefits	Overall Impacts	Overall Transportation	Timeframe	Est. Construction Costs	Recommended Next Phase
Byram	State Line	Byram Circle Reconfiguration 2 Roundabouts	●	●	●	●	●	●	●	●	- *	- *	-	-	-	-	●	●	-	Long	$$$$	CD
	Byram Circle						●	●			- *	- *	-									
	Western Jr Hwy.	3 Lane Cross-Section Dedicated Bike Lanes	·	●	●	●	·	●	·	●	A (6)	A (6)	A (7)	NB 3.9 SB 3.0	NB 3.6 SB 3.4	NB 3.9 +9% SB 3.5 +1%	●	·	●	Short	$$	D
	Weaver Street										C (24)	C (24)	C (28)									
	Valley Drive										B (12)	B (12)	B (19)									
	Harold Ave										A (2)	A(2)	A (4)									
	Edgewood Drive										D (44)	D (53)	D (41)									
	Brookside Drive										C (21)	C (21)	B (19)									
Downtown Greenwich	Dearfield Drive	Intersection Bulb Outs	·	·	●	·	·	·	·	●	D (41)	D (40)	-	NB 6.0 SB 6.0	NB 5.6 SB 6.8	-	●	·	-	Short	$	D
	Benedict Place										B (17)	B (16)	-									
	Lafayette Place										D (51)	D (41)	-									
	Greenwich Ave																					
	Church St										E (62)	E (71)	-									
	Maple Ave/ Millbank Ave	Pedestrian Crossing/Connection	·	·	●	·	●	·	●	●	E (73)	F (82)	-	-	-	-	·	●	-	Medium	$	CR
Greenwich Green	Old Church Road	3 Lane Cross-Section Dedicated Bike Lanes Indian Field Intersection Improvements	·	●	●	●	●	●	●	●	C (21)	C (22)	-	-	-	-	●	●	●	Long	$$	CD
	Overlook Drive										A (9)	B (12)	-	-	-	-						
	Hillside Road										B (17)	B (19)	C (26)	NB 1.4 SB 1.6	NB 1.6 SB 1.5	NB 1.5 -2% SB 1.1 -27%						
	Indian Field Road										C (35)	C (33)	C (24)									

Cost

- $ $0 - $2 Million
- $$ $2 - $5 Million
- $$$ $5 - $10 Million
- $$$$ $10 Million +

Recommended Next Phase

- D - Design
- CR - Concept Refinement
- CD - Concept Development

Positive Impact

- ● Significant
- ● Medium
- ● Minimal

Negative Impact

- ● Significant
- ● Medium
- ● Minimal

Negligible or No Impact

- ·

* Traffic analysis not completed due to Byram Circle not being included in the project limits and lack of available traffic data.

** No Build analysis includes design volumes, optimized cycle lengths and signal timings, and existing exclusive pedestrian phasing.

*** Build analysis includes design volumes and concurrent pedestrian phasing. Travel time percent comparison is between No Build and Build.

US 1 Greenwich-Stamford Operational Improvements Plan

Evaluation Matrix

Section	Intersection	Design Modification	BENEFITS: Parking	BENEFITS: Multi-Modal	BENEFITS: Community Vision	BENEFITS: Safety	IMPACTS: Environmental	IMPACTS: Access	IMPACTS: ROW	IMPACTS: Utility	TRAFFIC ANALYSIS: LOS (Delay) Existing	LOS (Delay) No Build**	LOS (Delay) Build***	TRAFFIC ANALYSIS: Travel Time (minutes) Existing	Travel Time (minutes) No Build**	Travel Time (minutes) Build***	IMPLEMENTATION: Overall Benefits	Overall Impacts	Overall Transportation	Timeframe	Est. Construction Costs	Recommended Next Phase
Cos Cob	Strickland/Cross	3 Lane Cross-Section Strickland/Cross Reconfiguration	●	●	●	●	● / ●	● / ●	●	●	E (75)	D (42)	B (19)	NB 1.8 SB 2.0	NB 1.3 SB 1.1	NB 0.8 -43% SB 0.8 -28%	●	●	●	Long	$$	CD
	Sinawoy Road										C (30)	B (15)	B (11)									
	Orchard St	3 Lane Cross-Section Intersection Bulb-outs	●	●	●	●	•	•	•	●	D (42)	C (34)	D (36)	NB 2.0 SB 1.5	NB 2.4 SB 0.8	NB 1.9 -21% SB 1.3 +60%	●	•	-	Short	$	CR
	Diamond Hill										A (3)	A (3)	A (4)									
	River Road										C (34)	D (40)	C (27)									
Riverside	Riverside Lane	No Changes	•	•	•	•	•	•	•	•	C (33)	C (31)	-	NB 4.5 SB 5.0	NB 4.5 SB 4.9	-	•	•	-	•	•	•
	Sheep Hill Road										B (18)	C (26)	-									
	I-95 Exit 5 NB	I-95 Exit 5 Reconfiguration 2 Roundabouts & New Connections	•	●	●	●	●	●	●	●	E (76)	E (74)	-				●	●	-	Long	$$$$	CD
	Sound Beach Ave										C (34)	C (32)	-									
	Rockmere Ave	3 Lane Cross-Section Dedicated Bike Lanes	•	●	●	•	•	•	•	●	A (9)	A (7)	A (7)	NB 1.5 SB 1.5	NB 1.4 SB 1.3	NB 1.6 +9% SB 1.4 +9%	●	•	•	Short	$	D
	Wendle Place										A (8)	A (7)	A (8)									
	Havemeyer Lane										D (43)	C (30)	D (37)									
West Stamford	Alvord Lane	Single Lane Roundabout	•	•	●	•	●	●	●	●	C (26)	C (20)	B (15)	NB 5.2 SB 3.4	NB 4.8 SB 3.2	NB 5.2 +9% SB 3.2 +2%	●	●	•	Medium	$	CR
	Harvard Lane	3 Lane Cross-Section Dedicated Bike Lanes	●	●	●	●	•	•	•	●	B (17)	B (15)	C (26)				●	•	●	Short	$	D
	West Avenue										F (96)	E (74)	D (38)									
	Virgil St/Diaz St										C (16)	B (10)	A (7)									
	Roosevelt/Wilson	Richmond Hill Reconfiguration Jackie Robinson Park Reclamation	●	●	●	●	●	● / ●	●	●	A (5)	A (5)	A (4)				●	●	•	Medium	$$	CR
	Richmond Hill										A (5)	A (6)	A (2)									
	Stillwater Ave	Hybrid Roundabout	●	●	●	●	●	●	●	●	B (18)	B (16)	C (30)				●	●	•	Medium	$$	CR
	West Main Street										B (17)	B (15)	B (12)									

Cost

$	$0 - $2 Million
$$	$2 - $5 Million
$$$	$5 - $10 Million
$$$$	$10 Million +

Recommended Next Phase

D - Design

CR - Concept Refinement

CD - Concept Development

Positive Impact

- ● Significant
- ● Medium
- ● Minimal

Negative Impact

- ● Significant
- ● Medium
- ● Minimal

Negligible or No Impact

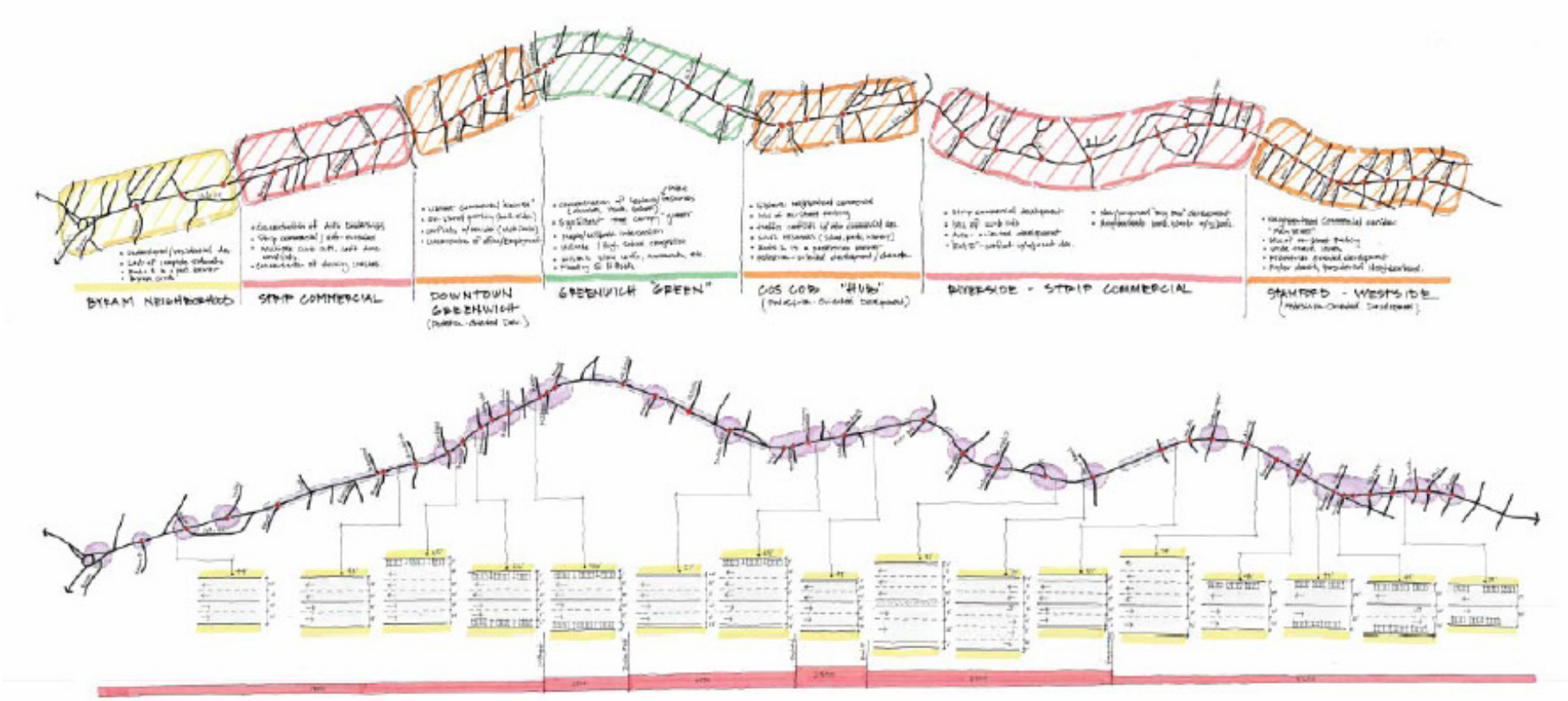
- •

** No Build analysis includes design volumes, optimized cycle lengths and signal timings, and existing exclusive pedestrian phasing.

*** Build analysis includes design volumes and concurrent pedestrian phasing. Travel time percent comparison is between No Build and Build.

3.2 Implementation Plan

The project team and SWRPA have developed a plan that prioritizes the implementation of concepts in the evaluation matrix. The implementation plan groups projects by the recommended next phase of design, concept refinement, and concept development to separate projects ready for quick implementation and project requiring further study. Within the recommended next phase, projects are prioritized from top to bottom based on the projects benefits, impacts, traffic operations analysis, public and stakeholder perception, cost, any outstanding concept issues, and ease of implementation.



US 1 Greenwich-Stamford Operational Improvements Plan

Implementation Plan

Next Phase	Section	Priority	Action	Lead	Timeframe	Cost Range	Major Factors Affecting Cost Range
DESIGN	ALL	High	- Retime and coordinate signals using Synchro model ★	Greenwich Stamford	Short	<$100K	None
	West Stamford	High	- Create a consistent roadway cross-section from W. Main/Greenwich Ave thru Havemeyer Ln - One lane per direction with turn lanes and/or center turn lane where applicable (1.0 mile) - Define parking by adding landscaping treatments and intersection bulb-outs	Stamford CTDOT	Medium	$500K - $2M	Landscaping, median and intersection treatments, ADA accommodations, signal modifications
	Downtown Greenwich	Moderate	- Install Intersection bulb-outs in Downtown Greenwich between Dearfield Dr and Maple Ave ★ - 6 signalized intersections	Greenwich	Short	<$500K - $1M	Potential impacts to stormwater and drainage
	Riverside	Moderate	- Implement road diet from Havemeyer Ln to Rockmere Ave with bicycle lanes (0.45 Mile) - 3 signalized intersections	Greenwich CTDOT	Short	$500K - $2M	Landscaping, median and bike lane treatments, ADA accommodations, signal modifications
	Byram	Moderate	- Implement road diet from State Line to Brookside Drive with bicycle lanes (1.65 Miles) - 6 signalized intersections	Greenwich CTDOT	Short	$2M - $4M	Landscaping, median and bike lane treatments, ADA accommodations, signal modifications
CONCEPT REFINEMENT	ALL	Moderate	- Adaptive signal technology in key sections	Greenwich Stamford CTDOT	Short	$100K - $1M	Technology investigation, equipment, installation, number of intersections
	Downtown Greenwich	Moderate	- Install pedestrian accommodations at Maher/Millbank/Maple intersection	Greenwich SWRPA	Medium	$100K - $500K	New sidewalk, median treatment, possible ROW costs, historic sites
	West Stamford	Moderate	- Realign Richmond Hill Ave intersection and improve Jackie Robinson Park	Stamford SWRPA	Medium	$3M - $5M	ROW impacts to possible 4(f) property, roadway design, traffic signal, pavement/street treatments
	West Stamford	Moderate	- Implement single lane roundabout at Route 1 and Alvord Lane	Stamford CTDOT	Medium	$1M - $2M	Anticipated ROW and utility impacts.
	West Stamford	Moderate	- Implement 2/1 hybrid lane roundabout at Route 1 and West Main St/Greenwich Ave	Stamford CTDOT	Medium	$2M - $3M	Anticipated ROW and utility impacts. Possible 4(f) properties on NE and SE corners.
	Cos Cob	Moderate	- Implement road diet & bulb-outs in Cos Cob between Orchard St and River Rd (0.4 Miles) - 3 signalized intersections (Orchard Street and two Diamond Hill intersections)	Greenwich CTDOT	Short	$500K - $2M	Landscaping, median and intersection treatments, ADA accommodations, signal modifications
CONCEPT DEVELOPMENT	Byram	High	- Reconfigure the Byram Circle - 2 single lane roundabouts	Greenwich CTDOT SWRPA NYSDOT	Long	$10M +	New/modified roadway, roundabouts, ROW impacts, landscaping, access, environmental and utility impacts, historic site on south side
	Greenwich Green & Cos Cob	Moderate	- Implement road diet from Old Church Road to Sinawoy Rd (1.1 miles) - Includes intersection changes at Indian Field and Taylor/Cross	Greenwich CTDOT	Medium	$3M - $5M	Landscaping, median and intersection treatments, ADA accommodations, signal modifications, back-in angle parking, parking lot reconfiguration, waterfront access, ROW
	Cos Cob	Moderate	- Redevelop Route 1 at Sinawoy Rd - New park/plaza, replacement on-street parking, planted median, reconfigure Starbucks parking	Greenwich CTDOT	Long	$2M - $4M	Anticipated ROW impacts to possible 4(f) property, access, utilities, transportation enhancements, back-in angle parking, parking lot reconfiguration, waterfront access
	Riverside	Low	- Improve Exit 5 by modifying existing ramps & connecting Neil Lane to Sound Beach Ave	CTDOT	Long	$5M - $10M	Redesigned interstate ramps, new roadways, intersections and connections
	Riverside	Low	- Reconfigure Route 1 between Neil Lane and Sound Beach Ave - Replace Neil Lane and Sound Beach Ave signals with roundabouts, and provide new shopping access	CTDOT	Long	$10M +	Anticipated ROW, access, utility impacts, two (2) new roundabouts, new signalized intersection, landscaping

★ Early action item

Notes:

Concepts within each plan are ordered by prioritization

3.3 Implementation Plan Project Grouping Recommendations

The Implementation Plan is based on individual projects grouped into "Next Phase" categories, but some projects that cross phase and/or section boundaries should be grouped together for roadway continuity. The following individual projects should be considered as group projects:

Riverside & West Stamford Road Diet

- DESIGN - West Stamford - Create consistent roadway cross section from W. Main Street/Greenwich Avenue through Havemeyer Lane
- DESIGN - Riverside - Implement road diet from Havemeyer Lane to Rockmere Ave with bicycle lanes
- CONCEPT REFINEMENT - West Stamford - Implement single lane roundabout at Route 1 and Alvord Lane

The goal with this grouping is to maintain a three lane cross section from just east of Sound Beach Avenue to Wilson Street/Richmond Hill Avenue where the existing two lane cross section will be met. The proposed roundabout at Alvord Lane is a single lane roundabout and it would be beneficial to have single lane approaches on Route 1 leading up to the roundabout.

Greenwich Green & Cos Cob Road Diet

- CONCEPT REFINEMENT - Cos Cob - Implement road diet & bulb outs in Cos Cob between Orchard Street and River Road
- CONCEPT DEVELOPMENT - Greenwich Green & Cos Cob - Implement road diet from Old Church Road to Sinawoy Road

The goal with this grouping is to maintain a three lane cross section for the entire Greenwich Green and Cos Cob roadway sections. In Greenwich Green the road diet will begin east of Maple Avenue and terminate just west of River Road in the Cos Cob section. The redevelopment of Route 1 at Sinawoy Road project could also be included with this grouping, but not including it does not preclude the project from being completed at a later date.

In addition to the grouped projects listed above, the two Riverside concept development projects at Exit 5 and Neil Lane/Sound Beach Avenue could be grouped together if design or operational characteristics of each individual projects requires the projects be carried out together.

Appendices

A. Traffic Volume Development
B. No Build Simulation Results
C. Build Simulation Results
D. 2030 Long Term Analysis

Appendix A: Traffic Volume Development

Meeting Summary

SUBJECT: US Route 1 Greenwich/Stamford Operational Improvements Study

DATE: August 4th, 2010

LOCATION: ConnDOT

ATTENDEES:

Alex Karman	SWRPA
Joe Ouellette	CTDOT – Traffic
Fred Kulakowski	CTDOT – Traffic
Dave Head	CTDOT – Planning
Gary Sojka	CTDOT – Planning
Melanie Zimyeski	CTDOT – Planning
Kate Rattan	CTDOT – Planning
Mike Connors	CTDOT – Planning
Todd Dumais	City of Stamford
Susan VanBenschoten	FHI
Scott Diehl	Urban Engineers
Órla Pease	Urban Engineers

Meeting Purpose:
This meeting was a coordination meeting to discuss and coordinate the development and use of existing and projected traffic volumes, discuss the study purpose and objectives, and to discuss initial cross-section and intersection concepts developed from the visioning workshop.

Meeting Handouts:
Meeting Agenda
Existing Traffic Volumes Memorandum dated 7-1-2010

Meeting Summary:
The following is a summary of the items discussed, next steps and action items.

Mr. Alex Karman, SWRPA Project Manager, introduced the project to the group, and provided a brief meeting purpose. Following introductions, Mr. Scott Diehl, Urban, provided additional information on the project based on the meeting agenda as follows:

Purpose and Objectives of the Study: The ultimate goal of the study is to provide a safer, more efficient multi-modal transportation facility. The study is examining the potential to enhance safety and operations for pedestrians, transit facilities as well as the general motoring public. The connection between traffic operations and local development is also being examined. The final plan will be broken into short and long term improvements.

Work Completed to Date: Mr. Diehl informed the group on the project status. The DRAFT Existing Conditions report was completed and circulated for comments. Completion of the final report is anticipated this month. W week long visioning workshops and stakeholder interviews were conducted in June in Greenwich and Stamford.

Existing Traffic Volumes and Design Volumes: Mr. Diehl described to the group, the traffic data collected in March and April of this year. Urban initially conducted turning movement counts at 20 intersections along the corridor. An additional five (5) locations were counted during the existing conditions analysis phase.

The discussion regarding the traffic volumes is summarized as follows:

- Mr. Diehl explained that the 2010 traffic data collected and developed by Urban Engineers was used in combination with other traffic data, including travel and delay studies, queuing information and intersection observations, to develop a simulation model calibrated to existing conditions in the field.
- The available CTDOT 2008 traffic volume information, which is higher in some locations than volumes recorded in 2010, will be used to develop a "Base" set of traffic volumes for the corridor. Urban will provide an initial set of these traffic volumes to CTDOT.
- There was lengthy discussion on the methodology to be used to develop future volumes for the corridor. The Technical Advisory Group (TAG) have previously agreed that designing to large projected volumes is not realistic for the corridor. CTDOT traffic agreed that widening of Route 1 through the study area is not an option due to impacts and public opposition.
- CTDOT will develop two (2) sets of unconstrained traffic volumes starting with the "Base" volumes. The first set will be projected for short term (5-years), the second set will be projected for long term (20 years).

Concepts Developed from Workshop: the results of the workshop and stakeholder interviews were briefly provided by Mr. Diehl:

- The majority of concerns from stakeholders were related to difficulties making left turns onto and off of Route 1.
- Safety was a major concern. There were 1800 crashes on the corridor in 3 years (2006-2009)
- Stakeholders do not envision or desire widening of Route 1.

Workshop outcomes and potential concepts for testing were also briefly discussed:

- Mr. Diehl presented a graphical representation of the corridor showing existing roadway cross sections, peak hour traffic volumes, and crash "hot-spots".
- Following discussion, it was determined that at this point in the project, different forms of intersection control and roadway cross-section options can be considered in the analysis of the project with the exception of 2-lane roundabouts. CTDOT would like to see successful single lane roundabouts in the state before installing 2-lane roundabouts.

Action Items:

- Urban Engineers will provide an initial set of "Base" volumes to CTDOT which will reflect the 2008 CTDOT traffic volumes
- Urban Engineers will provide information on known development in the project area to CTDOT
- Urban Engineers will provide graphical examples of 2-1 (major-minor) roundabouts to CTDOT Traffic

We believe the foregoing record to be an accurate summary of the discussion and related decisions. We would appreciate notification of exceptions or corrections to this summary within five (5) working days. Without notification, we will consider this summary to be a record of fact.

Respectfully Submitted,

URBAN ENGINEERS, INC.

Órla H. Pease, P.E., PTOE

US Route 1 Greenwich/Stamford Operational Improvements Plan
Base Traffic Volumes

MEMORANDUM

TO: File
FROM: Chris Burke
CC: Scott Diehl and Órla Pease
DATE: August 11, 2010
PROJECT: US Route 1 Greenwich/Stamford Operational Improvements Plan
SUBJECT: Analysis for merging 2008 ConnDOT counts with 2010 Urban counts to create base traffic volumes

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The purpose of this memo is to provide an explanation and results from the volume balancing effort undertaken to merge the 2008 ConnDOT counts with the Urban counts from April 2010 to create Base volumes. The volume balancing methodology was a conservative approach where 2010 Urban counts were utilized unless 2008 ConnDOT counts showed higher volumes. In the locations where 2008 ConnDOT counts were higher, the surrounding intersections were balanced upwards distributing the excess volume based on 2010 movement split percentages. The following locations were not balanced up to match the 2008 ConnDOT counts:

AM Peak

- *Old Post Road #6/Indian Field Road* – The ~180 car difference in the southbound direction for the 2008 ConnDOT counts does not seem consistent based on the 2008 counts at the surrounding intersections of Overlook Dr (-65) and Orchard St (-60). Is it possible this 2008 count is incorrect?
- *Orchard St* – The 2008 counts for the sidestreet are ~110 higher than 2010 counts. The attached file "Orchard Street Volumes.pdf" shows that the 2010 Urban counts agree with 2009 counts from a Chase Bank Traffic Impact Study submitted by Atlantic Traffic & Design Engineers in 2010.

MID Peak

- *Old Post Road #6/Indian Field Road* – The 2008 CTDOT count entering the intersection along southbound US 1 does not agree with the 2008 CTDOT volume exiting the intersection moving southbound.
- *Orchard St* – Same differences as AM.
- *Riverside Lane* – Sidestreet is ~110 higher in 2008 ConnDOT counts compared to 2010 counts, but surrounding 2008 count locations (River Rd & I-95 Exit 5) are lower than 2010 counts. Increasing this number would result in large imbalances at the adjacent intersections

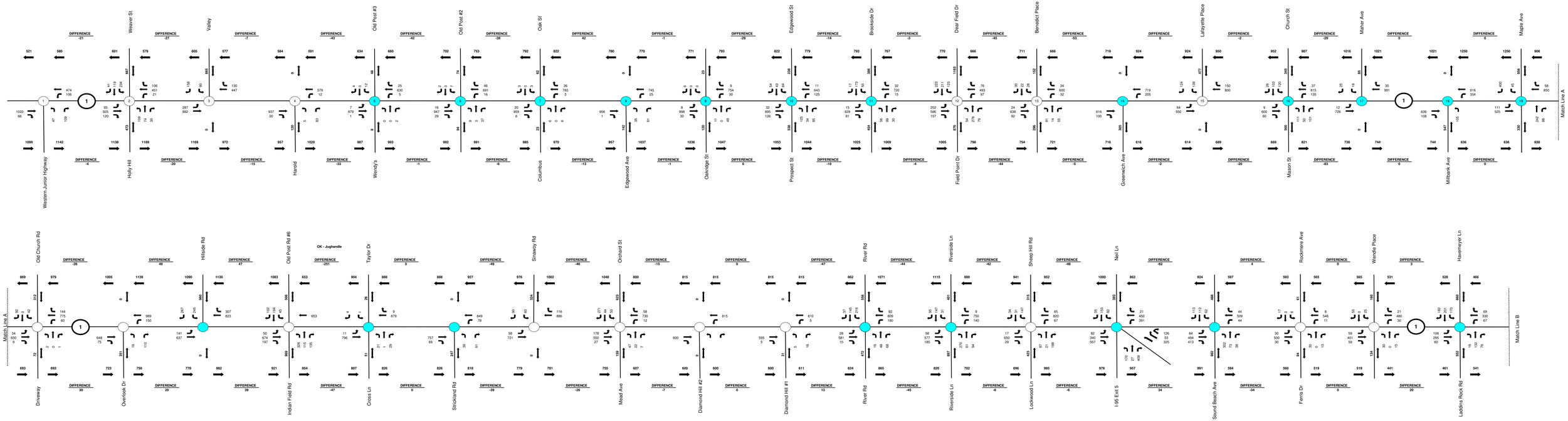
PM Peak

- *Orchard St* – Same as AM/MID
- *Riverside Lane* – Same as MID

In general the 2010 counts were higher than the 2008 counts located in Stamford and no adjustments were made. The attached PDF document "Base Volumes.pdf" shows the original 2010 Urban existing volumes, 2008 ConnDOT count locations, and proposed Base Volumes.

AM Peak

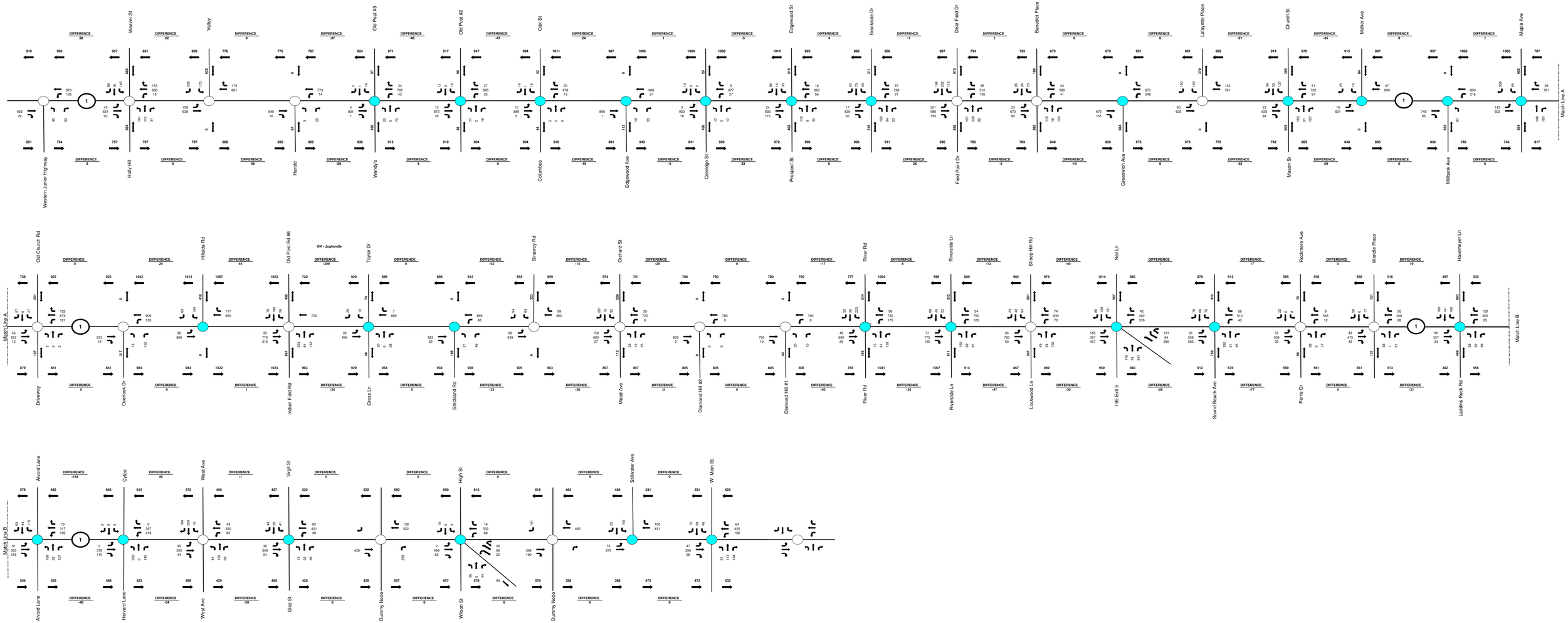
Base Volumes



Legend

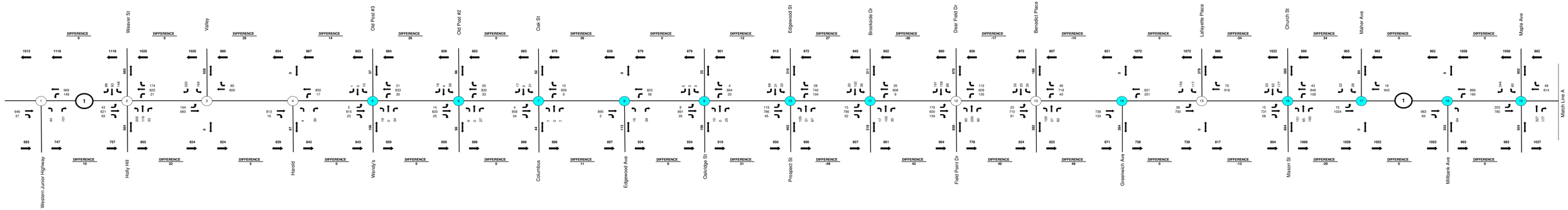
= 2010 Urban Count (AM Peak is 7:45-8:45)

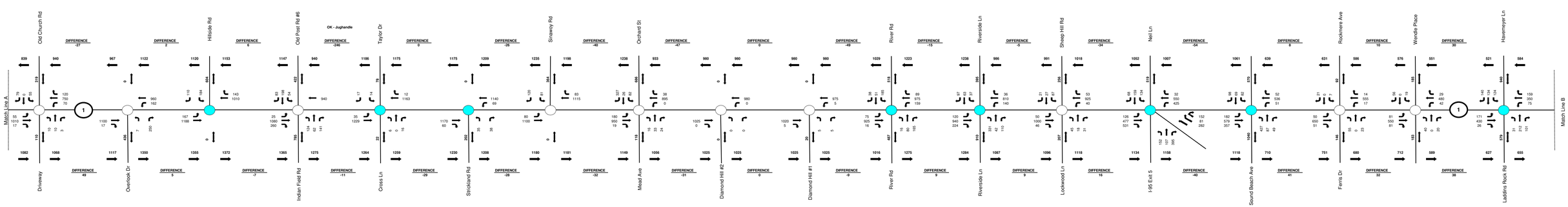
MID Peak
Base Volumes

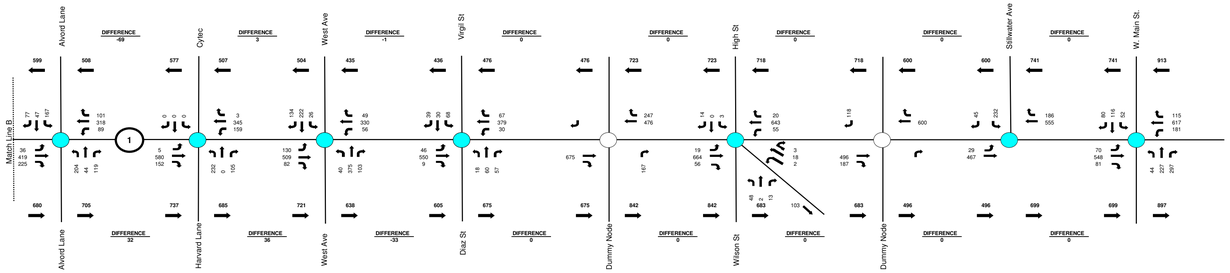


PM Peak

Base Volumes

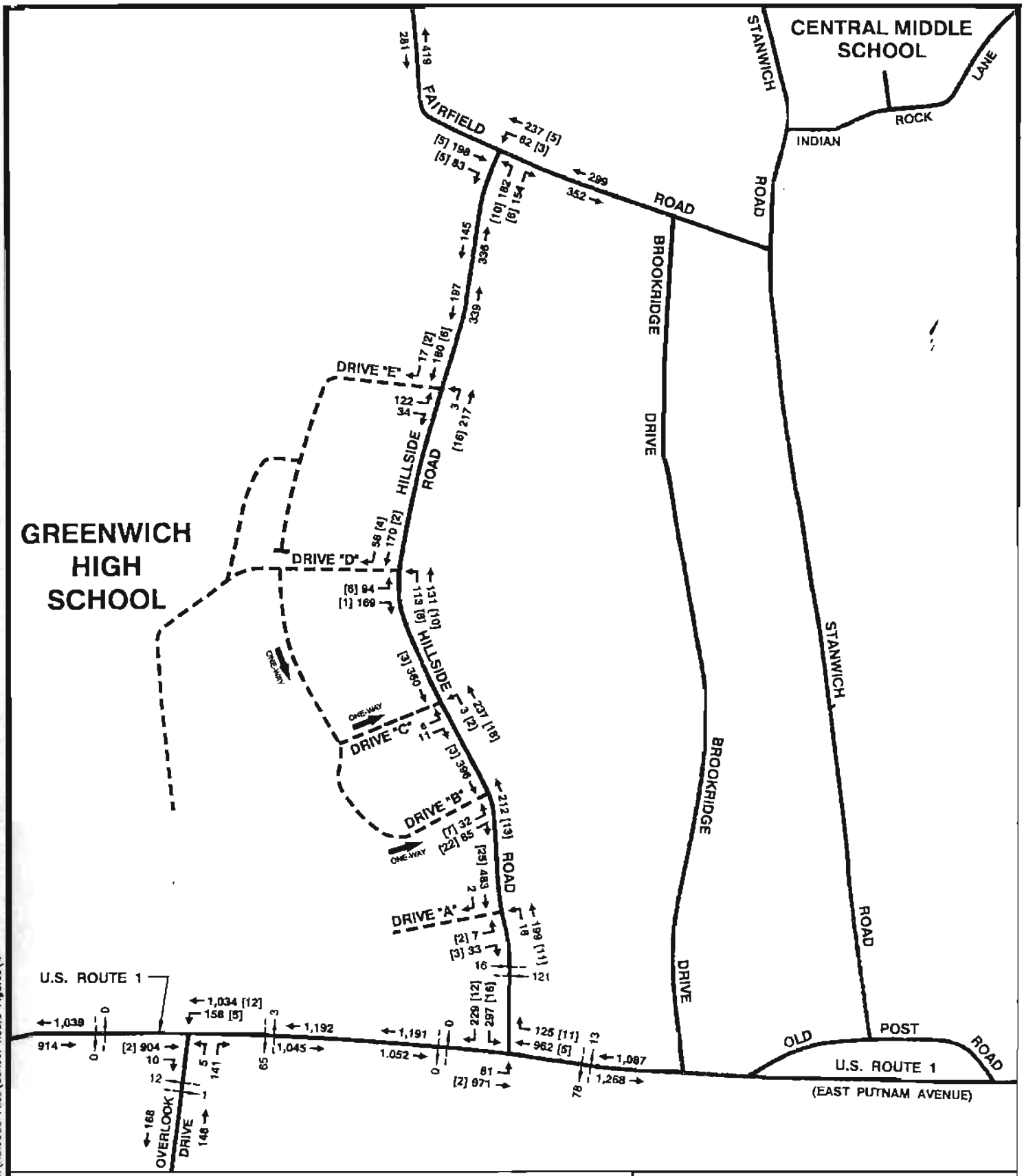






Legend

= 2010 Urban Count (PM Peak is 4:45-5:45)



LEGEND

- SITE ACCESS DRIVES
- [00] SCHOOL BUSES
- 00 PEDESTRIAN MOVEMENTS

Notes:

1. Manual turning movement counts conducted by Frederick P. Clark Associates, Inc. on Thursday, October 22, 2009 from 1:30 to 3:30 P.M.
2. Manual turning movement counts were compared and acceptable according to Connecticut Department of Transportation AutomaticTraffic Recorders data, March and April, 2005.

2009 EXISTING TRAFFIC VOLUMES
WEEKDAY AFTERNOON SCHOOL DEPARTURES
PEAK HOUR (2:15 – 3:15 P.M.)

GREENWICH HIGH SCHOOL
Greenwich, Connecticut

NORTH

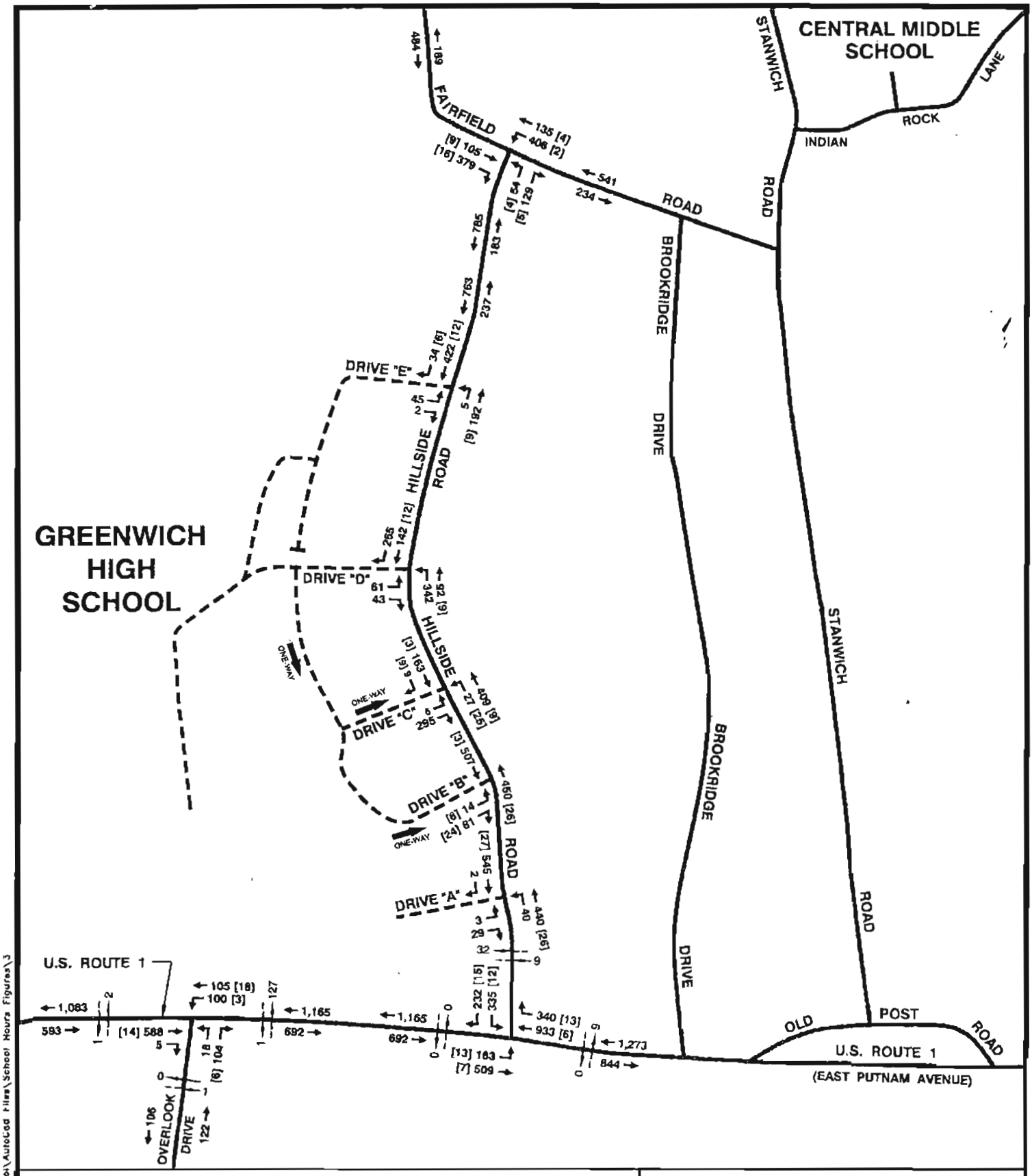
FREDERICK P. CLARK ASSOCIATES, INC.
Planning/Development/Environment/Transportation

Not to Scale

Date: 11/4/09

4

File: Q:\802.000 Greenwich High School\AutoCad Files\School Hours Figures\4



LEGEND

- SITE ACCESS DRIVES
- [00] SCHOOL BUSES
- 00 PEDESTRIAN MOVEMENTS

Notes:

1. Manual turning movement counts conducted by Frederick P. Clark Associates, Inc. on Thursday, October 22, 2009 from 6:30 to 8:30 A.M.
2. Manual turning movement counts were compared and adjusted to Connecticut Department of Transportation AutomaticTraffic Recorders data, March and April, 2005.

2009 EXISTING TRAFFIC VOLUMES
WEEKDAY MORNING SCHOOL ARRIVALS
PEAK HOUR (6:45 – 7:45 A.M.)

GREENWICH HIGH SCHOOL
Greenwich, Connecticut

NORTH

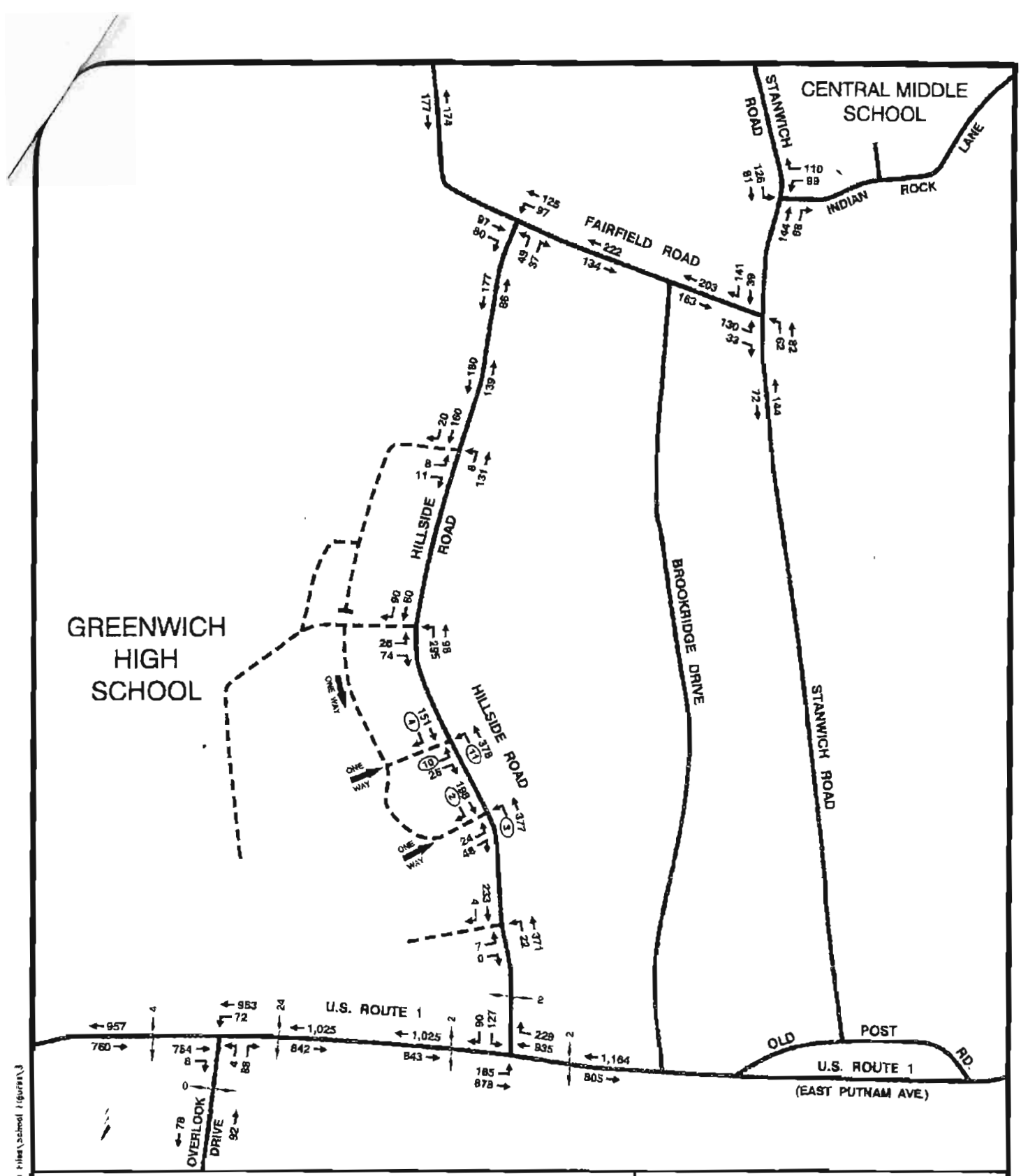
FREDERICK P. CLARK ASSOCIATES, INC.
Planning/Development/Environment/Transportation

Not to Scale

Date: 11/4/09

3

File: U:\502.000 Greenwich High School\AutoCad Files\School Hours Figures\3



LEGEND

- SITE ACCESS DRIVES
- (99) ILLEGAL MOVEMENTS
- PEDESTRIAN MOVEMENTS

Note:

1. Manual turning movement counts conducted by Frederick P. Clark Associates, Inc. on Wednesday, June 3, 2009 from 6:00 P.M. to 10:00 P.M.
2. Manual turning movement counts were compared and adjusted to CONNDOT ATR data, March and April, 2008

2009 EXISTING TRAFFIC VOLUMES
WEEKDAY EVENING EVENT ARRIVALS
PEAK HOUR - (6:45 to 7:45 P.M.)

GREENWICH HIGH SCHOOL
Greenwich, Connecticut

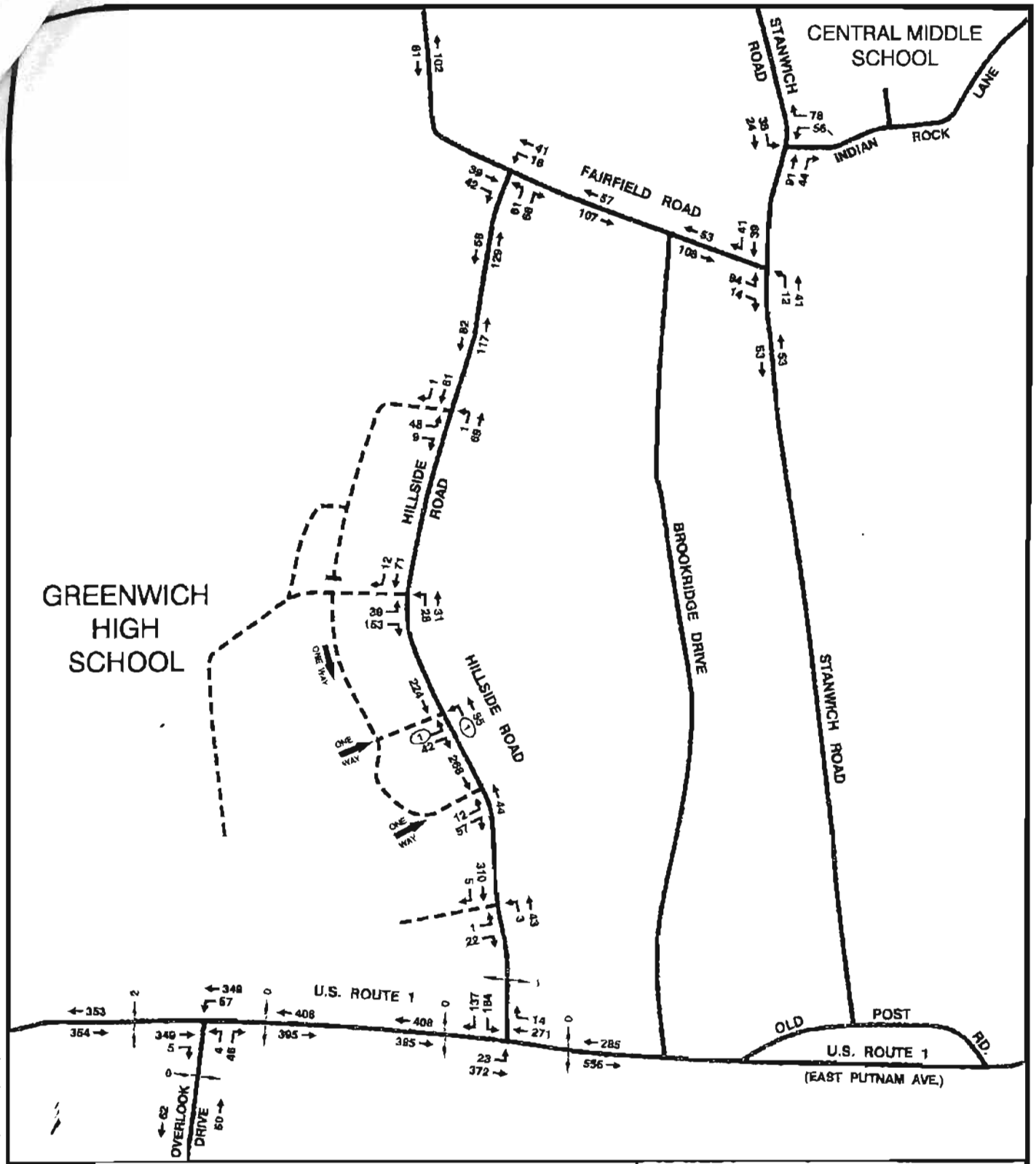
NORTH

FREDERICK P. CLARK ASSOCIATES, INC.
Planning/Development/Environment/Transportation

Not to Scale

Date: 7/30/09

3



LEGEND

- SITE ACCESS DRIVES
- (00) ILLEGAL MOVEMENTS
- 00 PEDESTRIAN MOVEMENTS

Note:

1. Manual turning movement counts conducted by Frederick P. Clark Associates, Inc. on Wednesday, June 3, 2009 from 6:00 P.M. to 10:00 P.M.
2. Manual turning movement counts were compared and adjusted to CONNDOT ATR data, March and April, 2005

2009 EXISTING TRAFFIC VOLUMES
WEEKDAY EVENING EVENT DEPARTURES
PEAK HOUR - (9:00 to 10:00 P.M.)

GREENWICH HIGH SCHOOL
Greenwich, Connecticut

NORTH

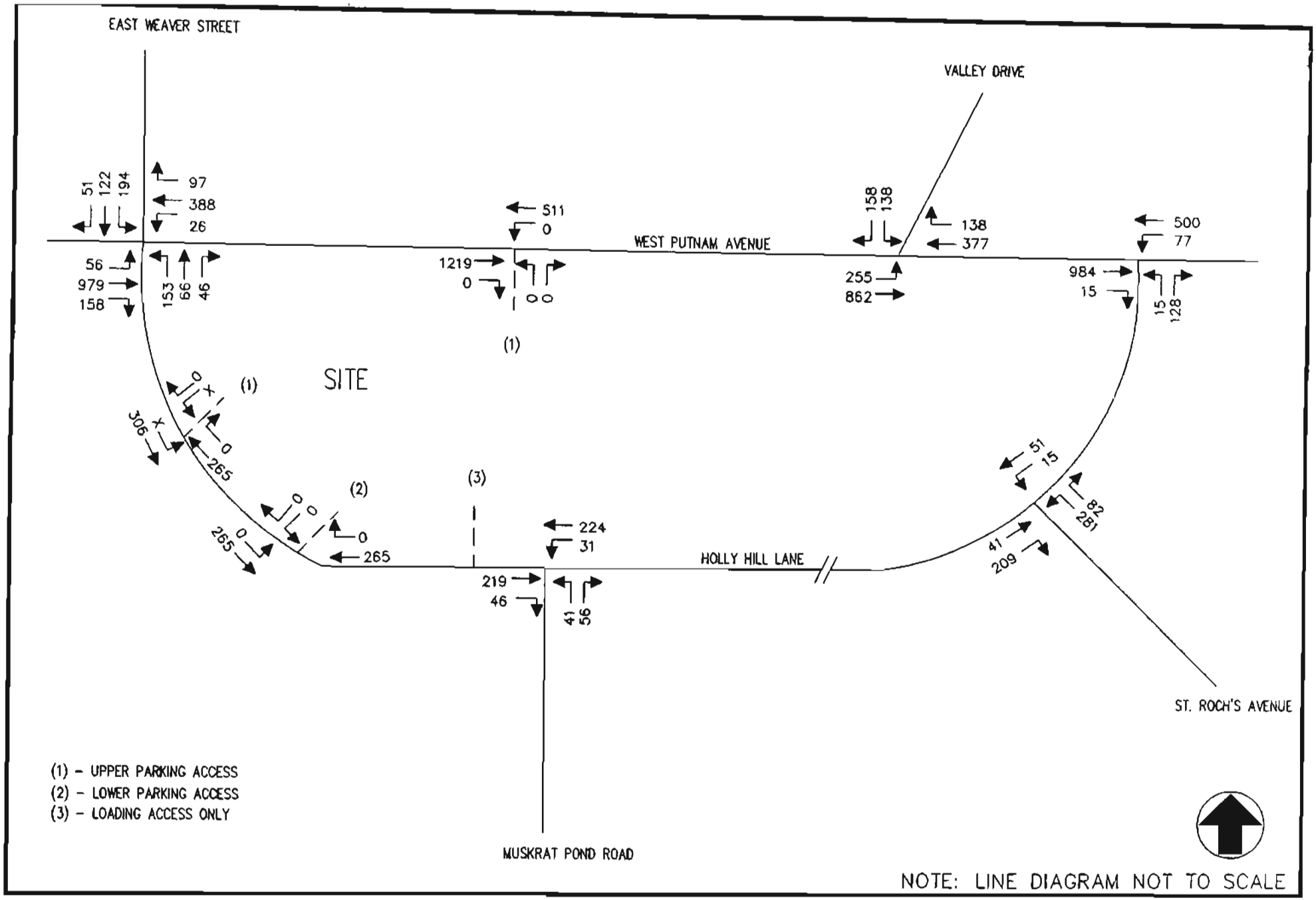
FREDERICK P. CLARK ASSOCIATES, INC.
Planning/Development/Environment/Transportation

Not to Scale

Date: 7/30/09

4

File: Q:\3602.000 Greenwich High School\AutoCad Files\School Figures\4

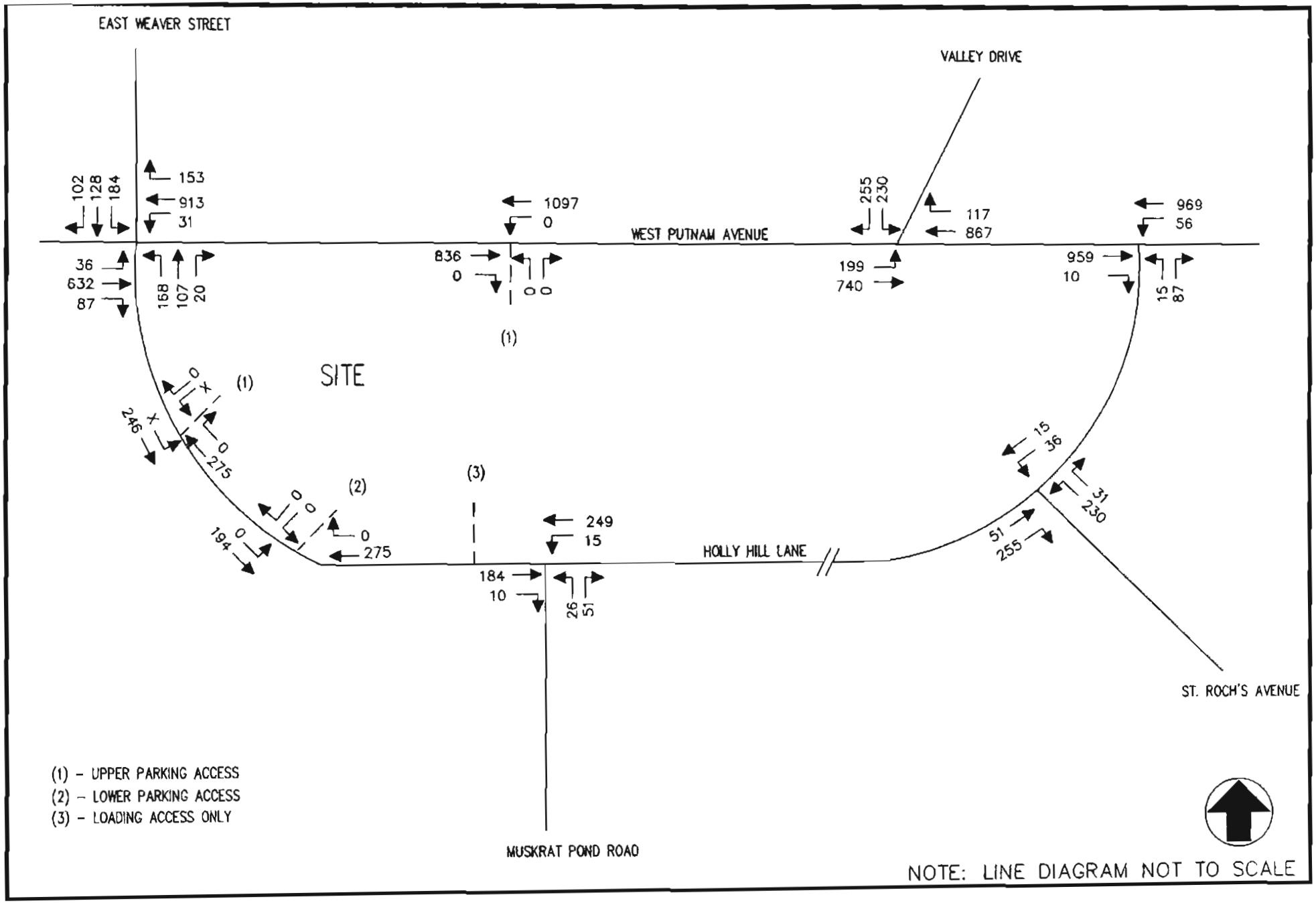


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2008 EXISTING TRAFFIC VOLUMES
PEAK AM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 2

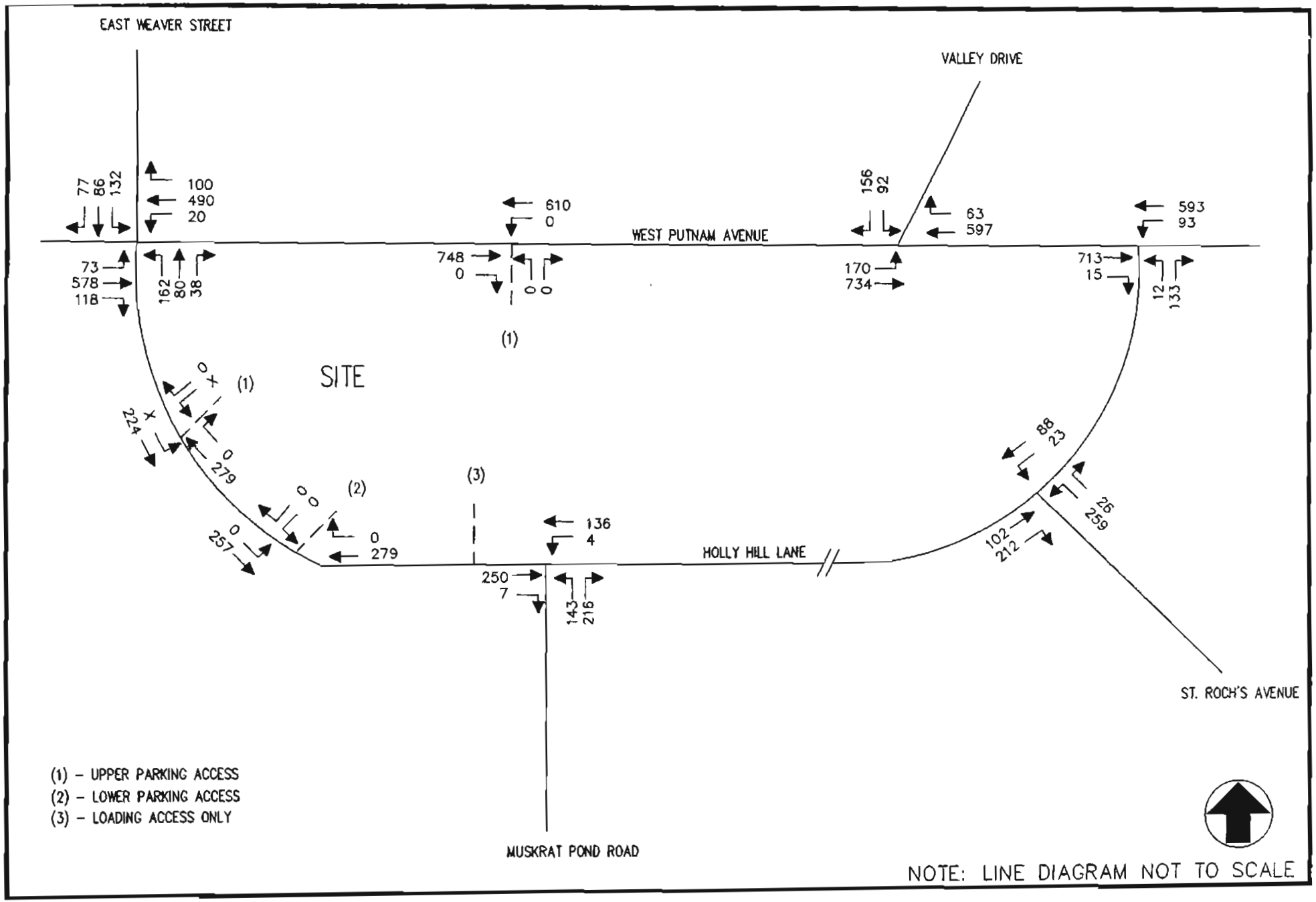


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2008 EXISTING TRAFFIC VOLUMES
PEAK PM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 3

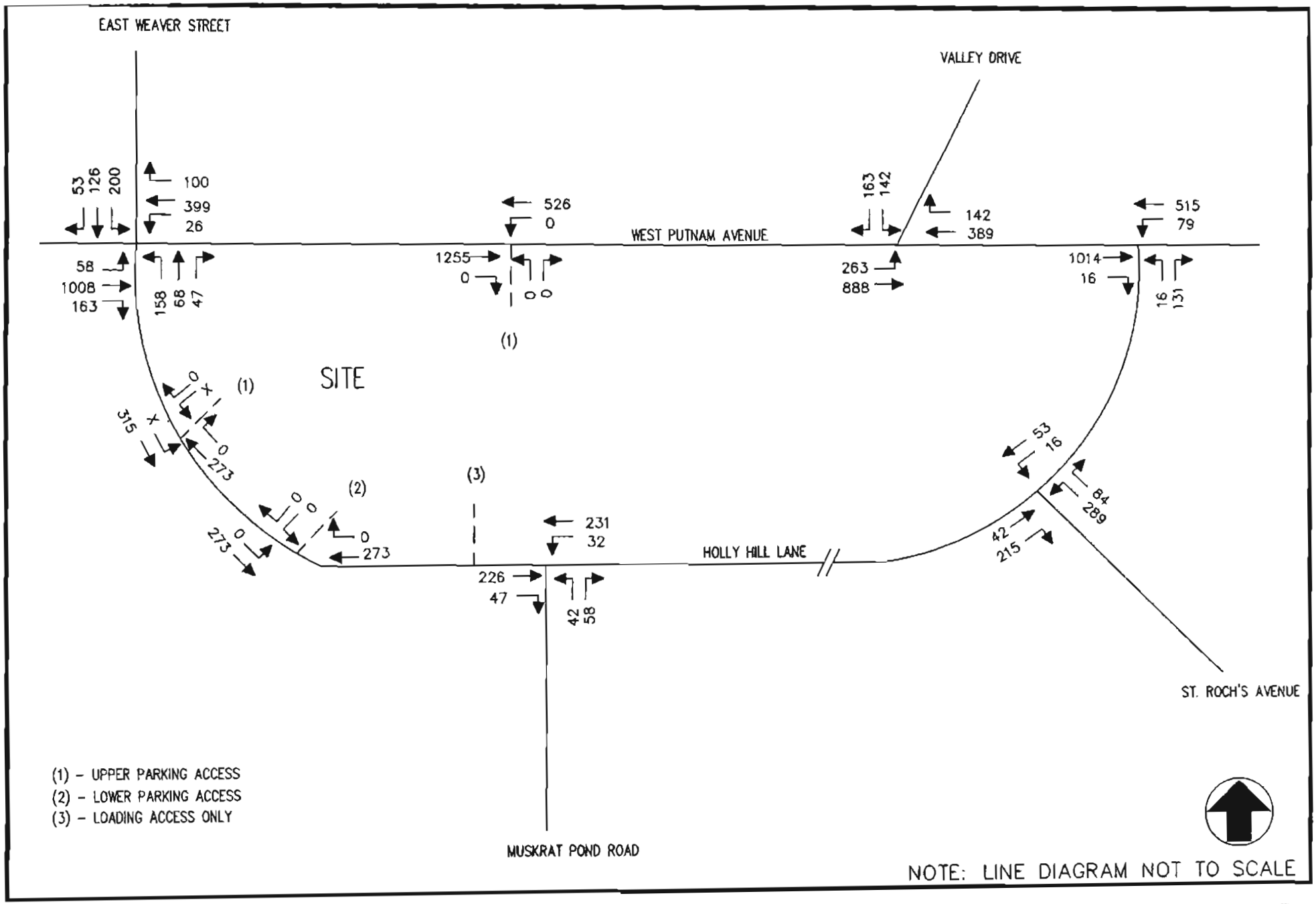


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2008 EXISTING TRAFFIC VOLUMES
SATURDAY PEAK HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 4

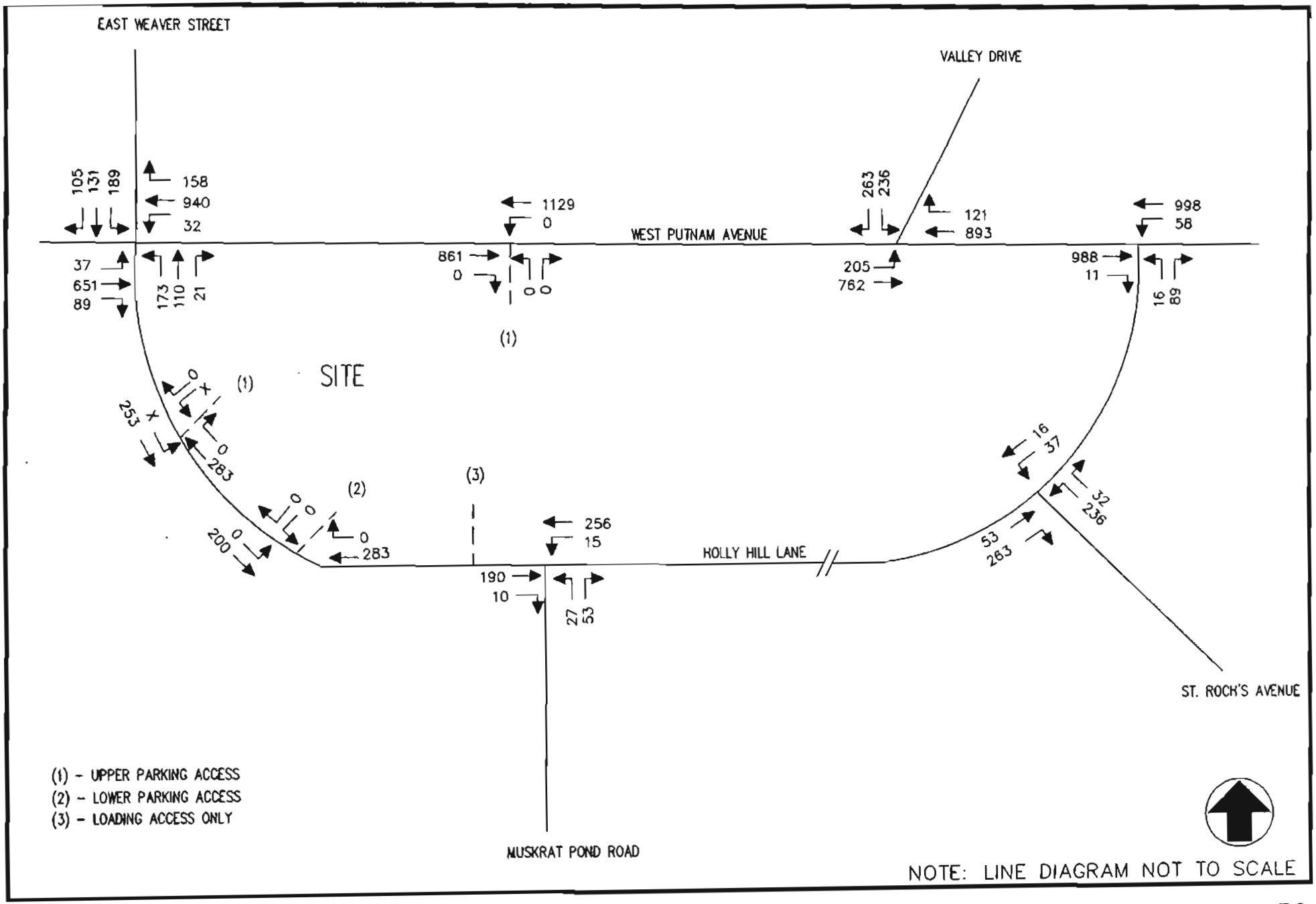


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2011 NO-BUILD TRAFFIC VOLUMES
PEAK AM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 5

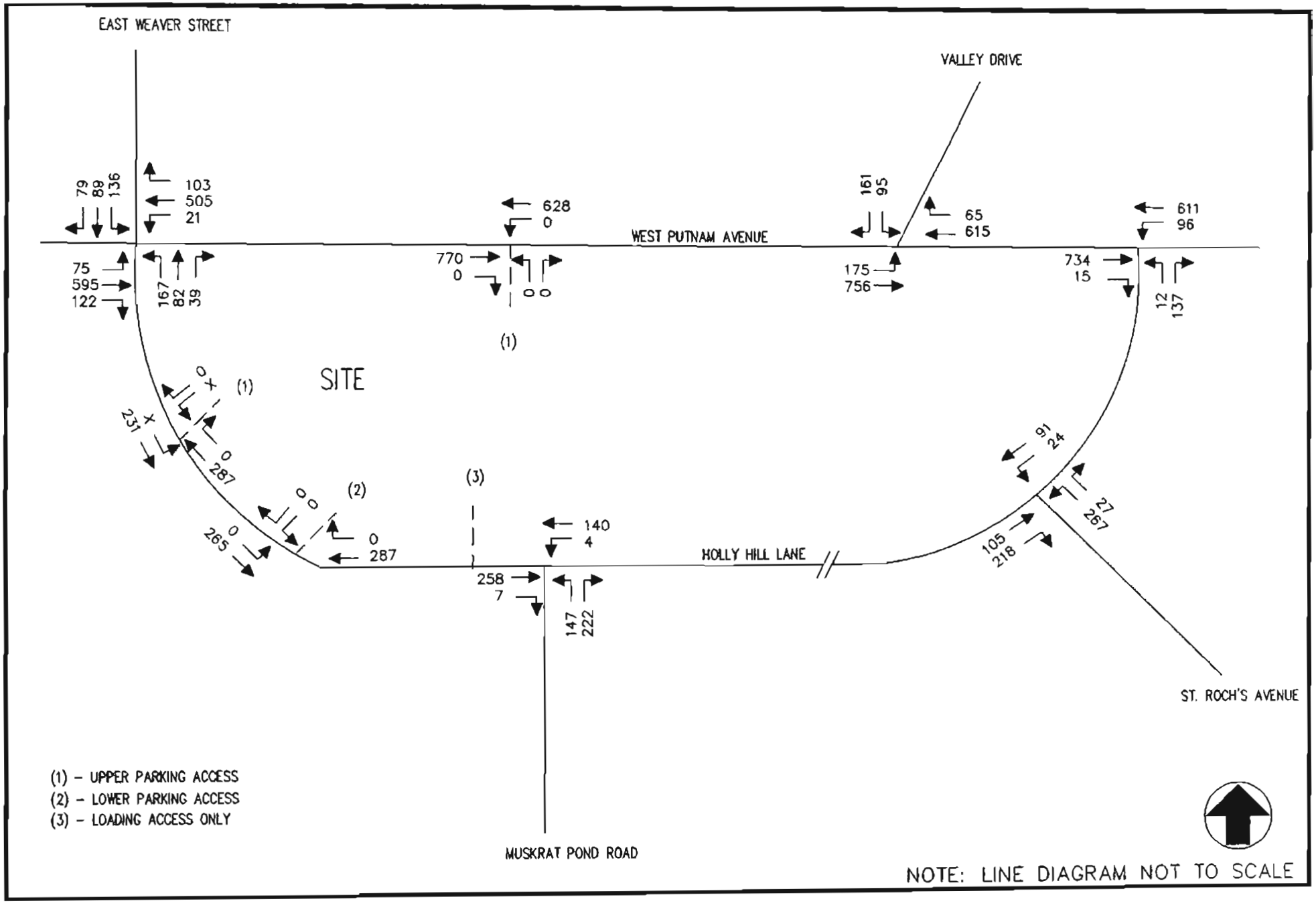


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2011 NO-BUILD TRAFFIC VOLUMES
PEAK PM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 6

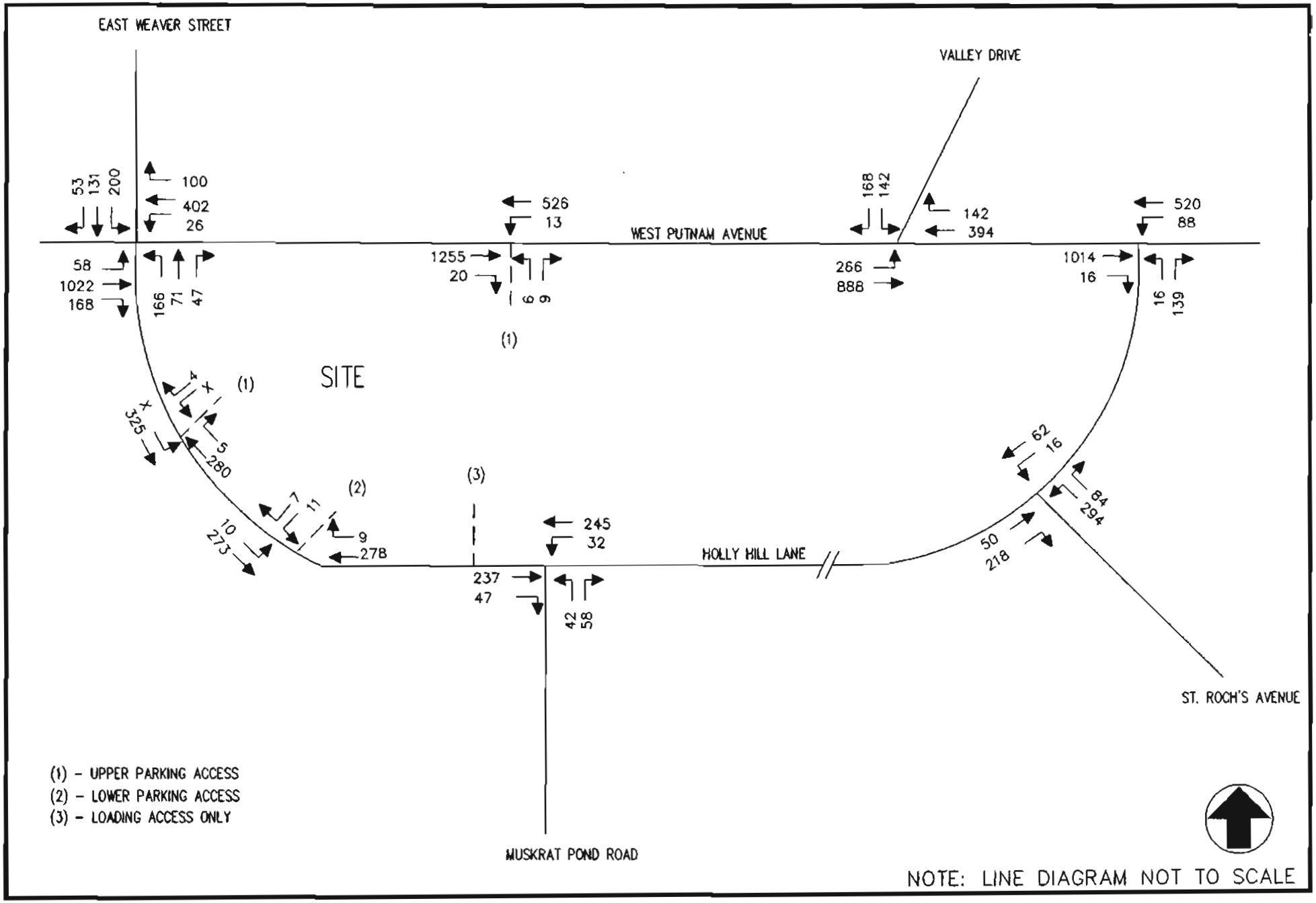


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2011 NO-BUILD TRAFFIC VOLUMES
SATURDAY PEAK HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 7

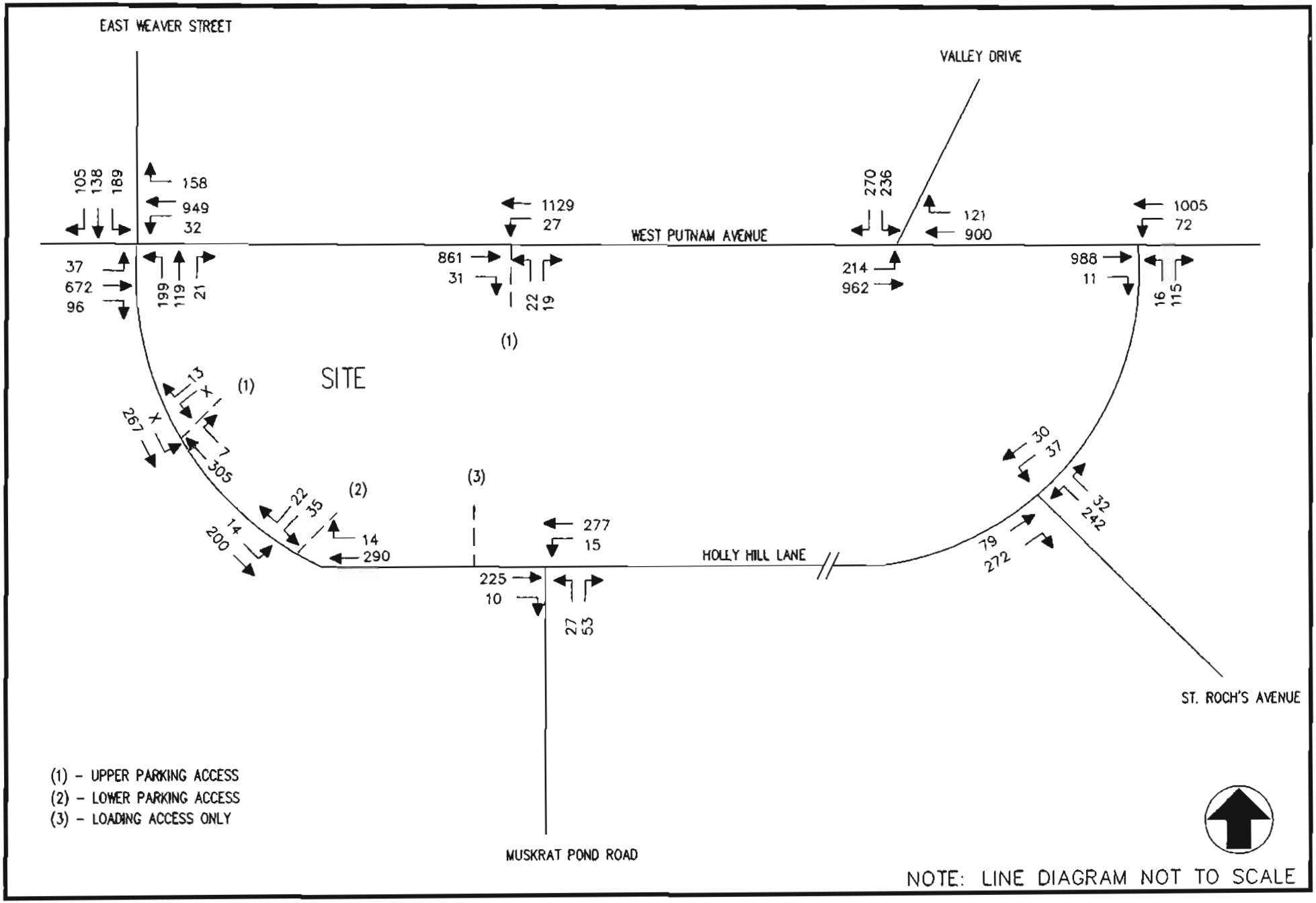


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2011 BUILD TRAFFIC VOLUMES
PEAK AM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 12

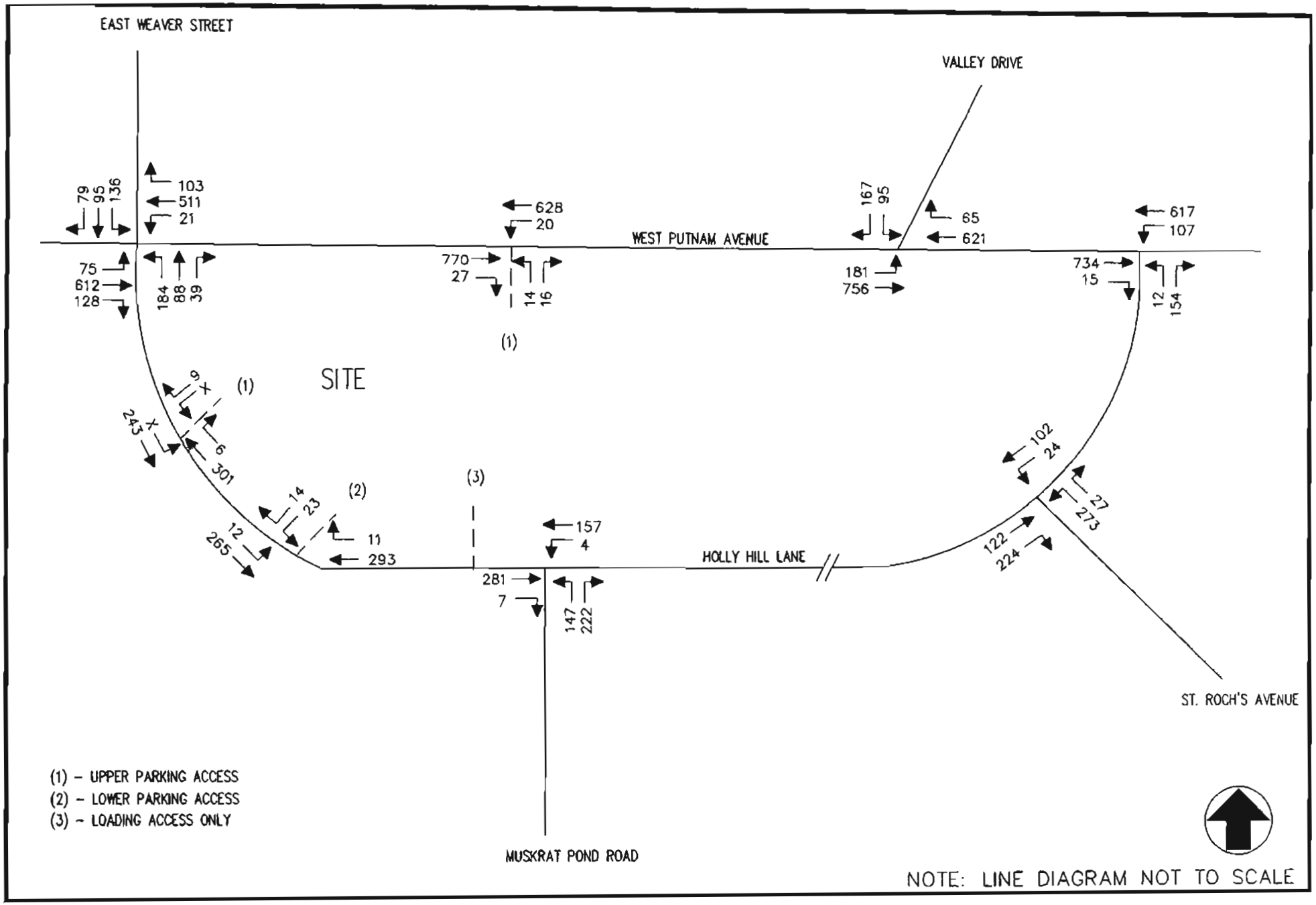


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2011 BUILD TRAFFIC VOLUMES
PEAK PM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO.13

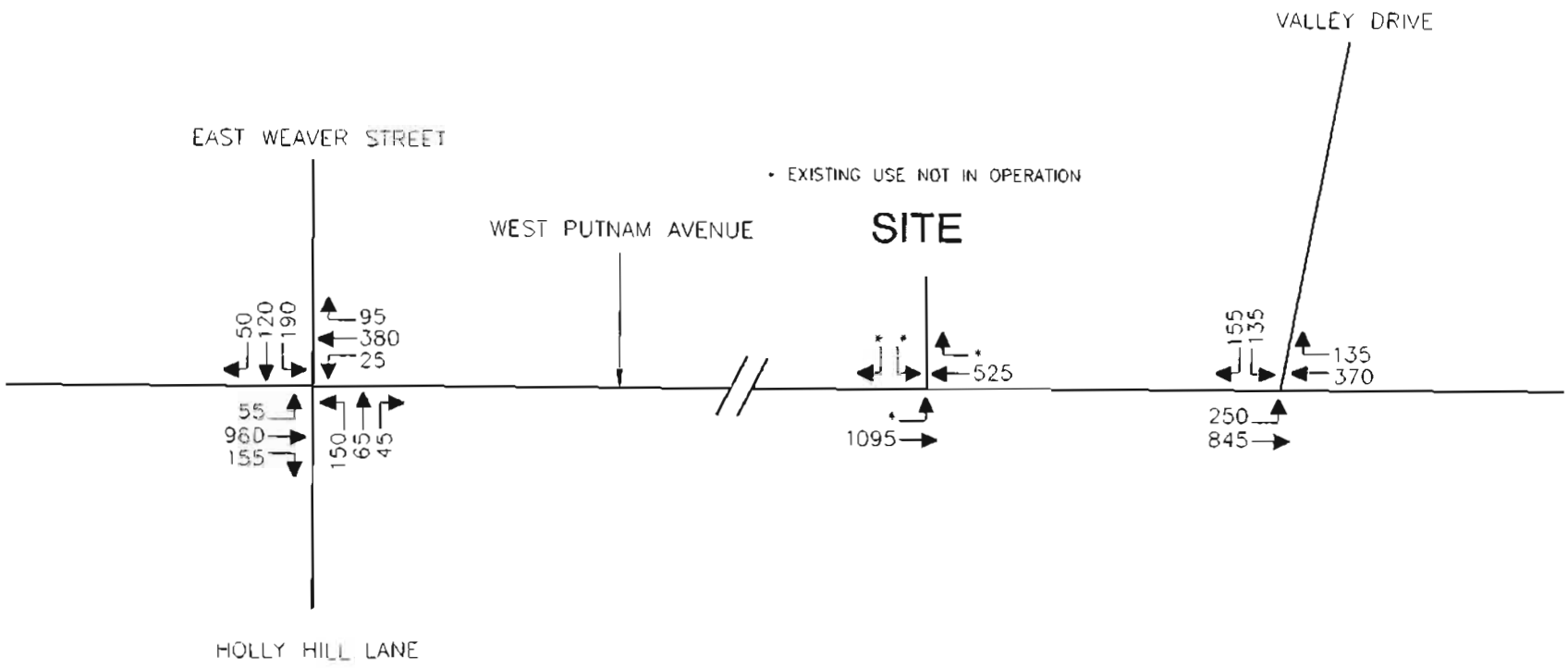


644 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2011 BUILD TRAFFIC VOLUMES
SATURDAY PEAK HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1561 DATE: NOVEMBER 2008 FIG. NO. 14



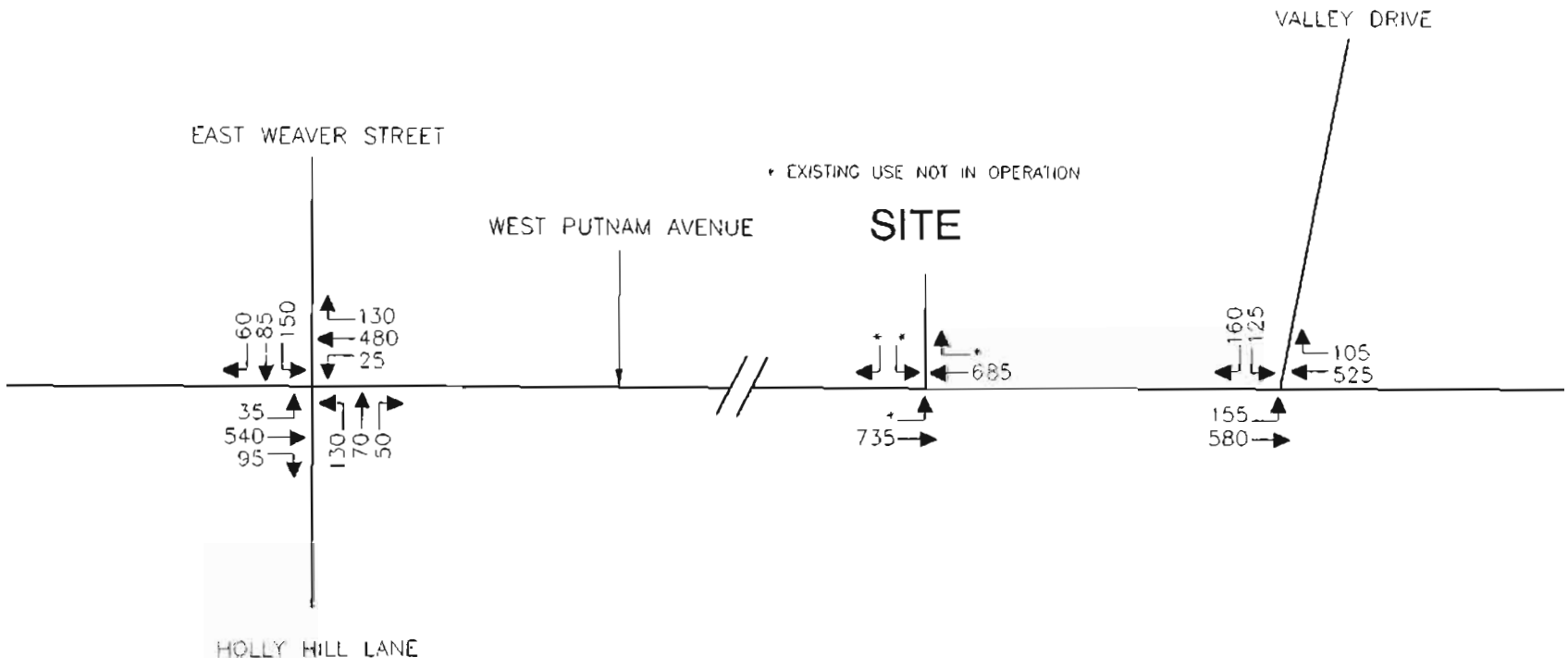
NOTE. LINE DIAGRAM NOT TO SCALE

581 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2008 EXISTING TRAFFIC VOLUMES
WEEKDAY PEAK AM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1507 DATE: JUNE, 2008 FIG. NO. 2



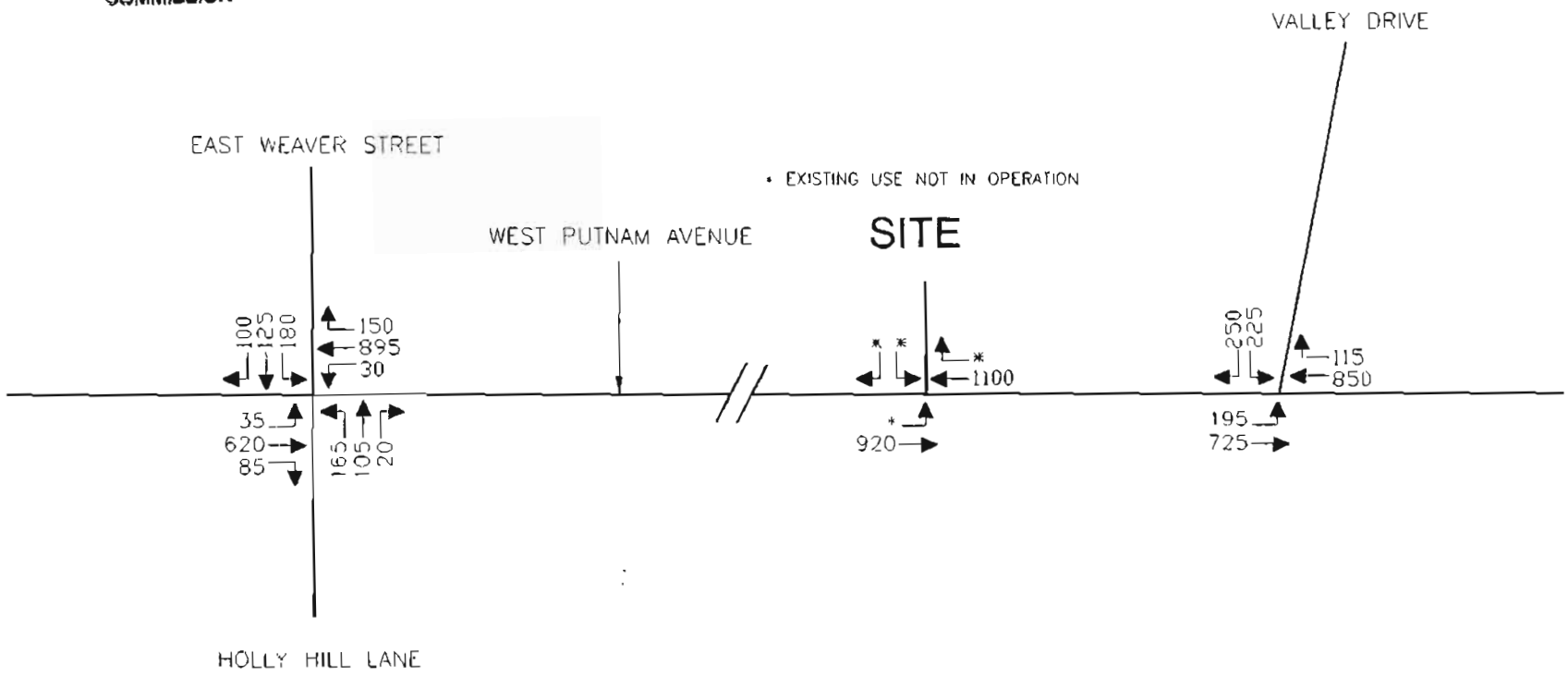
NOTE: LINE DIAGRAM NOT TO SCALE

581 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2008 EXISTING TRAFFIC VOLUMES
WEEKDAY PEAK MIDDAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1507 DATE: JUNE, 2008 FIG. NO. 3



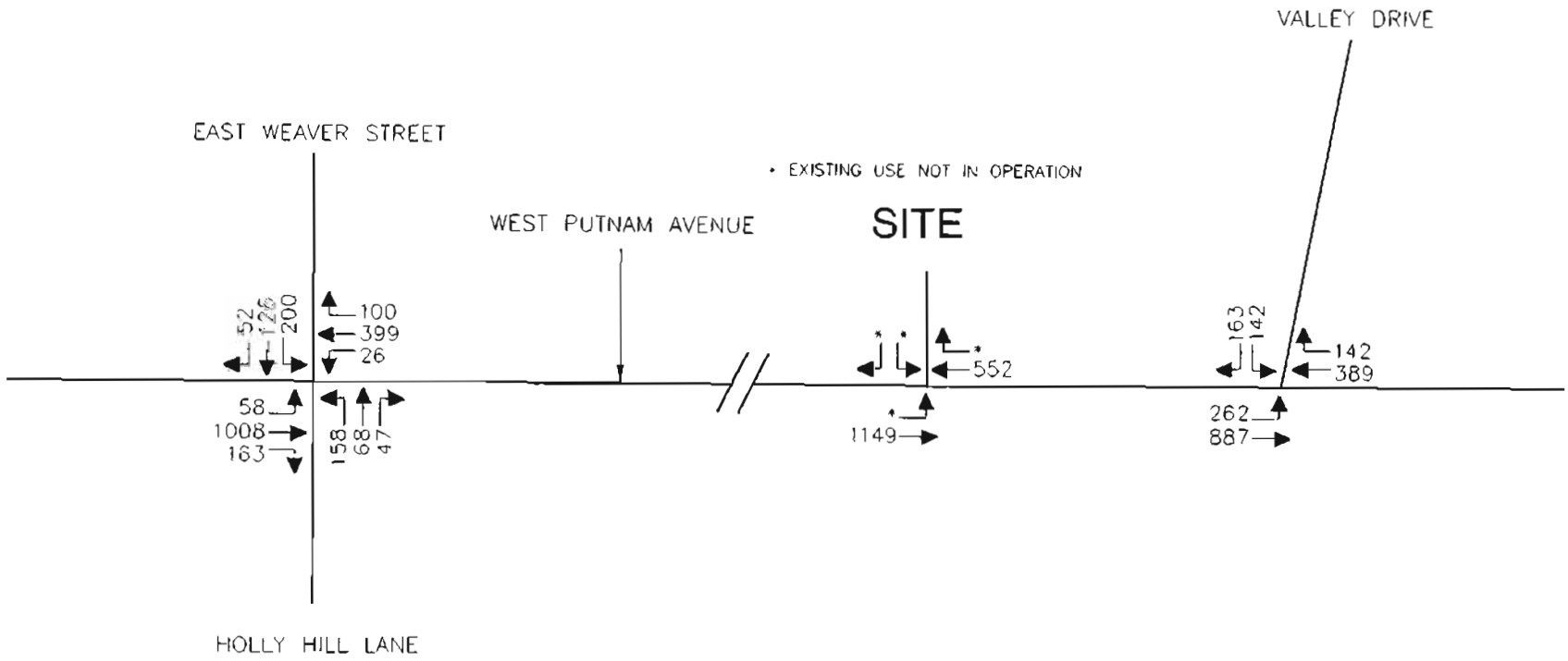
NOTE. LINE DIAGRAM NOT TO SCALE

581 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2008 EXISTING TRAFFIC VOLUMES
WEEKDAY PEAK PM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1507 DATE: JUNE, 2008 FIG. NO. 4



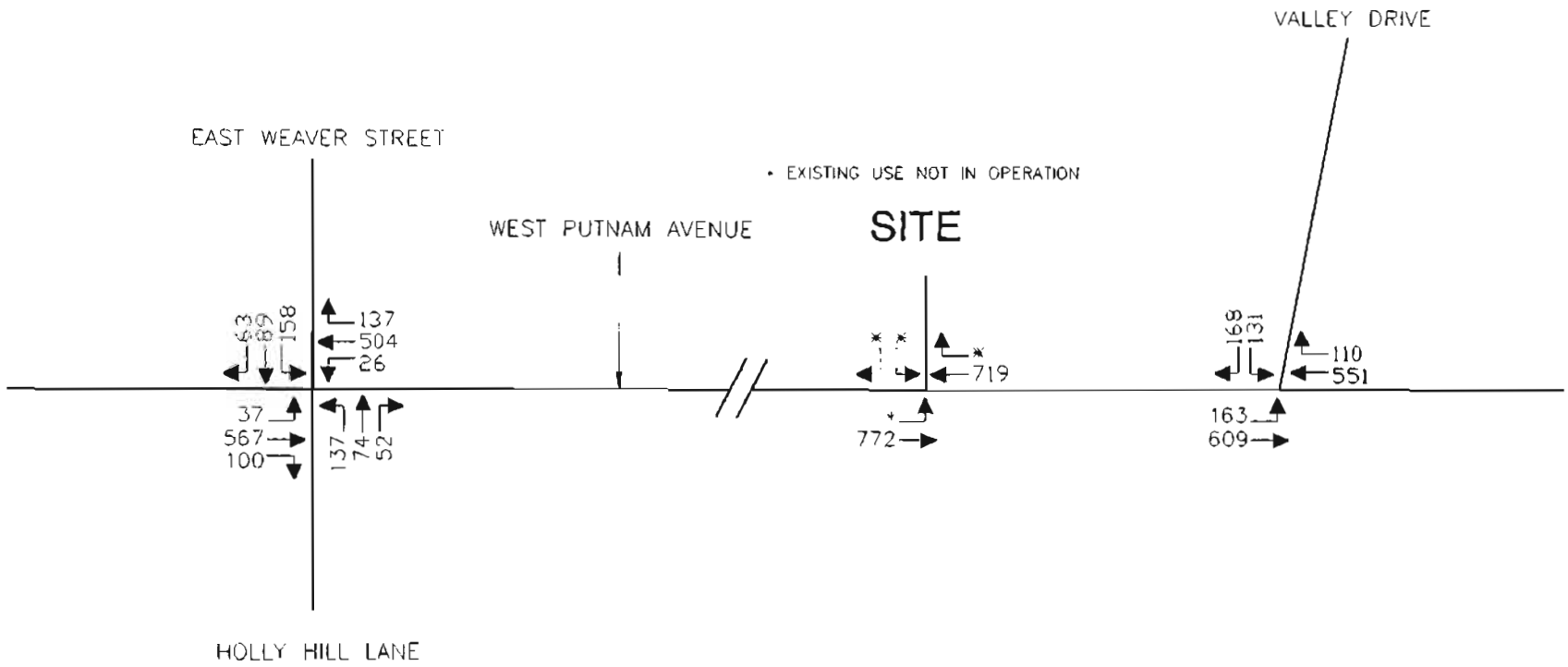
NOTE: LINE DIAGRAM NOT TO SCALE

581 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2010 NO-BUILD TRAFFIC VOLUMES
WEEKDAY PEAK AM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1507 DATE: JUNE, 2008 FIG. NO. 5



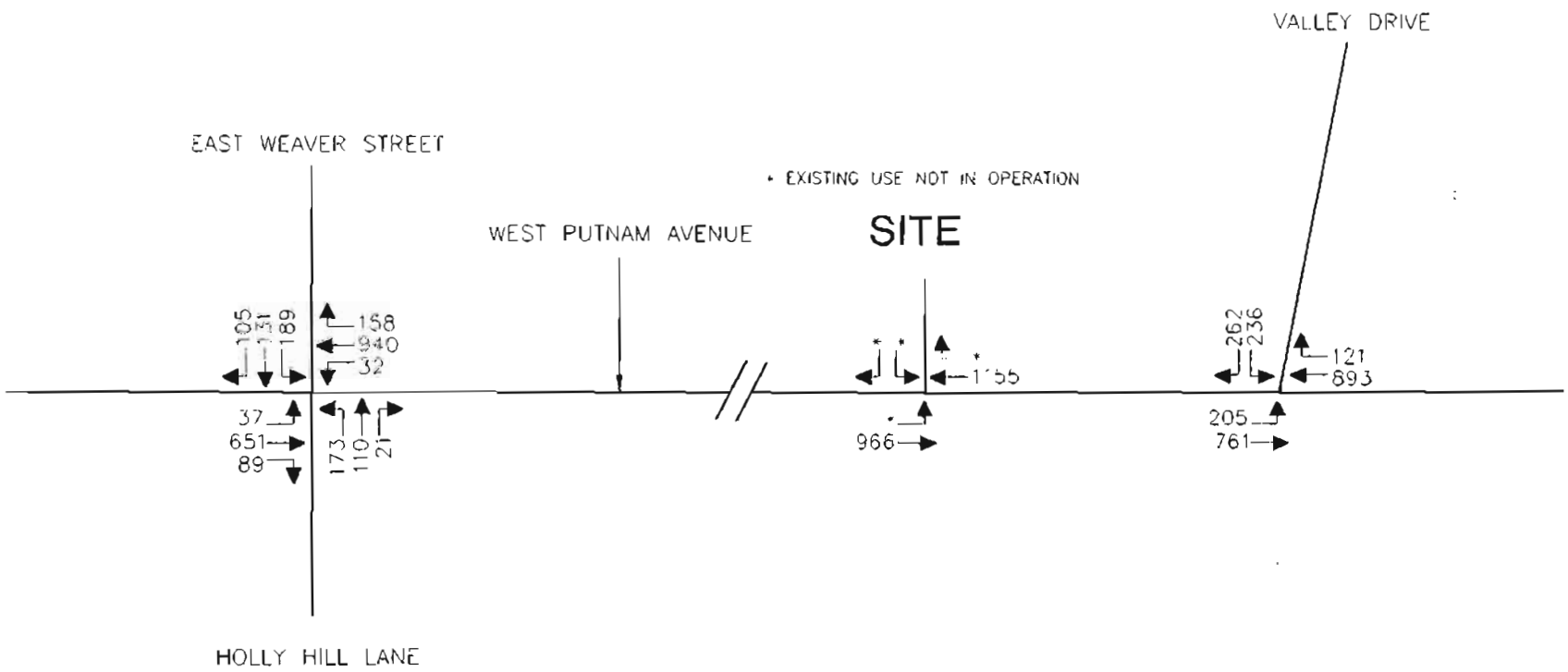
NOTE. LINE DIAGRAM NOT TO SCALE

581 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2010 NO-BUILD TRAFFIC VOLUMES
WEEKDAY PEAK MIDDAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

PROJECT NO. 1507 DATE: JUNE, 2008 FIG. NO. 6



NOTE: LINE DIAGRAM NOT TO SCALE

581 WEST PUTNAM AVENUE
GREENWICH, CONNECTICUT

YEAR 2010 NO-BUILD TRAFFIC VOLUMES
WEEKDAY PEAK PM HIGHWAY HOUR

JOHN COLLINS ENGINEERS, P.C.
HAWTHORNE , NEW YORK

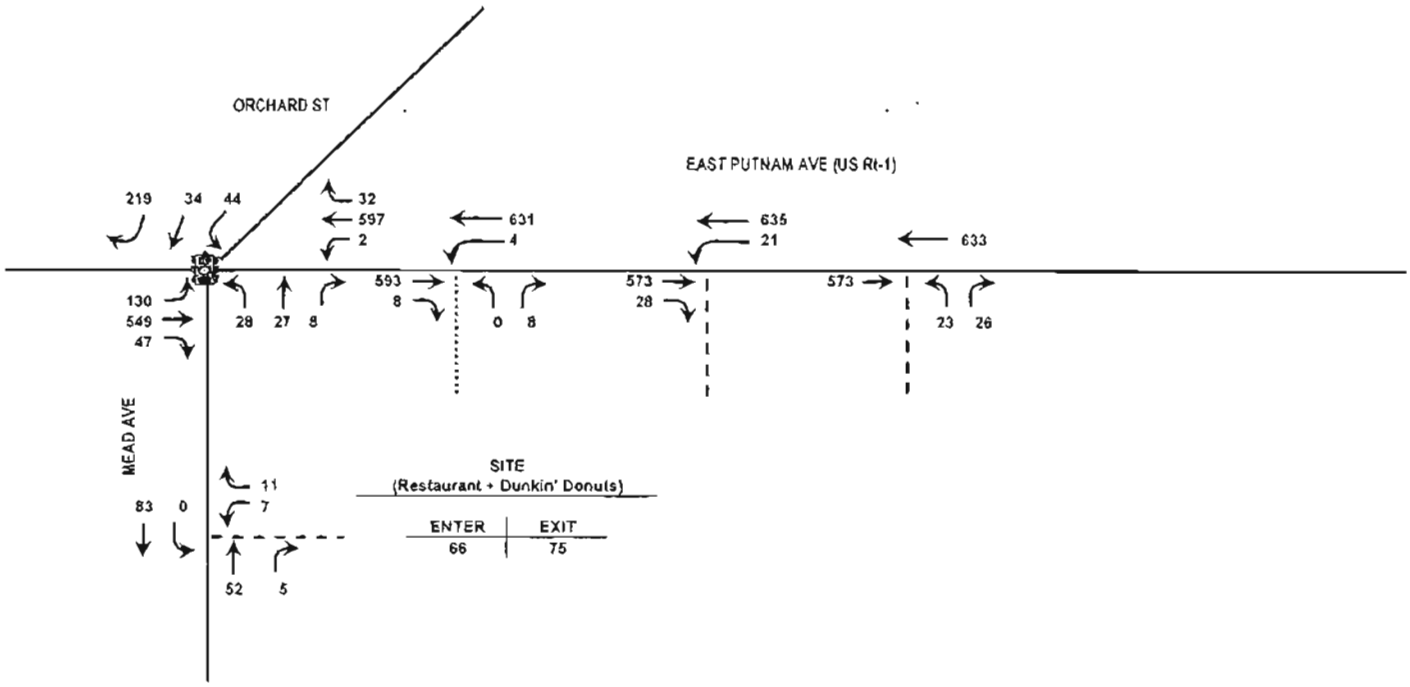
PROJECT NO. 1507 DATE: JUNE, 2008 FIG. NO. 7

ATLANTIC TRAFFIC
& DESIGN ENGINEERS, INC.

EXISTING WEEKDAY MORNING TRAFFIC VOLUMES Jan 2009

Figure 2

Proposed Chase Bank
Cos Cob, Town of Greenwich
Fairfield County, Connecticut



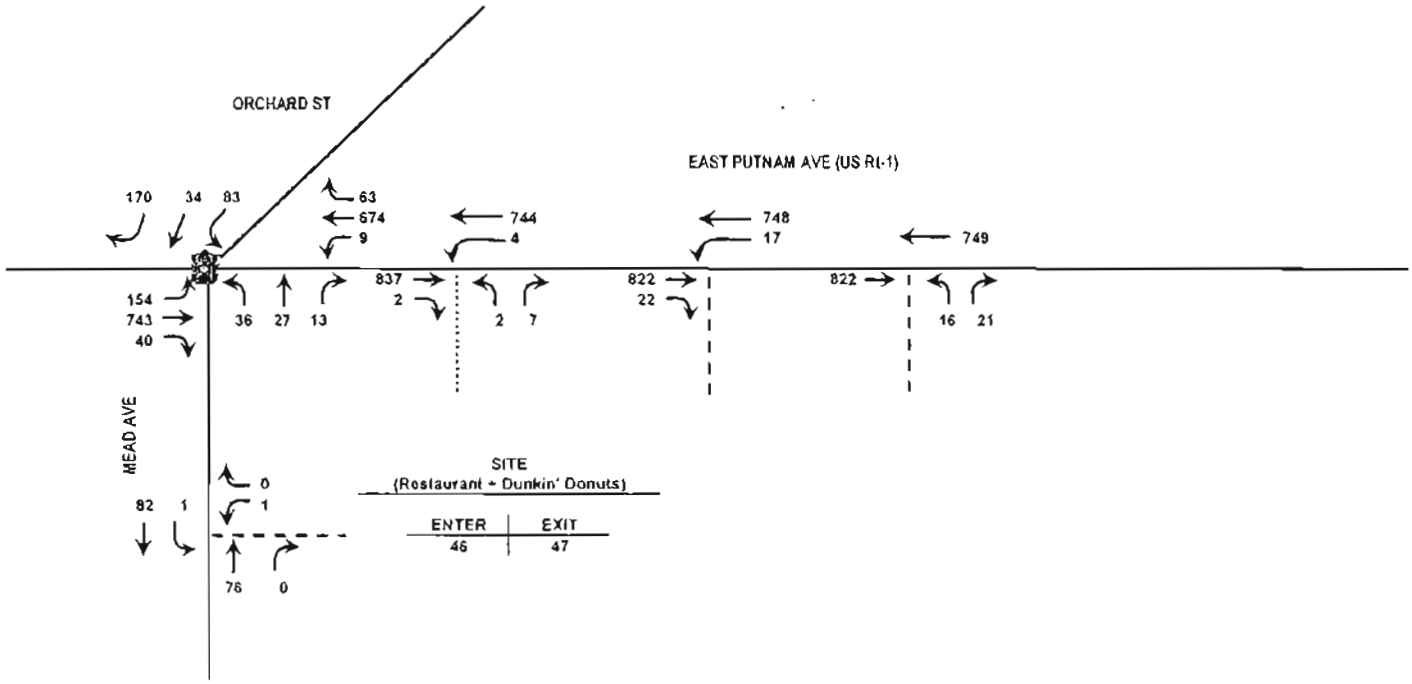
LEGEND
= EXISTING ROADWAY
= EXISTING DRIVEWAY TO BE REMOVED
= EXISTING DRIVEWAY
= WEEKDAY MORNING PEAK HOUR VOLUMES
= EXISTING TRAFFIC SIGNAL

DRAWING NOT TO SCALE

ATLANTIC TRAFFIC
& DESIGN ENGINEERS, INC.

EXISTING WEEKDAY MIDDAY TRAFFIC VOLUMES Aug 2007 Figure 3

Proposed Chase Bank
Cos Cob, Town of Greenwich
Fairfield County, Connecticut



LEGEND
= EXISTING ROADWAY
= EXISTING DRIVEWAY TO BE REMOVED
= EXISTING DRIVEWAY
= WEEKDAY MIDDAY PEAK HOUR VOLUMES
= EXISTING TRAFFIC SIGNAL

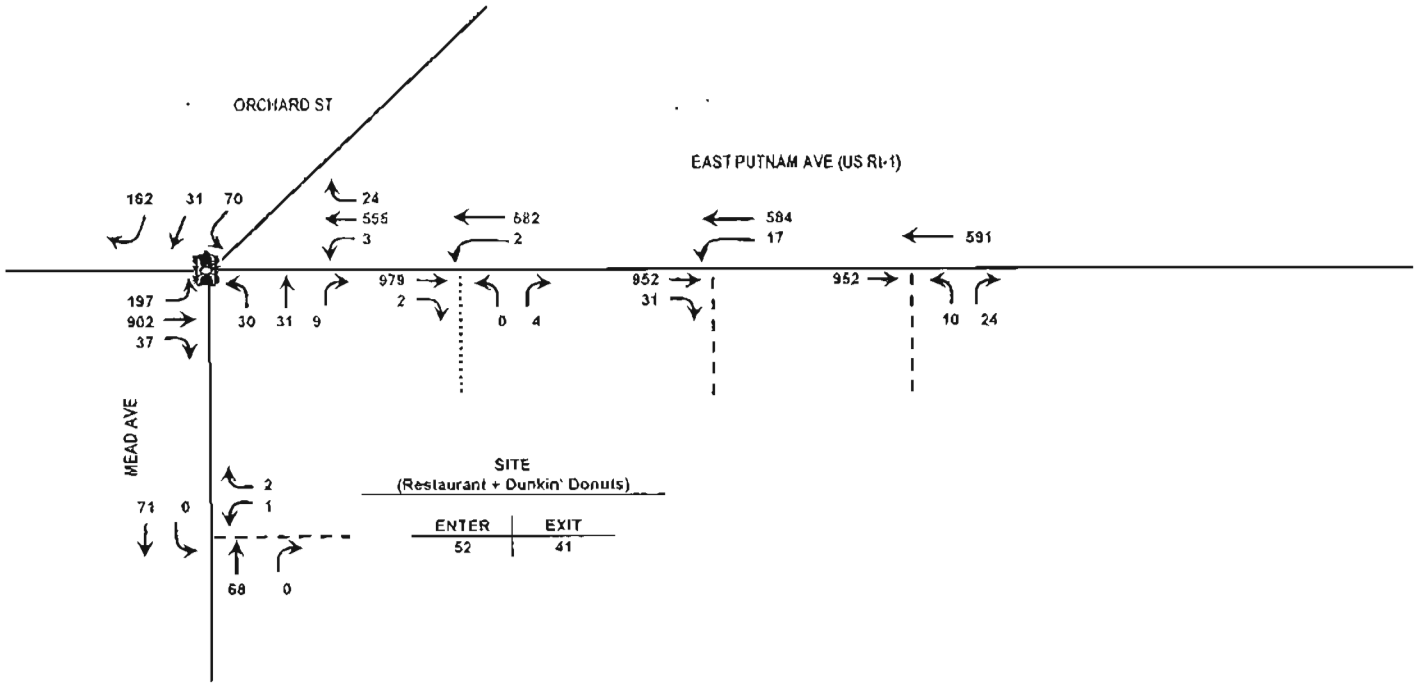
DRAWING NOT TO SCALE

ATLANTIC TRAFFIC
& DESIGN ENGINEERS, INC.

EXISTING WEEKDAY AFTERNOON TRAFFIC VOLUMES Jan 2009

Figure 4

Proposed Chase Bank
Cos Cob, Town of Greenwich
Fairfield County, Connecticut



LEGEND
= EXISTING ROADWAY
= EXISTING DRIVEWAY TO BE REMOVED
= EXISTING DRIVEWAY
= WEEKDAY AFTERNOON PEAK HOUR VOLUMES
= EXISTING TRAFFIC SIGNAL

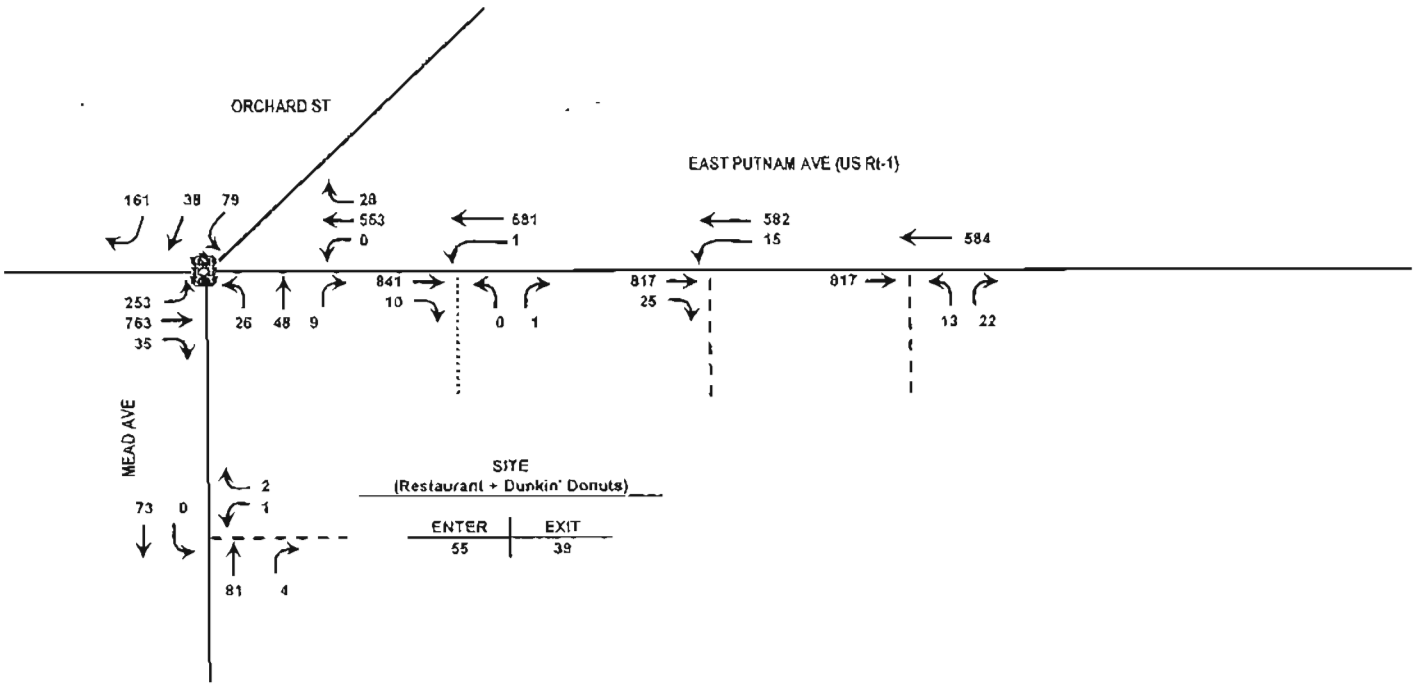
DRAWING NOT TO SCALE

ATLANTIC TRAFFIC
& DESIGN ENGINEERS, INC.

EXISTING WEEKDAY EVENING TRAFFIC VOLUMES Jan 2009

Figure 5

Proposed Chase Bank
Cos Cob, Town of Greenwich
Fairfield County, Connecticut



LEGEND
= EXISTING ROADWAY
= EXISTING DRIVEWAY TO BE REMOVED
= EXISTING DRIVEWAY
= WEEKDAY EVENING PEAK HOUR VOLUMES
= EXISTING TRAFFIC SIGNAL

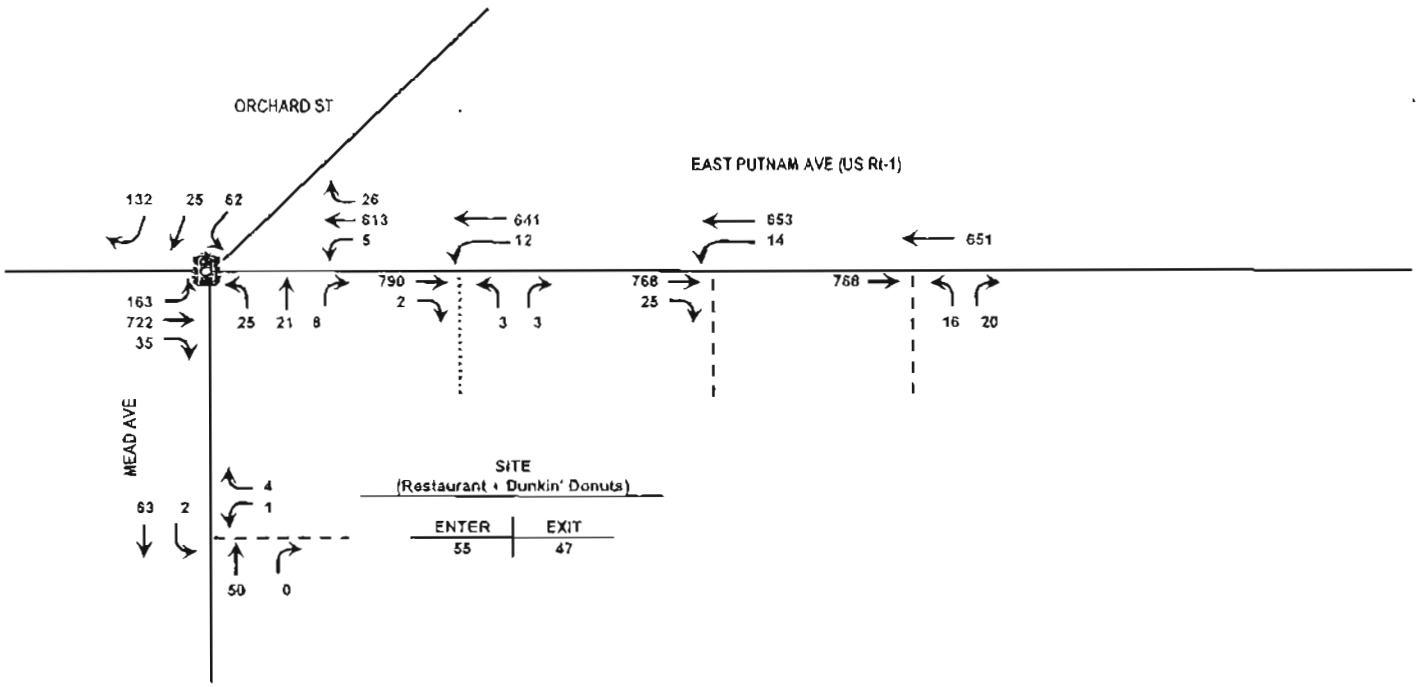
DRAWING NOT TO SCALE

ATLANTIC TRAFFIC
& DESIGN ENGINEERS, INC.

EXISTING SATURDAY MIDDAY TRAFFIC VOLUMES Jan 2009

Figure 6

Proposed Chase Bank
Cos Cob, Town of Greenwich
Fairfield County, Connecticut



LEGEND
= EXISTING ROADWAY
= EXISTING DRIVEWAY TO BE REMOVED
= EXISTING DRIVEWAY
= SATURDAY MIDDAY (PEAK HOUR VOLUMES
= EXISTING TRAFFIC SIGNAL

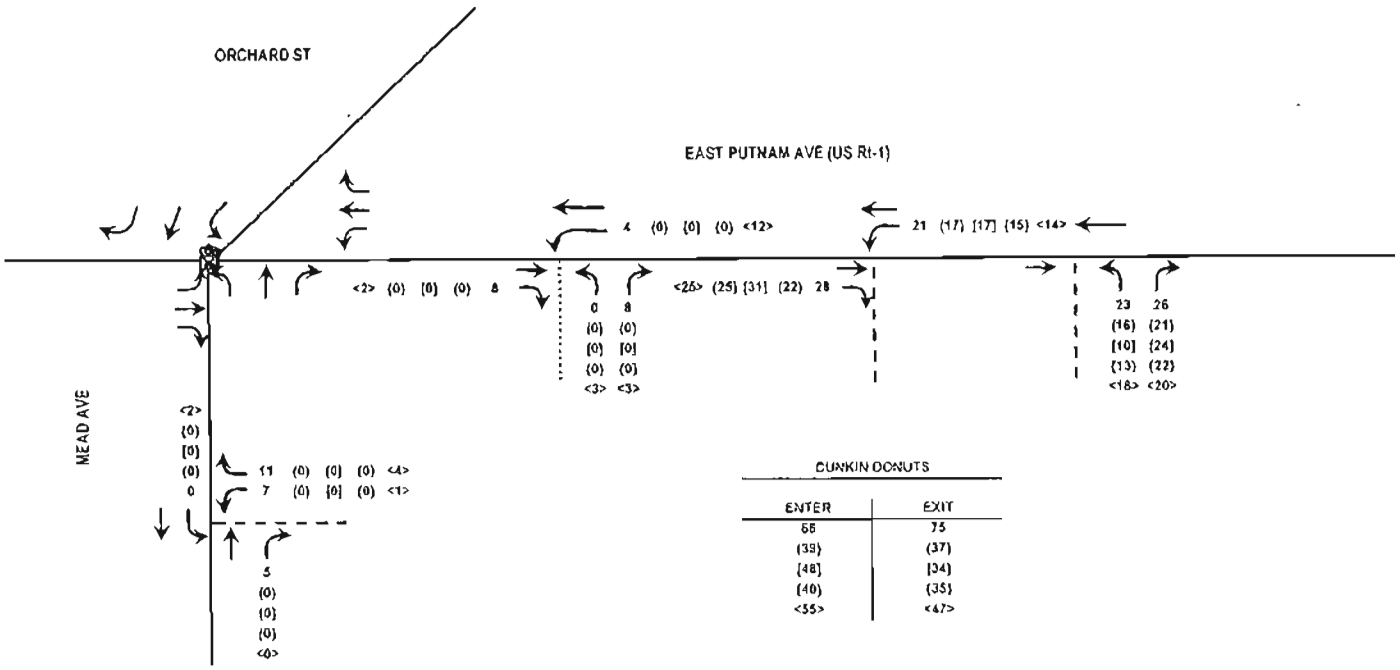
DRAWING NOT TO SCALE

ATLANTIC TRAFFIC
& DESIGN ENGINEERS, INC.

EXISTING DUNKIN' DONUTS TRAFFIC VOLUMES Jan 2009

Figure 7

Proposed Chase Bank
Cos Cob, Town of Greenwich
Fairfield County, Connecticut



DUNKIN DONUTS

ENTER	EXIT
68	75
(39)	(37)
[48]	[34]
(40)	(35)
<55>	<47>

LEGEND
= EXISTING ROADWAY
= EXISTING DRIVEWAY TO BE REMOVED
= EXISTING DRIVEWAY
= DUNKIN' DONUTS AM (MID) [AFT] (PM) <SAT> PEAK HOUR VOLUMES
= EXISTING TRAFFIC SIGNAL

Cross Lane approach is offset from the Taylor Drive approach by approximately 80 feet.

D. FIELD STUDIES

Traffic counts were performed at the strategic intersections along East Putnam Avenue during the AM and PM peak periods on Thursday August 20, 2009 and on Saturday, August 22, 2009. Data were collected between 7:00 a.m. and 9:30 a.m. and between 4:00 p.m. and 6:30 p.m. on the weekday and between 11:00 a.m. and 2:00 p.m. on Saturday. Traffic queues were measured at the drive-up window for the People's United Bank branch located at 119 East Putnam Avenue, adjacent to the proposed Site. Data were collected on Thursday evening and on Saturday concurrent with the intersection data collection, and on Friday morning, between 8:00 a.m. (the opening of the drive-up window) and 9:30 a.m.

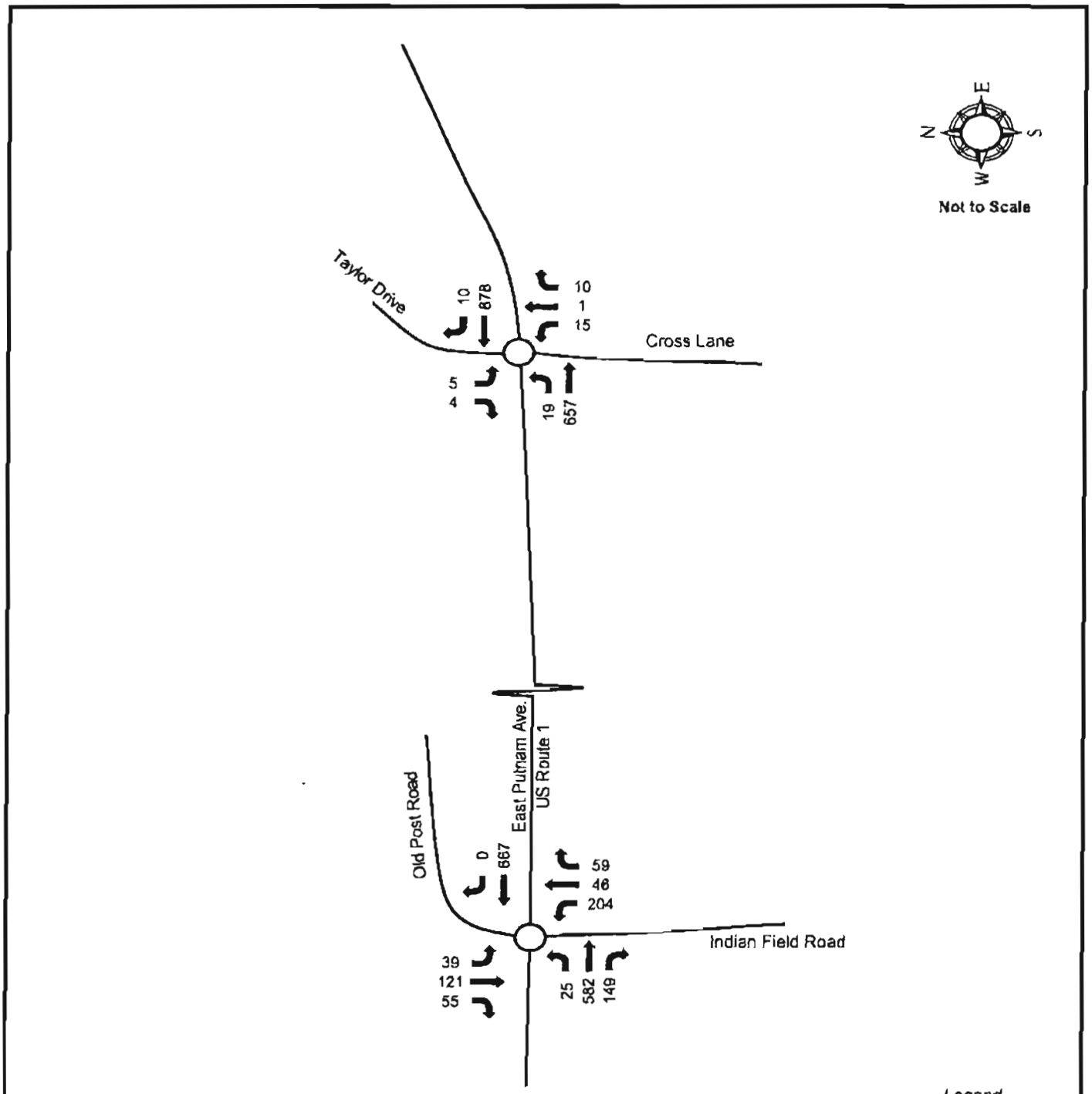
E. PEAK HOURS

A review of the collected traffic data revealed that the combination of bank traffic and adjacent street traffic was a maximum during the following peak hours:

Peak AM Hour	8:30 a.m. to 9:30 a.m.
Peak PM Hour	5:00 p.m. to 6:00 p.m.
Peak Saturday Hour	11:15 a.m. to 12:15 p.m.

F. EXISTING TRAFFIC VOLUMES

The counted traffic volumes along the roadway network were examined to verify their validity. To account for seasonal variation, the peak hour traffic volumes were increased by eight (8) percent. The seasonal adjustment values for the traffic volumes were based on direction from the Town of Greenwich Traffic Operations Coordinator and correspond to data provided from the State of Connecticut. The resulting "Existing" traffic volumes are shown graphically in Figure 2, Figure 3 and Figure 4 for the AM Peak Hour, PM Peak Hour and Saturday Peak Hour, respectively.



Project:

People's United Bank
Cos Cob, CT

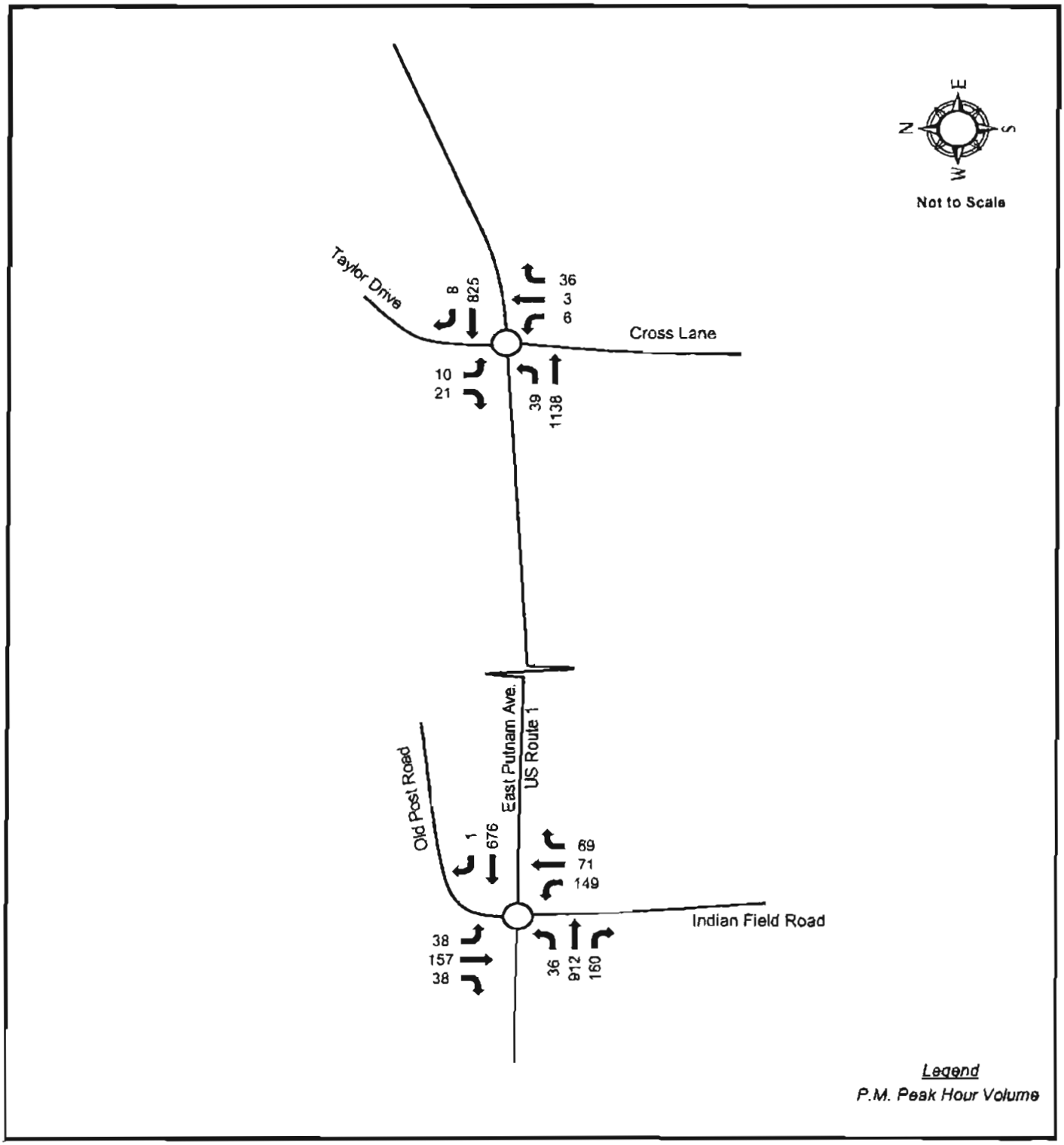
Prepared By:

Adler Consulting, White Plains, NY
Transportation Planning & Traffic Engineering, PLLC

Title:

Existing
Weekday AM Peak Highway
Hour Traffic Volumes

FIGURE 2



Project:

People's United Bank
Cos Cob, CT

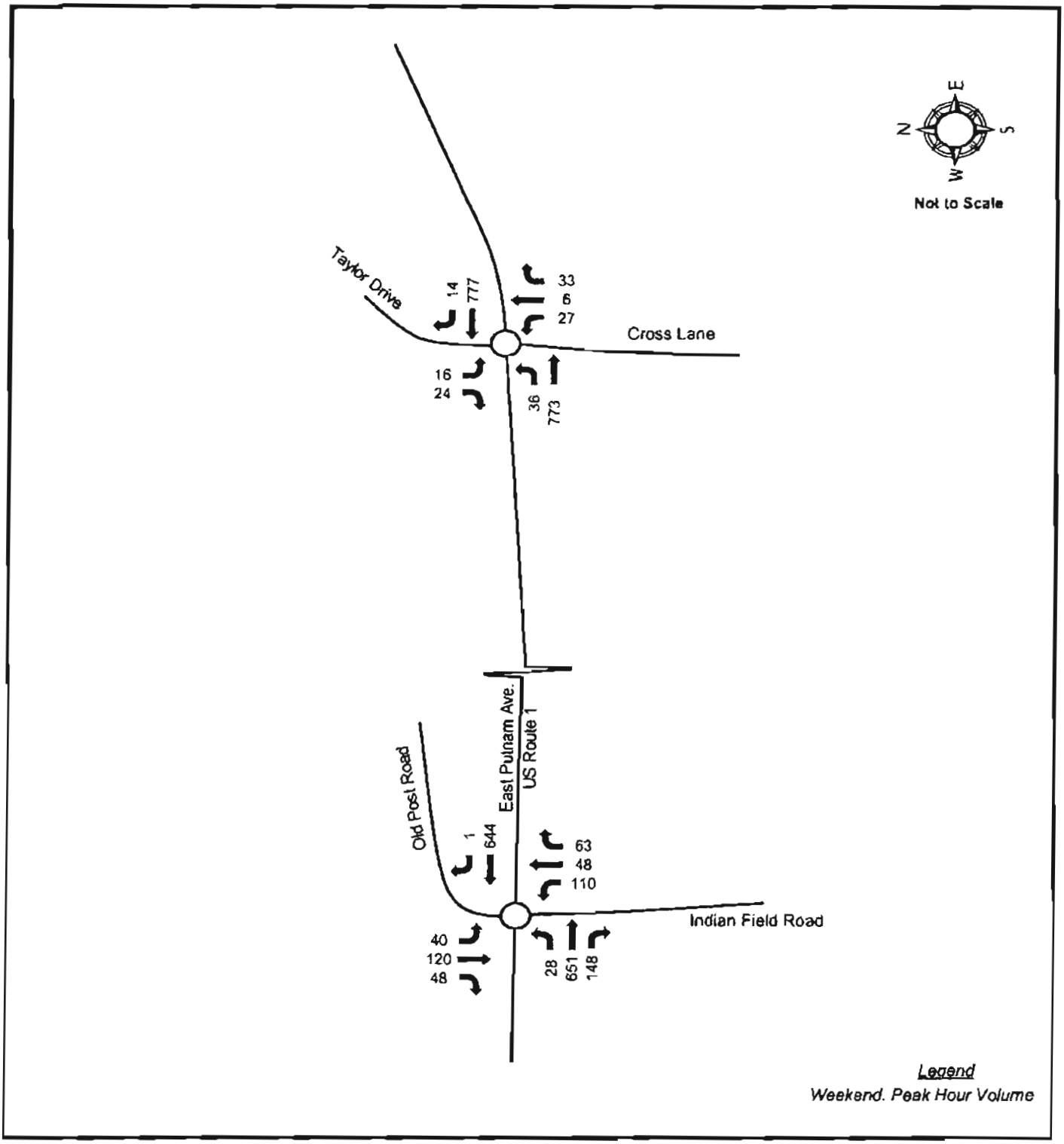
Prepared By:

Adler Consulting, White Plains, NY
Transportation Planning & Traffic Engineering, PLLC

Title:

Existing
Weekday PM Peak Highway
Hour Traffic Volumes

FIGURE 3



Project:

People's United Bank
Cos Cob, CT

Prepared By:

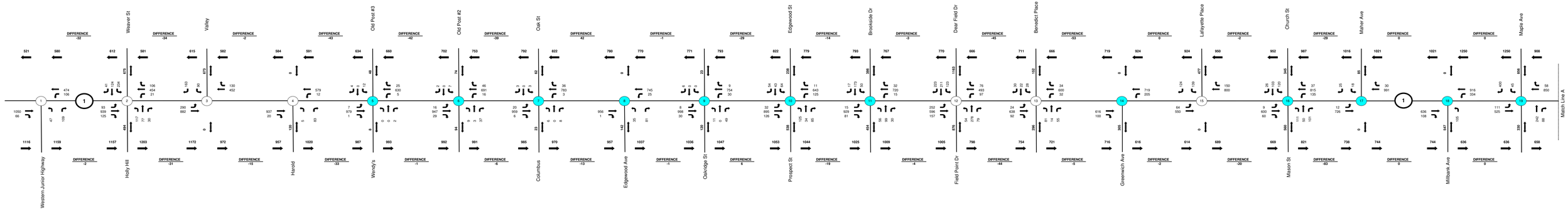
Adler Consulting, White Plains, NY
Transportation Planning & Traffic Engineering, PLLC

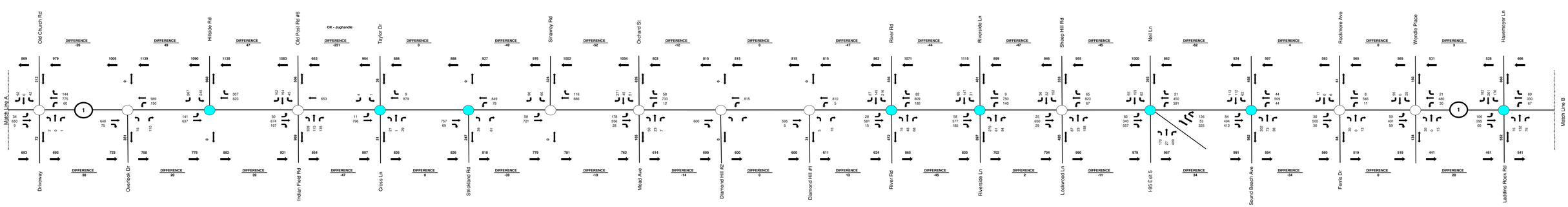
Title:

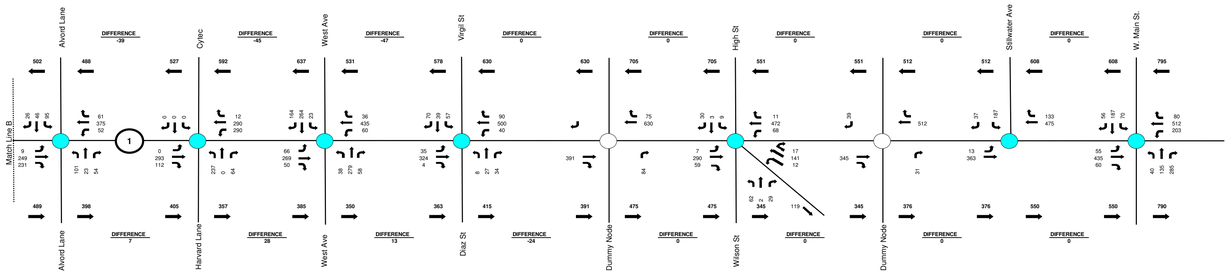
Existing
Weekend Peak Highway Hour
Traffic Volumes

FIGURE 4

AM Peak
Design Volumes







Legend

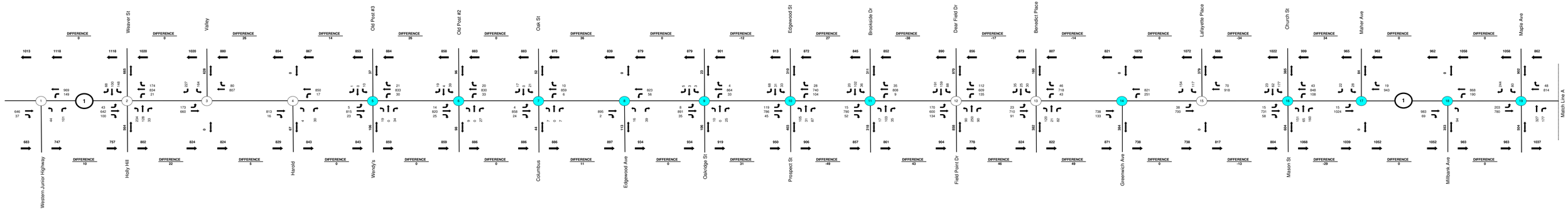
= 2010 Urban Count (AM System Peak is 7:45-8:45)

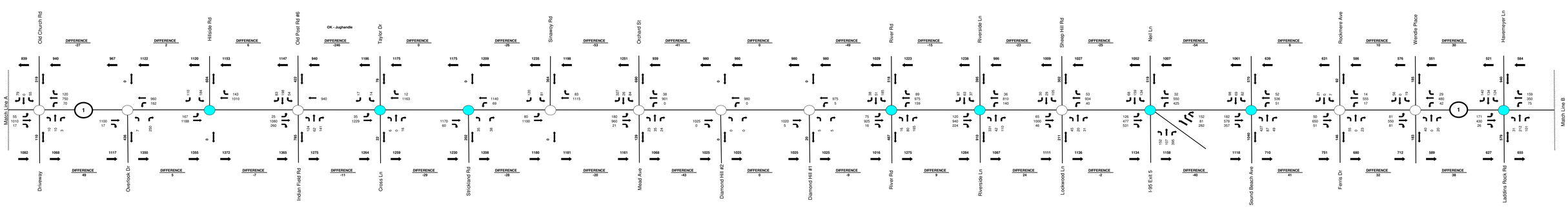
MID Peak
Design Volumes

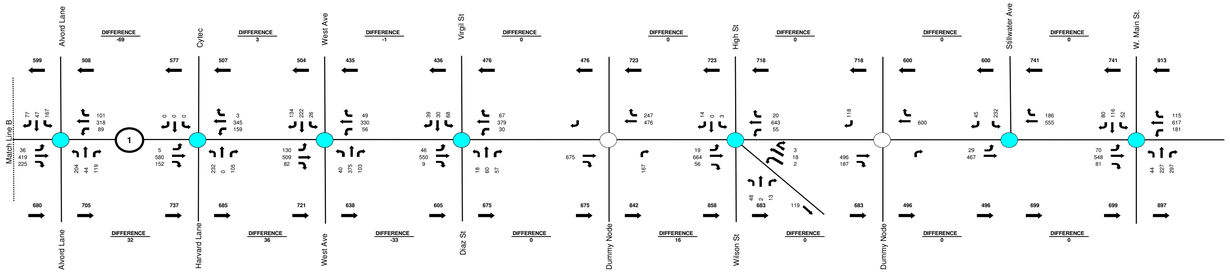
Legend

= 2010 Urban Count (MID System Peak is 12:15-1:15)

PM Peak
Design Volumes







Legend

= 2010 Urban Count (PM System Peak is 4:45-5:45)

AM Peak				
Intersection	**Direction**	**Existing**	**Design**	**Percent Increase**
Weaver Street/Holly Hill	NB	1159	1189	2.6%
Edgewood Street/Prospect Street	NB	909	1044	14.9%
Brookside Drive	NB	880	1009	14.7%
Dear Field Drive/Field Point Drive	NB	737	798	8.3%
Indian Field Road	NB	701	854	21.8%
Taylor Drive/Cross Lane	NB	728	826	13.5%
Strickland Road	NB	728	818	12.4%
Sound Beach Ave	NB	554	594	7.2%
Laddins Roack Road	NB	489	541	10.6%
Orchard Street/Mead Ave	SB	990	1048	5.9%
Sinawoy Road	SB	948	1002	5.7%
Hillside Road	SB	1028	1090	6.0%
Overlook Drive	SB	940	1005	6.9%
Maple Avenue	SB	1187	1250	5.3%
Millbank Avenue	SB	975	1021	4.7%
Maher Avenue	SB	972	1016	4.5%
Brookside Drive	SB	725	793	9.4%
Edgewood Street/Prospect Street	SB	739	822	11.2%
Harold Avenue	SB	535	584	9.2%
Valley Drive	SB	563	605	7.5%
Weaver Street/Holly Hill	SB	550	601	9.3%

MID Peak				
Intersection	**Direction**	**Existing**	**Design**	**Percent Increase**
Old Church	NB	788	851	8.0%
Overlook Drive	NB	922	984	6.7%
Hillside Drive	NB	963	1022	6.1%
Indian Field Road	NB	908	963	6.1%
Maple Ave	SB	945	1065	12.7%
Millbank Ave	SB	840	937	11.5%
Maher Ave	SB	830	915	10.2%
Church/Mason	SB	881	914	3.7%
Lafayette Place	SB	870	921	5.9%
Greenwich Ave	SB	636	673	5.8%
Benedict Place	SB	661	733	10.9%
Dear Field Drive/Field Point Drive	SB	753	807	7.2%
Brookside Drive	SB	798	888	11.3%
Edgewood Street/Prospect Street	SB	896	1014	13.2%

PM Peak				
Intersection	**Direction**	**Existing**	**Design**	**Percent Increase**
Old Church	NB	1012	1068	5.5%
Overlook Drive	NB	1250	1350	8.0%
Hillside Drive	NB	1284	1372	6.9%
Indian Field Road	NB	1245	1275	2.4%

Appendix B: No Build Simulation Results

US 1 Greenwich-Stamford Operational Improvements Study

NO BUILD AM SimTraffic Results

Intersection	NB		SB		WB		EB		NW		ALL	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1: US 1 and Havemeyer Lane / Laddins Rock Road	35.0	C	29.7	C	55.7	E	73.0	E			48.2	D
2: US 1 and Wendle Place	3.6	A	9.4	A	38.9	D	18.1	B			8.6	A
3: US 1 and Rockmere Ave	2.4	A	3.4	A	43.1	D	19.8	B			4.6	A
4: US 1 and Sound Beach Ave	16.7	B	27.1	C	34.3	C	58.8	E			27.8	C
5: US 1 and I-95 Exit 5 NB (NB) / Neil Lane (SB) / I-95 Exit 5 SB (NW)	49.6	D	64.3	E	92.0	F	78.4	E	59.8	E	65.8	E
6: US 1 and Sheep Hill Road / Lockwood Lane	34.0	C	26.9	C	32.7	C	38.4	D			31.1	C
7: US 1 and Riverside Lane	49.6	D	23.8	C	29.8	C	47.2	D			36.2	D
8: US 1 and River Road	35.3	D	20.3	C	29.8	C	41.1	D			28.5	C
9: US 1 and Diamond Hill #1	1.4	A	2.3	A	38.4	D		-			2.4	A
99: US 1 and Diamond Hill #2	3.9	A	0.5	A		-		-			2.0	A
10: US 1 and Orchard St / Mead Ave	31.9	C	45.3	D	45.3	D	36.2	D			38.5	D
11: US 1 and Sinawoy Road	7.1	A	11.6	B		-	22.0	C			10.5	B
12: US 1 and Strickland (NB) / Taylor Drive (SB) / Cross Lane (NW)	47.1	D	37.5 ★	D	28.5	C	69.8	E	59.2	E	41.6	D
13: US 1 and Old Post Road #6 / Indian Field Road	46.4	D	36.8	D	30.0	C	69.2	E			43.3	D
14: US 1 and Hillside Road	23.3	C	31.9	C		-	35.7	D			30.0	C
16: US 1 and Overlook Drive	6.3	A	8.4	A	21.4	C		-			8.5	A
17: US 1 and Old Church Road	6.6	A	13.3	B	39.8	D	32.9	C			12.2	B
18: US 1 and Maple Ave / Millbank Ave	34.1 ★	C	53.5 ★	D	76.9	E	50.8	D			51.7	D
19: US 1 and Maher Ave	19.5	B	2.9	A		-	72.6	E			11.9	B
20: US 1 and Church St / Mason St	32.5	C	37.8	D	53.8	D	54.1	D			39.8	D
21: US 1 and Greenwich Ave / Lafayette Place	31.5	C	27.3	C		-	57.8	E			33.0	C
22: US 1 and Benedict Place	6.4	A	7.1	A	56.3	E	51.2	D			13.4	B
23: US 1 and Dearfield Drive / Field Point Drive	26.4	C	30.6	C	53.5	D	45.9	D			35.8	D
24: US 1 and Brookside Drive	15.5	B	13.3	B	59.9	E	56.6	E			23.1	C
25: US 1 and Edgewood Drive / Prospect Street	98.5	F	94.8	F	57.5	E	56.5	E			89.8	F
179: US 1 and Oak Street / Columbus Ave	0.9	A	2.1	A	18.2	C	14.6	B			1.6	A
176: US 1 and Old Post Road #2 / Josephine Evaristo Ave	1.6	A	1.4	A	17.1	C	18.9	C			2.0	A
26: US 1 and Harold Ave	1.4	A	0.9	A	16.3	B	14.5	B			2.1	A
154: US 1 and Old Post Road #3	0.9	A	1.2	A		-	11.0	B			1.0	A
27: US 1 and Valley Road	10.3	B	3.2	A		-	22.2	C			9.9	A
28: US 1 and Weaver Street / Holly Hill Lane	27.3	C	14.9	B	25.3	C	72.2	E			31.5	C
29: US 1 and Western Jr Highway	4.3	A	6.7	A	22.4	C		-			6.5	A
67: US 1 and Alvord Lane	8.9	A	13.3	B	35.9	D	48.2	D			18.7	B
80: US 1 and Harvard Lane	14.7	B	9.4	A	35.7	D		-			16.9	B
85: US 1 and West Avenue	29.4	C	25.1	C	35.5	D	37.0	D			31.3	C
163: US 1 and Virgil Street / Diaz Street	4.1	A	9.8	A	21.0	C	62.3	F			15.4	C
88: US 1 and Wilson Street / Richmond Hill Ave	10.2	B	1.5	A	50.9	D		-			8.5	A
91: US 1 and High Street / Richmond Hill Ave	3.1	A	16.6	B	42.1	D		-			16.6	B
118: US 1 and Stillwater Ave	9.3	A	4.9	A		-	34.0	C			11.8	B
35: US 1 and West Main Street / Greenwich Ave	10.5	B	11.9	B	17.4	B	31.7	C			15.8	B

Description	Direction	Section	Distance (miles)	Avg Speed (mph)	Travel Time (seconds)		
					Existing	No Build	Delta
NY Line to Brookside	NB	1	1.34	16.1	223	301	35%
Brookside toOld Church		2	1.08	15.9	241	245	2%
Old Church to River		3	1.49	15.5	330	346	5%
River to Havemyer		4	1.49	14.8	342	362	6%
Havemyer to West Main		5	1.07	16.6	227	232	2%
NY Line to Brookside	SB	1	1.34	21.6	196	224	15%
Brookside toOld Church		2	1.08	13.9	298	279	-6%
Old Church to River		3	1.49	16.7	293	321	10%
River to Havemyer		4	1.49	18.6	288	289	0%
Havemyer to West Main		5	1.07	15.3	250	251	1%

System Totals	
Average Stops per Vehicle	2.5
Total Delay (hr)	574.8
Fuel Efficiency (mpg)	24

★ Clustered signalized intersection - delay includes approach delay at all intersections in the cluster

US 1 Greenwich-Stamford Operational Improvements Study

NO BUILD MID SimTraffic Results

Intersection	NB		SB		WB		EB		NW		ALL	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1: US 1 and Havemeyer Lane / Laddins Rock Road	26.0	C	25.0	C	29.7	C	31.7	C		-	27.4	C
2: US 1 and Wendle Place	3.4	A	6.9	A	40.8	D	15.6	B		-	7.6	A
3: US 1 and Rockmere Ave	3.0	A	3.7	A	43.0	D	13.0	B		-	5.2	A
4: US 1 and Sound Beach Ave	14.2	B	17.4	B	35.0	C	50.0	D		-	22.3	C
5: US 1 and I-95 Exit 5 NB (NB) / Neil Lane (SB) / I-95 Exit 5 SB (NW)	51.7	D	67.5	E	45.5	D	115.6	F	62.9	E	64.2	E
6: US 1 and Sheep Hill Road / Lockwood Lane	20.7	C	21.5	C	37.1	D	67.7	E		-	26.0	C
7: US 1 and Riverside Lane	26.4	C	15.5	B	31.3	C	41.5	D		-	23.8	C
8: US 1 and River Road	11.8	B	22.0	C	27.1	C	41.1	D		-	21.4	C
9: US 1 and Diamond Hill #1	0.8	A	3.7	A	87.1	F		-		-	4.1	A
99: US 1 and Diamond Hill #2	3.1	A	1.1	A		-		-		-	2.1	A
10: US 1 and Orchard St / Mead Ave	30.8	C	36.4	D	40.7	D	39.4	D		-	34.6	C
11: US 1 and Sinawoy Road	15.8	B	22.3	C		-	24.5	C		-	19.6	B
12: US 1 and Strickland (NB) / Taylor Drive (SB) / Cross Lane (NW)	60.6	E	50.7 ★	D	30.4	C	57.6	E	57.3	E	54.8	D
13: US 1 and Old Post Road #6 / Indian Field Road	30.5	C	37.3	D	23.1	C	34.6	C		-	31.6	C
14: US 1 and Hillside Road	16.2	B	18.4	B		-	37.2	D		-	19.2	B
16: US 1 and Overlook Drive	6.2	A	8.4	A	19.7	B		-		-	8.4	A
17: US 1 and Old Church Road	5.9	A	22.2	C	29.8	C	32.9	C		-	15.0	B
18: US 1 and Maple Ave / Millbank Ave	38.3 ★	D	46.4 ★	D	64.9	E	47.5	D		-	46.8	D
19: US 1 and Maher Ave	27.4	C	3.8	A		-	66.6	E		-	16.3	B
20: US 1 and Church St / Mason St	46.4	D	66.3	E	56.9	E	67.7	E		-	58.3	E
21: US 1 and Greenwich Ave / Lafayette Place	66.5	E	26.3	C		-	63.8	E		-	48.0	D
22: US 1 and Benedict Place	11.6	B	14.8	B	51.2	D	49.5	D		-	20.4	C
23: US 1 and Dearfield Drive / Field Point Drive	32.5	C	33.1	C	63.4	E	48.4	D		-	41.0	D
24: US 1 and Brookside Drive	14.6	B	16.6	B	51.7	D	46.7	D		-	21.8	C
25: US 1 and Edgewood Drive / Prospect Street	28.4	C	27.1	C	52.7	D	30.2	C		-	29.8	C
179: US 1 and Oak Street / Columbus Ave	0.6	A	2.7	A	7.0	A	28.5	D		-	2.2	A
176: US 1 and Old Post Road #2 / Josephine Evaristo Ave	1.4	A	1.5	A	20.9	C	40.0	E		-	2.3	A
26: US 1 and Harold Ave	1.1	A	1.0	A	12.5	B	28.4	C		-	1.8	A
154: US 1 and Old Post Road #3	1.3	A	1.3	A		-	14.7	B		-	1.7	A
27: US 1 and Valley Road	13.2	B	4.6	A		-	31.4	C		-	13.4	B
28: US 1 and Weaver Street / Holly Hill Lane	27.2	C	19.3	B	19.5	B	30.7	C		-	23.6	C
29: US 1 and Western Jr Highway	2.5	A	4.9	A	19.2	B		-		-	5.0	A
67: US 1 and Alvord Lane	13.2	B	9.0	A	42.8	D	40.6	D		-	21.0	C
80: US 1 and Harvard Lane	10.1	B	8.6	A	31.8	C		-		-	15.0	B
85: US 1 and West Avenue	39.9	D	17.8	B	46.2	D	40.7	D		-	35.3	D
163: US 1 and Virgil Street / Diaz Street	3.3	A	3.3	A	16.2	C	20.8	C		-	5.6	A
88: US 1 and Wilson Street / Richmond Hill Ave	5.9	A	2.1	A	37.1	D		-		-	6.0	A
91: US 1 and High Street / Richmond Hill Ave	2.3	A	8.7	A	41.6	D		-		-	9.1	A
118: US 1 and Stillwater Ave	8.5	A	4.2	A		-	32.6	C		-	9.1	A
35: US 1 and West Main Street / Greenwich Ave	6.4	A	7.7	A	17.0	B	20.4	C		-	10.7	B

Description	Direction	Section	Distance (miles)	Avg Speed (mph)	Travel Time (seconds)		
					Existing	No Build	Delta
NY Line to Brookside	NB	1	1.34	22.1	217	219	1%
Brookside toOld Church		2	1.08	12.3	305	316	3%
Old Church to River		3	1.49	15.6	326	343	5%
River to Havemyer		4	1.49	18.2	300	295	-2%
Havemyer to West Main		5	1.07	15.2	254	253	0%
NY Line to Brookside	SB	1	1.34	24.7	191	196	3%
Brookside toOld Church		2	1.08	12.3	285	316	11%
Old Church to River		3	1.49	15.3	353	351	-1%
River to Havemyer		4	1.49	19.2	271	280	3%
Havemyer to West Main		5	1.07	17.0	223	227	2%

System Totals	
Average Stops per Vehicle	2.5
Total Delay (hr)	497.7
Fuel Efficiency (mpg)	25

★ Clustered signalized intersection - delay includes approach delay at all intersections in the cluster

US 1 Greenwich-Stamford Operational Improvements Study

NO BUILD PM SimTraffic Results

Intersection	NB		SB		WB		EB		NW		ALL	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1: US 1 and Havemeyer Lane / Laddins Rock Road	31.0	C	27.0	C	32.1	C	31.7	C			30.2	C
2: US 1 and Wendle Place	4.3	A	6.5	A	37.3	D	11.4	B			6.9	A
3: US 1 and Rockmere Ave	4.9	A	4.0	A	40.9	D	13.0	B			6.7	A
4: US 1 and Sound Beach Ave	21.1	C	28.3	C	49.2	D	53.1	D			32.0	C
5: US 1 and I-95 Exit 5 NB (NB) / Neil Lane (SB) / I-95 Exit 5 SB (NW)	61.3	E	76.4	E	54.8	D	176.2	F	51.3	D	73.8	E
6: US 1 and Sheep Hill Road / Lockwood Lane	17.1	B	12.8	B	48.2	D	154.5	F			25.8	C
7: US 1 and Riverside Lane	34.3	C	23.9	C	33.2	C	42.4	D			31.1	C
8: US 1 and River Road	43.1	D	33.8	C	38.9	D	52.0	D			39.5	D
9: US 1 and Diamond Hill #1	2.9	A	2.8	A	71.0	E		-			3.2	A
99: US 1 and Diamond Hill #2	5.2	A	0.5	A		-		-			2.9	A
10: US 1 and Orchard St / Mead Ave	42.9	D	9.0	A	55.6	E	59.6	E			33.6	C
11: US 1 and Sinawoy Road	14.4	B	8.8	A		-	30.7	C			13.0	B
12: US 1 and Strickland (NB) / Taylor Drive (SB) / Cross Lane (NW)	41.3	D	38.0 ★	D	48.4	D	72.8	E	106.8	F	40.8	D
13: US 1 and Old Post Road #6 / Indian Field Road	35.2	D	29.0	C	33.3	C	51.7	D			34.9	C
14: US 1 and Hillside Road	14.1	B	16.8	B		-	45.6	D			18.7	B
16: US 1 and Overlook Drive	6.9	A	12.3	B	27.8	C		-			11.6	B
17: US 1 and Old Church Road	12.3	B	30.4	C	84.7	F	36.0	D			22.4	C
18: US 1 and Maple Ave / Millbank Ave	75.4 ★	E	104.2★	F	74.6	E	52.8	D			82.1	F
19: US 1 and Maher Ave	56.7	E	3.9	A		-	69.8	E			32.7	C
20: US 1 and Church St / Mason St	39.1	D	106.7	F	56.3	E	61.0	E			71.3	E
21: US 1 and Greenwich Ave / Lafayette Place	47.5	D	32.4	C		-	55.6	E			41.3	D
22: US 1 and Benedict Place	9.4	A	9.2	A	51.9	D	48.9	D			16.0	B
23: US 1 and Dearfield Drive / Field Point Drive	36.7	D	28.4	C	76.0	E	36.3	D			40.4	D
24: US 1 and Brookside Drive	16.6	B	14.7	B	45.2	D	56.5	E			21.1	C
25: US 1 and Edgewood Drive / Prospect Street	50.4	D	56.4	E	56.7	E	37.0	D			52.6	D
179: US 1 and Oak Street / Columbus Ave	0.4	A	1.5	A	14.6	B	16.4	C			1.4	A
176: US 1 and Old Post Road #2 / Josephine Evaristo Ave	1.1	A	1.0	A	15.1	C	27.0	D			2.2	A
26: US 1 and Harold Ave	1.2	A	1.0	A	17.7	B	16.3	B			1.7	A
154: US 1 and Old Post Road #3	0.9	A	1.4	A		-	7.3	A			1.3	A
27: US 1 and Valley Road	10.8	B	5.3	A		-	29.7	C			12.1	B
28: US 1 and Weaver Street / Holly Hill Lane	16.8	B	13.5	B	36.0	D	62.2	E			24.4	C
29: US 1 and Western Jr Highway	2.6	A	5.7	A	18.4	B		-			5.5	A
67: US 1 and Alvord Lane	12.5	B	17.2	B	28.0	C	34.6	C			20.1	C
80: US 1 and Harvard Lane	12.1	B	9.7	A	28.1	C		-			14.8	B
85: US 1 and West Avenue	64.0	E	15.0	B	114.7	F	98.7	F			73.5	E
163: US 1 and Virgil Street / Diaz Street	2.8	A	3.1	A	40.9	E	43.6	E			10.2	B
88: US 1 and Wilson Street / Richmond Hill Ave	4.8	A	1.5	A	52.6	D		-			5.2	A
91: US 1 and High Street / Richmond Hill Ave	2.7	A	6.2	A	62.0	E		-			5.5	A
118: US 1 and Stillwater Ave	22.4	C	5.6	A		-	29.5	C			15.5	B
35: US 1 and West Main Street / Greenwich Ave	12.0	B	13.3	B	17.3	B	20.0	B			14.6	B

Description	Direction	Section	Distance (miles)	Avg Speed (mph)	Travel Time (seconds)		
					Existing	No Build	Delta
NY Line to Brookside	NB	1	1.34	22.3	231	217	-6%
Brookside to Old Church		2	1.08	11.6	357	335	-6%
Old Church to River		3	1.49	14.4	394	373	-5%
River to Havemyer		4	1.49	16.8	324	320	-1%
Havemyer to West Main		5	1.07	13.5	311	286	-8%
NY Line to Brookside	SB	1	1.34	23.8	179	204	14%
Brookside to Old Church		2	1.08	9.6	361	406	12%
Old Church to River		3	1.49	17.7	400	303	-24%
River to Havemyer		4	1.49	17.4	318	309	-3%
Havemyer to West Main		5	1.07	16.8	256	230	-10%

System Totals	
Average Stops per Vehicle	3.0
Total Delay (hr)	733.3
Fuel Efficiency (mpg)	24

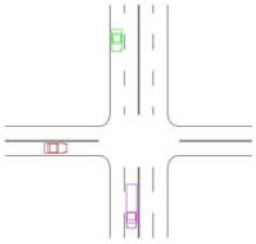
★ Clustered signalized intersection - delay includes approach delay at all intersections in the cluster

Level of Service Explanation

Level of Service (LOS) is a grading system for intersections and other transportation components (freeways, ramps, etc.). Like school, LOS A indicates the best conditions, while LOS F indicates the worst conditions. In this area, signalized intersections are the key bottleneck points that control the traffic operations of the entire corridor.

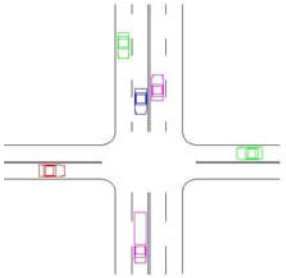
Graphical and written descriptions of level of service are shown below. The most important grade difference is between LOS E and F. At LOS E, although delays are becoming significant, queues still do not generally back-up through or affect nearby intersections. The volume is slightly under or at capacity. However, at LOS F, the demand volume exceeds capacity, and queues can and will frequently back-up through adjacent intersections.

LOS A



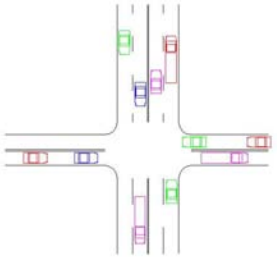
With LOS A, motorists experience virtually no delay. Most vehicles pass through the intersection without stopping. This is indicative of very low volume compared to capacity and good signal coordination

LOS B



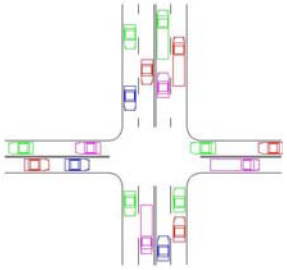
With slightly more delay than LOS A, LOS B still maintains excellent conditions. Some vehicles must stop for relatively short periods of time.

LOS C



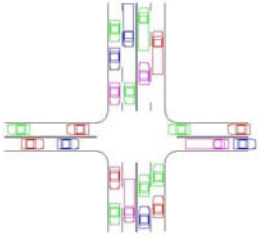
At LOS C, delays are longer than LOS B, but operations would still be considered good. Short to moderate queue lengths form during the red phase of the signal. In rare cases, a vehicle may have to wait through more than one signal cycle to proceed.

LOS D



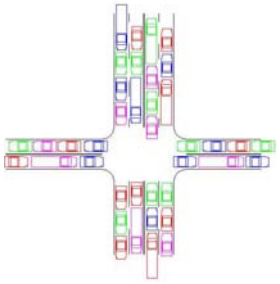
At LOS D, delays start to become more noticeable, and longer queue lengths start to become apparent at intersections. Still, the majority of vehicles have to wait no more than one signal cycle to clear the intersection..

LOS E



At LOS E, intersection volume now equals capacity. Nearly all vehicles have to stop, and delays are long. Many vehicles may have to wait for more than one signal cycle to proceed. However, back-ups generally do not affect nearby intersections

LOS F



Volumes exceed capacity at LOS F. Delays are extremely long, and virtually all vehicles must wait through several signal cycles to proceed. Extensive queues frequently back-up through adjacent intersections, propagating the gridlock conditions.

Appendix C: Build Simulation Results

US 1 Greenwich-Stamford Operational Improvements Study

BUILD PM SimTraffic Results

Intersection	EB		WB		NB		SB		NW		ALL	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1: US 1 and Havemeyer Lane / Laddins Rock Road	34.1	C	28.5	C	50.8	D	40.7	D			36.5	D
2: US 1 and Wendle Place	7.7	A	5.4	A	33.8	C	16.1	B			8.4	A
3: US 1 and Rockmere Ave	7.1	A	4.1	A	34.5	C	15.2	B			7.4	A
4: US 1 and Sound Beach Ave		-		-		-		-				-
5: US 1 and I-95 Exit 5 NB (NB) / Neil Lane (SB) / I-95 Exit 5 SB (NW)		-		-		-		-				-
6: US 1 and Sheep Hill Road / Lockwood Lane		-		-		-		-				-
7: US 1 and Riverside Lane		-		-		-		-				-
8: US 1 and River Road	19.5	B	28.1	C	37.6	D	43.4	D			27.3	C
9: US 1 and Diamond Hill #1	3.7	A	2.6	A	97.5	F		-			3.6	A
99: US 1 and Diamond Hill #2	10.0	A	2.8	A		-		-			6.5	A
10: US 1 and Orchard St / Mead Ave	23.5	C	43.0	D	57.3	E	50.3	D			35.9	D
11: US 1 and Sinawoy Road	7.0	A	9.6	A		-	37.7	D			10.5	B
12: US 1 and Strickland (NB) / Taylor Drive (SB) / Cross Lane (NW)	14.8	B	20.5 ★	C	43.4	D	60.9	E	60.3	E	19.4	B
13: US 1 and Old Post Road #6 / Indian Field Road	24.3	C	16.2	B	49.5	D		-			24.0	C
14: US 1 and Hillside Road	46.2	D	14.4	B		-	65.7	E			35.3	D
16: US 1 and Overlook Drive						-		-				-
17: US 1 and Old Church Road		-		-		-		-				-
18: US 1 and Maple Ave / Millbank Ave		-		-		-		-				-
19: US 1 and Maher Ave		-		-		-		-				-
20: US 1 and Church St / Mason St		-		-		-		-				-
21: US 1 and Greenwich Ave / Lafayette Place		-		-		-		-				-
22: US 1 and Benedict Place		-		-		-		-				-
23: US 1 and Dearfield Drive / Field Point Drive		-		-		-		-				-
24: US 1 and Brookside Drive	14.8	B	14.4	B	43.2	D	56.8	E			19.8	B
25: US 1 and Edgewood Drive / Prospect Street	44.7	D	28.9	C	72.3	E	35.5	D			40.5	D
179: US 1 and Oak Street / Columbus Ave	1.0	A	2.9	A	29.4	D	25.6	D			2.6	A
176: US 1 and Old Post Road #2 / Josephine Evaristo Ave	2.0	A	1.3	A	25.5	D	44.5	E			3.4	A
26: US 1 and Harold Ave	2.8	A	2.5	A	23.1	C	25.5	C			3.5	A
154: US 1 and Old Post Road #3	1.5	A	7.6	A		-	16.1	B			4.8	A
27: US 1 and Valley Road	12.6	B	14.0	B		-	46.0	D			19.5	B
28: US 1 and Weaver Street / Holly Hill Lane	23.7	C	20.1	C	44.8	D	41.8	D			27.9	C
29: US 1 and Western Jr Highway	5.6	A	6.3	A	21.7	C		-			7.2	A
67: US 1 and Alvord Lane	28.0	C	7.2	A	7.4	A	10.0	A			15.0	B
80: US 1 and Harvard Lane	19.2	B	9.7	A	62.1	E		-			25.5	C
85: US 1 and West Avenue	44.2	D	23.6	C	31.2	C	51.0	D			37.7	D
163: US 1 and Virgil Street / Diaz Street	2.8	A	1.5	A	29.0	D	38.2	E			8.5	A
88: US 1 and Wilson Street / Richmond Hill Ave	1.3	A	1.7	A	54.2	D		-			3.6	A
91: US 1 and High Street / Richmond Hill Ave	1.3	A	2.5	A	0.1	A	48.0	D			2.1	A
118: US 1 and Stillwater Ave	43.6	D	8.6	A		-	62.0	E			29.7	C
35: US 1 and West Main Street / Greenwich Ave	13.8	B	9.3	A	5.7	A	9.1	A			9.7	A

Description	Direction	Section	Distance (miles)	Avg Speed (mph)	Travel Time* (seconds)		
					No Build	Build	Delta
NY Line to Brookside	NB	1	1.34	20.4	217	236	9%
N/A		2	-	-	-	-	-
Hillside Road to River Rd		3	1.14	16.5	314	249	-21%
N/A		4	-	-	-	-	-
Rockmere Ave to West Main Street		5	1.32	11.7	371	406	9%
NY Line to Brookside	SB	1	1.34	23.3	204	207	1%
N/A		2	-	-	-	-	-
Hillside Road to River Rd		3	1.14	21.2	207	194	-6%
N/A		4	-	-	-	-	-
Rockmere Ave to West Main Street		5	1.32	17.2	267	277	4%

System Totals	
Average Stops per Vehicle	3.0
Total Delay (hr)	733.3
Fuel Efficiency (mpg)	24

★ Clustered signalized intersection - delay includes approach delay at all intersections in the cluster

* Build Synchro model was separated into three models, and travel time sections for the Build condition differ from the No Build results in Appendix B

Appendix D: 2030 Long Term Analysis

Appendix D - Long Term Analysis

1. ***2030 No Build***: This scenario includes optimized signal timings and cycle lengths but no geometric changes from existing conditions. The existing conditions model, which extends the entire length of the corridor, developed early in the project, was used as a base for this analysis. However, due to the high volumes projected, a proper analysis required the team to examine intersections on an individual basis since simulation models filter vehicles at one congested intersection from getting to the next intersection.

2. ***2030 Fix:*** This scenario optimized the signal timings and cycle lengths for each intersection examined in the 2030 No Build scenario and added geometric improvements in order for the intersection to operate at LOS D or better. Geometric improvements started with the addition of turn lanes with additional through lanes added as needed. This scenario describes the level of improvements required to accommodate the 2030 projections and the impact of those improvements on the adjacent properties.

3. ***2030 Proposed:*** This scenario analyzed the proposed geometric design and signal timing changes outlined in the Design Workshop Summary Report at the same projected traffic volumes as in scenarios 1 and 2.

For each scenario, the simulation analysis was conducted for the PM peak hour, which is the highest peak of the day. The LOS results are based on intersection average delay per vehicle, unless otherwise noted, and are in units of average seconds per vehicle. The following pages provide a comparison between the three scenarios for each intersection. In addition, a summary matrix of additional measures of effectiveness (MOE) for all five sections is provided in ***Table D-1***, at the end of this Appendix.

Section 1 – Byram

US Route 1 and Weaver Street/Holly Hill Lane

The Weaver Street/Holly Hill Lane intersection operates well today at LOS C (24 seconds) with queuing and minor delay on the southbound Weaver Street approach which operates at LOS E (60 seconds). Existing geometric conditions consist of two through lanes in each direction on US 1.

1. 2030 No Build

Analysis: LOS C (32 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS C (35 sec.)

Geometry: No geometric changes.

Impacts: None

3. 2030 Proposed

Analysis = LOS E (74 sec.)

Geometry: 3 lane cross-section on US 1. 150' right turn lane on US 1 westbound. Conversion of pedestrian phase from exclusive to concurrent.

Comparison: The 2030 No Build conditions operate well at overall intersection LOS C (32 seconds) while southbound Weaver Street operates at LOS D (55 seconds). No geometric changes were necessary for the 2030 Fix conditions. The Proposed conditions include three lane cross-section on US 1, left turn lanes on both US 1 approaches, right turn lane on US 1 westbound, and removal of the exclusive pedestrian phase. The 2030 Proposed conditions include a lane reduction from four lanes to three which permits the addition of exclusive left turn lanes, as well as bike lanes. The analysis results show a deterioration of the vehicular operations to LOS E (74 seconds) with improved bicycle accommodations.

Section 1 – Byram

US Route 1 and Edgewood Drive/Prospect Street

This intersection operates, with split phasing for Edgewood Drive and Prospect Street, at LOS D (44 seconds) under Existing conditions. The eastbound US 1 approach operates at LOS E (59 seconds), which is mostly due to the shared through-left turn lane and large number of left turning vehicles (119 during Existing PM Peak).

1. 2030 No Build

Analysis: LOS F (261 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS D (37 sec.)

Geometry: 300' left turn lanes on US 1.

Impacts: ROW (± 16 Properties), Utility Relocation, Sidewalks, Drainage.

3. 2030 Proposed

Analysis: LOS F (203 sec.)

Geometry: 3 lane cross-section on US 1. Left turn lanes on US 1 approaches. Conversion of pedestrian phase from exclusive to concurrent.

Comparison: The 2030 No Build results show the overall intersection is expected to operate at LOS F (261 seconds) with average delay on US 1 of up to seven minutes. The 2030 Fix conditions would require widening of US 1 to provide for 300' left turn lanes on both US 1 approaches. Although this would produce a LOS D, it would result in significant impacts to numerous properties and require utility, drainage and sidewalk relocation. The Proposed conditions operate at LOS F (203 seconds); however, this delay is almost one minute less than anticipated for 2030 No Build conditions.

Section 2 – Downtown Greenwich

US Route 1 and Greenwich Avenue/Lafayette Place

This intersection is two offset "T" intersections operating on one controller. Existing conditions results show this intersection operates at LOS D (51 seconds) with queuing and congestion issues on the eastbound US 1 approach. These operational issues are most likely caused by the shared through-left lane combined with a large left turning volume (251 during Existing PM Peak) on Greenwich Avenue.

1. 2030 No Build

Analysis: LOS F (113 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS D (49 sec.)

Geometry: Add left turn lanes on US 1 between Lafayette Pl. and Greenwich Ave. Add a 2nd right turn lane on Lafayette Pl.

Impacts: ROW (± 1 Property), Lighting, Signal, Sidewalks, Drainage, Loss of on-street parking

3. 2030 Proposed

Analysis: LOS E (79 sec.)

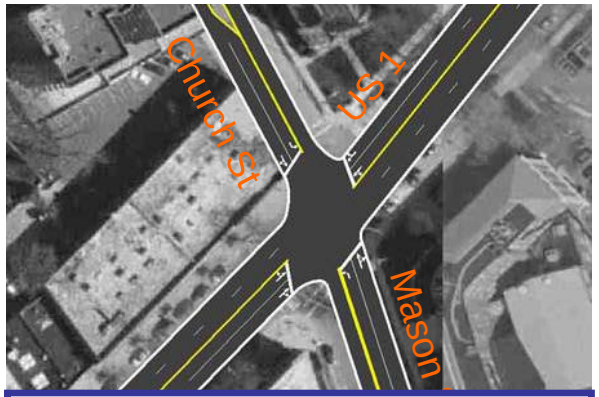
Geometry: Curb bump outs reduce pedestrian crossing width from 63' to 47'; therefore, pedestrian clearance time reduced from 18 to 14 seconds.

Comparison: The 2030 No Build results show this intersection operating at LOS F (113 seconds) with over two minutes of delay on the eastbound US 1 approach and over three minutes of delay on the southbound Lafayette Place approach. The 2030 Fix conditions require left turn lanes on US 1 between Lafayette Place and Greenwich Ave, and an additional southbound right turn lane on Lafayette Place in an area where the right-of-way is tightly constrained. Although this would result in a LOS D, it would result in significant impacts to the properties near the intersection including the First Presbyterian Church. It would also impact the existing sidewalk as well as signal equipment and lighting poles. The Proposed conditions would not change the existing number of lanes, but would introduce pedestrian bump outs on the corners where the existing parking lane is today. These bump outs reduce the pedestrian crossing width from 63' to 47', which reduces the required pedestrian crossing time from 18 to 14 seconds. This reduction in pedestrian clearance time increases the available green time for other vehicular phases at this intersection. Compared to 2030 No Build, the 2030 Proposed conditions results in a reduction from LOS F (113 seconds) to LOS E (79 seconds).

Section 2 – Downtown Greenwich

US Route 1 and Church Street/Mason Street

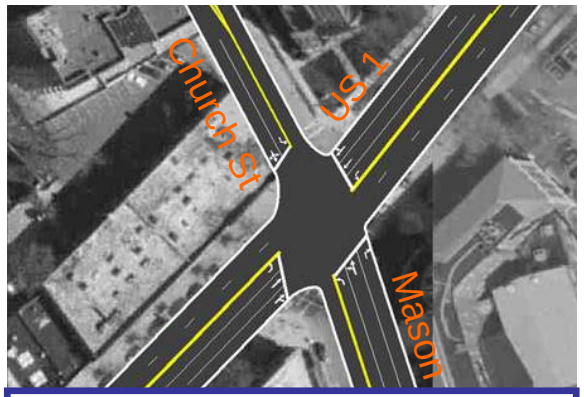
Under Existing conditions the Church Street/Mason Street intersection operates at LOS E (62 seconds) with LOS F (81 seconds) for the westbound US 1 approach. The failing westbound approach is most likely due to the high left turning volume without a dedicated left turn lane.



1. 2030 No Build

Analysis: LOS F (132 sec.)

Geometry: No geometric changes.

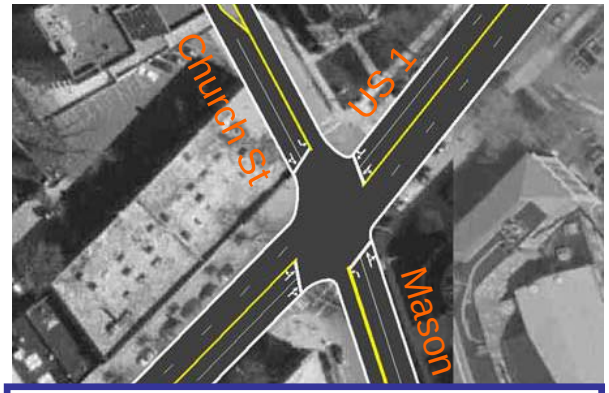


2. 2030 Fix

Analysis: LOS D (41 sec.)

Geometry: Left turn lanes on US 1. Southbound left and left-thru-right lane. Northbound right turn lane & shared thru-left. Split phasing for Church St & Mason St.

Impact: ROW, parking, Signals, Lighting, Sidewalks, Drainage.



3. 2030 Proposed

Analysis: LOS E (79 sec.)

Geometry: Curb bump outs reduce pedestrian crossing width from 56' to 40'; therefore, pedestrian clearance time reduced from 16 to 12 seconds.

Comparison: The 2030 No Build conditions operate at LOS F (132 seconds) with all approaches failing. In order to achieve LOS D results for the 2030 Fix conditions, the following was added to the intersection: left turn lanes on US 1, re-striping the southbound approach for a dedicated left turn lane and a shared left-through-right turn lane, northbound right turn lane and converted shared through-left lane on the Mason Street approach, and split phasing for Church Street and Mason Street. Although this would produce a LOS D, it would result in significant impacts to numerous properties including the Historic YMCA on the southeast corner and the multi-purpose building on the northwest corner, and require signal pole, drainage and sidewalk relocation. The Proposed conditions would not change the existing number of lanes, but would introduce pedestrian bump outs on the corners where the existing parking lane is today. These bump outs reduce the pedestrian crossing width from 56' to 40' which reduces the required pedestrian crossing time from 16 to 12 seconds. This reduction in pedestrian clearance time increases the available green time for other vehicular phases at this intersection. Compared to 2030 No Build, the 2030 Proposed conditions results in a reduction from LOS F (132 seconds) to LOS E (79 seconds).

Section 3 – Cos Cob "Hub"

US Route 1 and Strickland Road/Taylor Drive/Cross Lane

This intersection is three offset "T" intersections operating on one controller with a small storage area between Taylor Drive and Strickland Road. The lack of dedicated left turn lanes on US 1 at Cross Lane/Taylor Drive and Strickland Road create left lane blocking issues, which in turn increases delays and queuing. The Existing conditions operate at LOS E (75 seconds) with the westbound US 1 and Cross Lane approaches operating at LOS F.

1. 2030 No Build

Analysis: LOS F (372 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS D (41 sec.)

Geometry: Left turn lanes on US 1.

Impact: ROW (multiple buildings), Pedestrian Connections, reduction in Parking spots, Sidewalks, Drainage.

3. 2030 Proposed

Analysis: LOS F (141 sec.)

Geometry: 3 lane cross-section on US 1. Realign Taylor Drive and Cross Lane Replace exclusive pedestrian phase with hybrid concurrent phasing.

Impact: 1 property ROW

Comparison: The 2030 No Build conditions operate at LOS F (372 seconds) with up to eight minutes of delay on the US 1 approaches. The 2030 Fix conditions would require widening US 1 to accommodate left turn lanes on the eastbound US 1 approach at Cross Lane/Taylor Drive, and westbound US 1 approach at Strickland Road to generate LOS D results. Although this would produce a LOS D, it would result in significant impacts to numerous properties in the "hub" area including sidewalks, pedestrian connections and parking areas. The Proposed conditions includes reducing the roadway width to a three lane cross-section on US 1 with left turn lanes on US 1, installation of bicycle lanes, realigning Taylor Drive with Cross Lane to create a single intersection, and conversion of the exclusive pedestrian phase to concurrent pedestrian phases. The proposed changes would result in impacts to one (1) property. The 2030 Proposed conditions operate at LOS F (141 seconds), but is a reduction in average delay of nearly four minutes as compared to the 2030 No Build conditions which operate at LOS F (372 seconds).

Section 3 – Cos Cob "Hub"

US Route 1 and Sinawoy Road

The Sinawoy Road intersection operates well under Existing conditions at LOS C (30 seconds). However, there are queuing problems that result primarily from traffic spilling back in the northeast direction from US 1 and Strickland Road intersection, which delays vehicles from making the southbound right turn from Sinawoy Road onto US 1 westbound.

1. 2030 No Build

Analysis: LOS F (140 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS B (15 sec.)

Geometry: Left turn pocket on eastbound US 1.

Impacts: ROW, Pedestrian Connections, Parking, Utility Relocation, Sidewalks, Drainage.

3. 2030 Proposed

Analysis: LOS D (45 sec.)

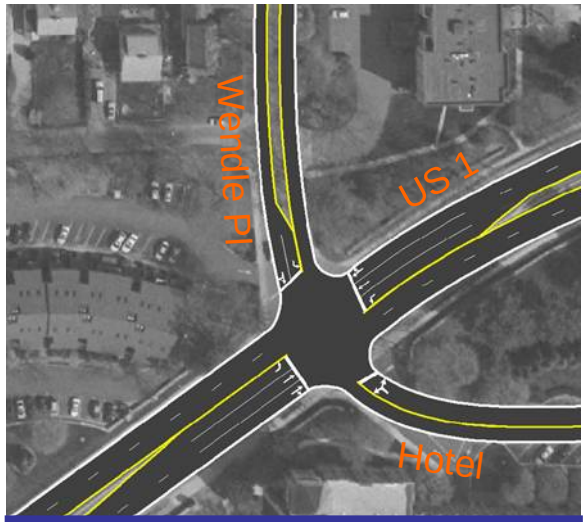
Geometry: 3 lane cross-section on US 1. Remove Sinawoy Rd channelized right turn lane and bring right turns into intersection. Replace exclusive pedestrian phase with hybrid concurrent phasing.

Comparison: The 2030 No Build results show a LOS F (140 seconds), much of which can be attributed to queuing and delay extending northeast from the US 1 and Strickland Road intersection. The 2030 Fix condition requires widening of US 1 to accommodate a left turn lane on eastbound US 1 approach at Sinawoy Road. This improvement at Sinawoy Road combined with the improvements at Strickland Road/Taylor Drive/Cross Lane created LOS B results at the Sinawoy Road intersection for the 2030 Fix condition. Although this would produce a LOS B, it would result in significant impacts to numerous properties in the "hub" area and Cos Cob Fire Department on the northeast corner including sidewalks, pedestrian connections and parking areas at business fronts, and require utility, drainage and parking relocation. The Proposed conditions include reducing US 1 to a three lane cross-section, addition of bicycle lanes, pulling the southbound right turning vehicles into the intersection and removing the channelized right turn lane, and conversion of the exclusive pedestrian phase to concurrent phases. The 2030 Proposed conditions results indicate the intersection operates at LOS D, which is significantly better than 2030 No Build conditions (LOS F).

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

US Route 1 and Wendle Place

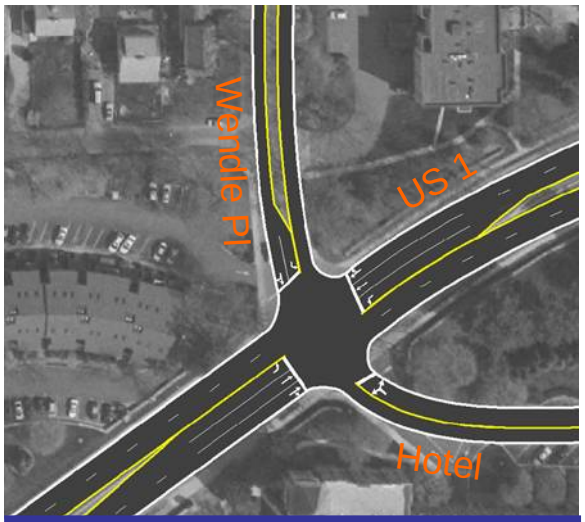
Under Existing conditions this intersection operates well under capacity with a LOS A (8 seconds).



1. 2030 No Build

Analysis: LOS B (11 sec.)

Geometry: No geometric changes.

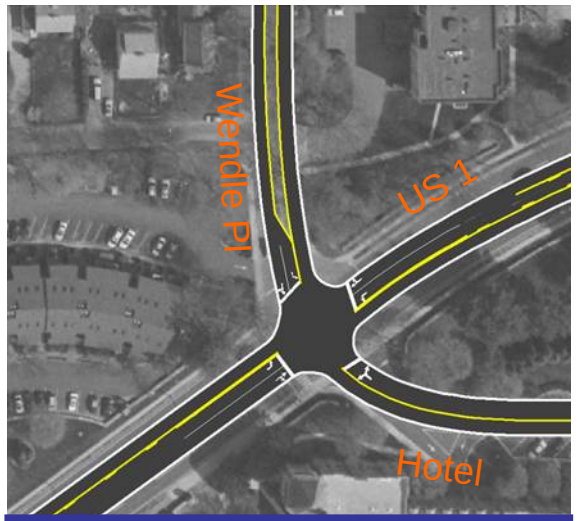


2. 2030 Fix

Analysis: LOS B (11 sec.)

Geometry: No geometric changes.

Impacts: None.



3. 2030 Proposed

Analysis: LOS B (12 sec.)

Geometry: 3 lane cross-section on US 1. Left turn lanes on the US 1 approaches. Conversion of exclusive pedestrian phase to concurrent phasing.

Comparison: This intersection operates well (LOS A) in Existing and 2030 No Build conditions; therefore, no changes were required for the 2030 Fix conditions. The Proposed conditions include a three lane cross-section with left turn lanes on the US 1 approaches and the addition of bike lanes. Under the Proposed conditions the exclusive pedestrian phase was converted to a concurrent phase where pedestrians will now proceed with the corresponding vehicular phase. The 2030 Proposed conditions results indicate the intersection continues to operate well at LOS B.

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

US Route 1 and Havemeyer Lane/Laddins Rock Road

The overall intersection operates well under Existing conditions at LOS D (42 seconds), but the southbound Havemeyer Lane approach does experience some queuing and delay at LOS E (58 seconds) possibly due to heavy left turning volume and only one approach lane.

1. 2030 No Build

Analysis: LOS D (48 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS D (40 sec.)

Geometry: 150' southbound left turn pocket.

Impacts: ROW (± 2 Properties), Retaining Wall and/or Utility Relocation

3. 2030 Proposed

Analysis: LOS E (63 sec.)

Geometry: 3 lane cross-section on US 1. conversion of exclusive pedestrian phase to concurrent phase. Southbound lead phase.

Comparison: The 2030 No Build condition operates similar to the Existing conditions with queuing and delay (LOS E) on the southbound approach. Although widening at this location would be difficult due to steep grades, to achieve LOS D for the 2030 Fix condition, adding a 150' southbound left turn pocket would improve the southbound approach to LOS C. Although this would produce a LOS C for the southbound approach, it would result in significant impacts to properties on the north side of the intersection including possibly an existing retaining wall and/or utility relocations. The 2030 Proposed condition includes a three lane cross-section on US 1 with right turn lanes and bicycle lanes in both directions. The 2030 Proposed conditions results show a reduction in level of service from LOS D to LOS E, a change of only 15 seconds of delay per vehicle with the reduced cross-section, with improved bicycle accommodation.

Section 5 – Stamford

US Route 1 and West Avenue

The West Avenue northbound and southbound approaches operate well above capacity under existing conditions with delays in excess of three minutes per vehicle. The eastbound lane drop on US 1, east of the intersection, also causes merging issues and queuing problems. This intersection serves as an access point to I-95 via Exit 6. Overall Existing conditions intersection delay is LOS F (96 seconds).

1. 2030 No Build

Analysis: LOS F (516 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS C (27 sec.)

Geometry: Left turn lanes on all approaches. Right turn lanes on US 1 approaches.

Impact: ROW (± 6 Properties), Retaining Walls, Utility Relocation, Sidewalks, Drainage.

3. 2030 Proposed

Analysis: LOS F (177 sec.)

Geometry: 3 lane cross-section on US 1.

Comparison: The No Build results show overall intersection LOS F with an expected average delay of nearly nine minutes per vehicle. Significant delay and queuing occur on all approaches with the exception on the westbound direction during the No Build condition. The 2030 Fix condition requires left turn lanes on all approaches and right turn lanes on US 1. The single through lane removes the eastbound lane drop on the east side of the intersection, which reduces queuing and merging problems and improves throughput along US 1. The right turn lanes pull the right turning volume out of the through lanes and also improve US 1 throughput. Although these improvements would produce a LOS C, it would result in significant impacts to numerous properties on West Avenue where right-of-way is tightly constrained and building fronts are close to the street. West Avenue would also require utility, drainage and sidewalk relocation, and possibly a retaining wall on the southwest corner. The 2030 Proposed conditions include a three lane cross-section along US 1 with left turn lanes at the intersection. No modifications are proposed on West Avenue primarily due to the proximity of buildings to the street. The 2030 Proposed results remain at LOS F, however the average delay per vehicle is reduced by over 5 minutes compared to the 2030 No Build conditions.

Section 5 – Stamford

US Route 1 and Virgil Street/Diaz Street

Virgil Street and Diaz Street are stop controlled approaches that operate at LOS F under Existing conditions with delays in excess of two minutes. The side street approaches are offset from each other, which contributes to delay when vehicles attempt to cross over US 1 from one side street to the other. The northbound and southbound stop controlled approaches operate at LOS F with 54 and 72 seconds of delay, respectively, under existing conditions.

1. 2030 No Build

Analysis: LOS F (134 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS D (36 sec.)

Geometry: 3 lane cross-section on US 1. Signalize intersection with split side street phasing. Left turn lanes at the intersection.

Impacts: On-street parking, signal installation costs

3. 2030 Proposed

Analysis: LOS F (87 sec.)

Geometry: 3 lane cross-section on US 1. Left turn lanes at intersection which remains unsignalized.

Impacts: On-street parking

Comparison: The results for the 2030 conditions above are an average of the Virgil Street and Diaz Street approaches. The 2030 No Build conditions operate at LOS F with over two minutes of delay for the side street movements. To generate LOS D or better results for the side street approaches the intersection would require signalization. Although this would produce a LOS D, it would require a new signal with associated installation and maintenance costs, as well as a potential loss in the number of on-street parking spaces. The 2030 Proposed condition is a three-lane cross section with left turn lanes at the unsignalized intersection. The 2030 Proposed condition, without signalization, would operate at LOS F (87 seconds) which is a reduction of 47 seconds of delay per vehicle when compared to 2030 No Build conditions (134 seconds).

Section 5 – Stamford

US Route 1 and Wilson Street/High Street/Richmond Hill Avenue

This location consists of two separate intersections operating as one with one signal controller. Wilson Street is offset to the west of High Street and Richmond Hill Avenue. In the Existing conditions these intersections operate well with overall intersection LOS A.

1. 2030 No Build

Analysis: LOS A (8 sec.)

Geometry: No geometric changes.

2. 2030 Fix

Analysis: LOS A (9 sec.)

Geometry: No geometric changes.

Impacts: None.

3. 2030 Proposed

Analysis: LOS A (5 sec.)

Geometry: 3 lane cross-section on US 1.
Realign Richmond Hill Ave. with High St.
Wilson St becomes stop controlled.
Left turn lanes at all intersections on US 1.

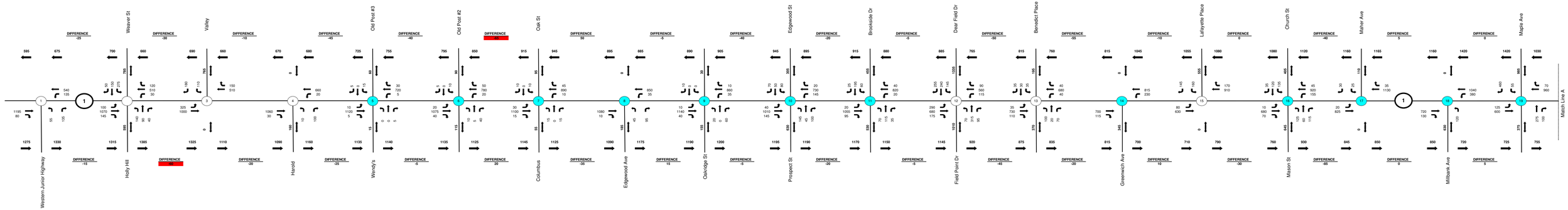
Impacts: Park, Parking, Business Access.

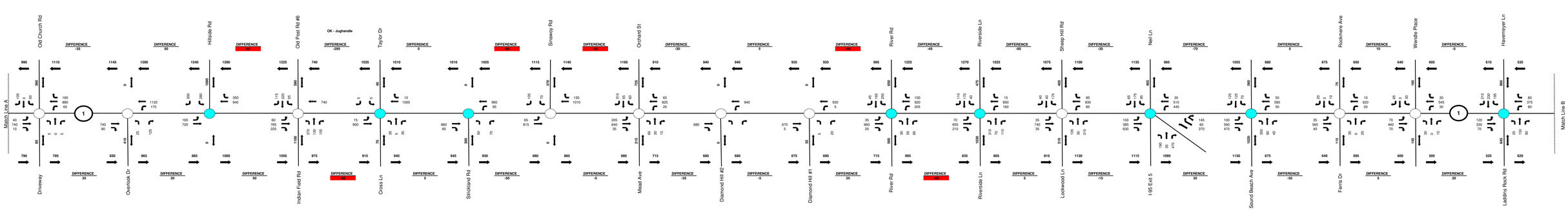
Comparison: This area in Stamford operates well (LOS A) in Existing and 2030 No Build conditions; therefore, no changes were required for the 2030 Fix conditions to address operations. However, the area was identified as an high accident location, and can be confusing to unfamiliar drivers and pedestrians. The proposed plan for this area simplfies the location, including realigning Richmond Hill Avenue with High Street and eliminating the signal at Wilson Street. Left turn lanes at all approaches on US 1 provide access to the side streets. Traffic operations would be expected to continue to operate well under proposed conditions. While there would not be any impact to ROW under the proposed scenario, there would be some impacts to Jackie Robinson park, on-street parking, and access to businesses. More details are provided in the full Workshop Summary Document, included in ***Volume 2: Public Involvement***.

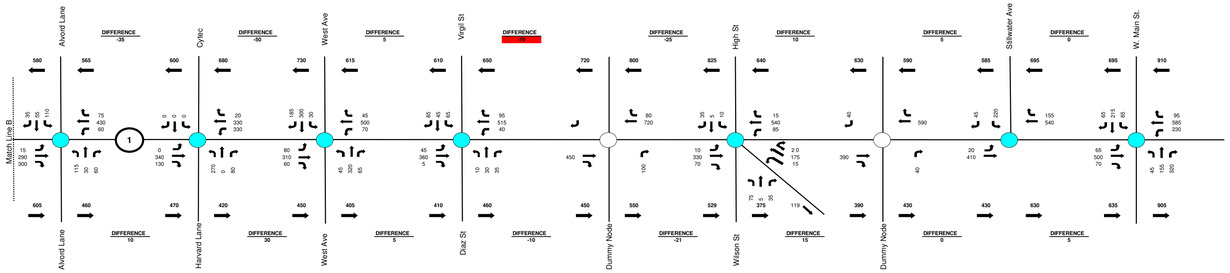
Table D-1: Measure of Effectiveness Comparison

Section	Intersection	Intersection LOS & Delay			Total Network Delay (hr)			Average Stops per Vehicle			Fuel Efficiency (mpg)		
		No Build	Fix	Proposed	No Build	Fix	Proposed	No Build	Fix	Proposed	No Build	Fix	Proposed
1	Edgewood Drive / Prospect Street	F (261)	D	F (203)	197	60	205	2.2	0.8	2.4	22.2	27.6	22.2
	Weaver Street / Holly Hill Lane	C	C	E (74)									
2	Church St / Mason St	F (132)	D	F (133)	255	65	216	3.2	1.5	3.0	12.9	22.3	14.2
	Greenwich Ave / Lafayette Place	F (99)	D	E (68)									
3	Sinawoy Rd	F (140)	B	D	312	42	124	5.3	1.0	2.0	17.2	29.1	24.1
	Strickland Rd / Taylor Dr / Cross Ln	F (372)	D	F (141)									
4	Havemeyer Ln / Laddins Rock Rd	D	D	E (63)	36	31	49	1.1	1.0	1.4	23.7	24.3	23.2
	Wendle Place	B	B	B									
5	West Ave	F (516)	C	F (177)	320	53	130	3.1	1.6	2.2	13.0	25.1	20.1
	Virgil St / Diaz St	D	C	C									
	High Street / Richmond Hill Ave	A	B	A									

2030 AM Peak



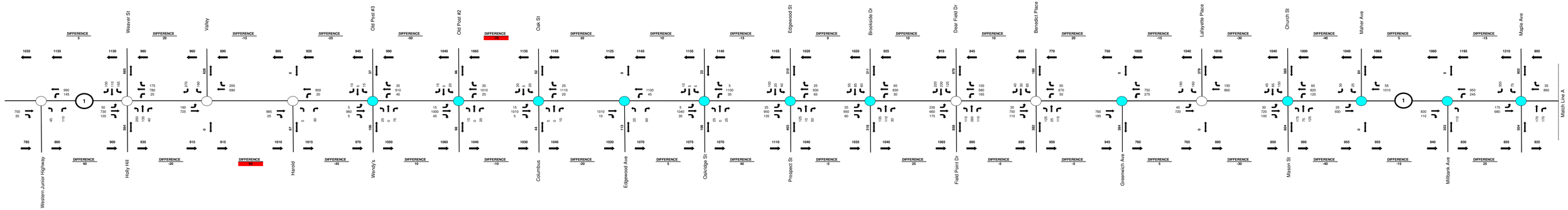


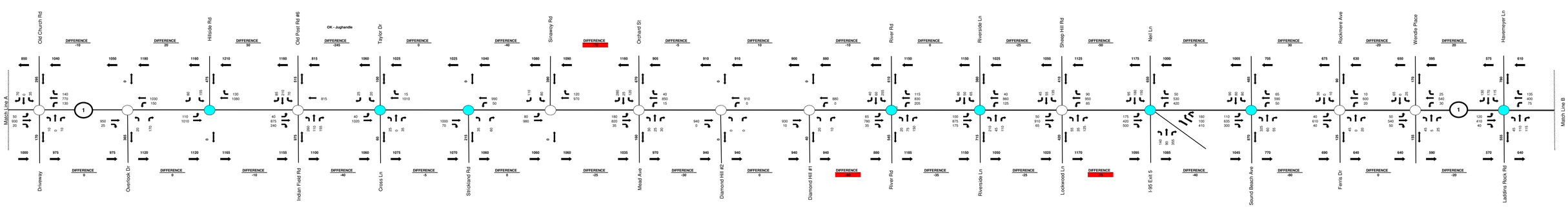


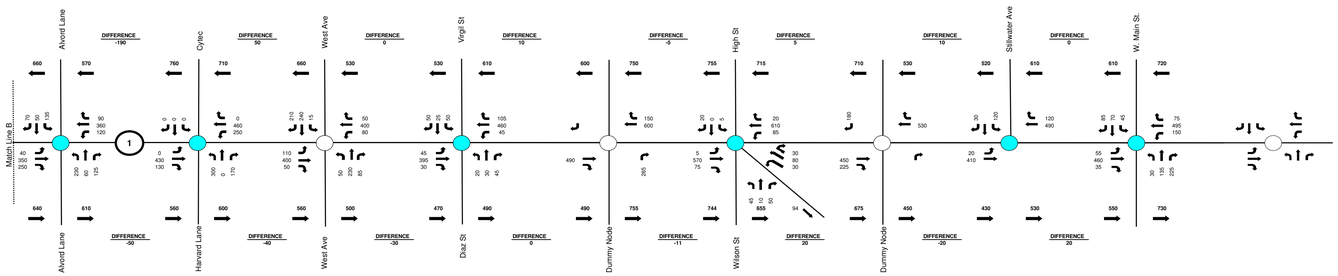
Legend

= 2010 Urban Count (AM Peak is 7:45-8:45)

2030 MID Peak







Legend

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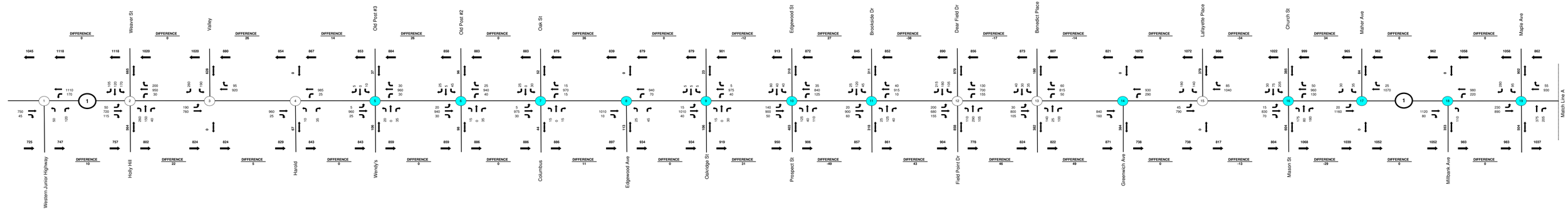
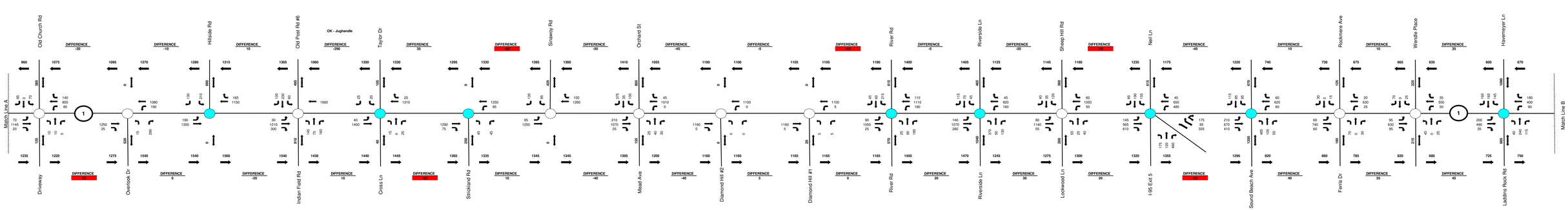
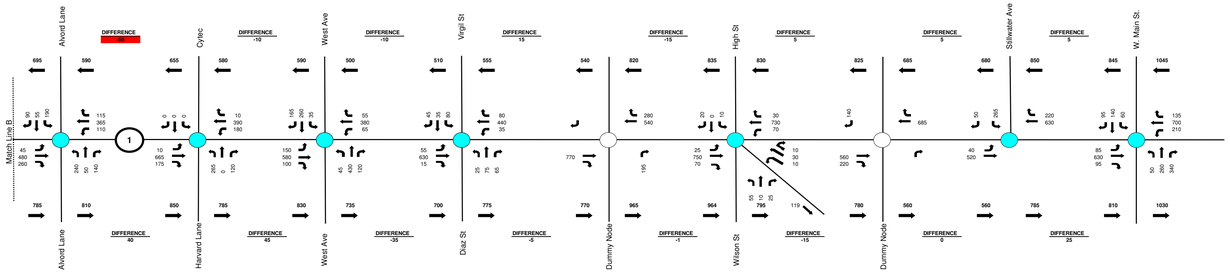
2030 PM Peak







Legend

= 2010 Urban Count (AM Peak is 7:45-8:45)