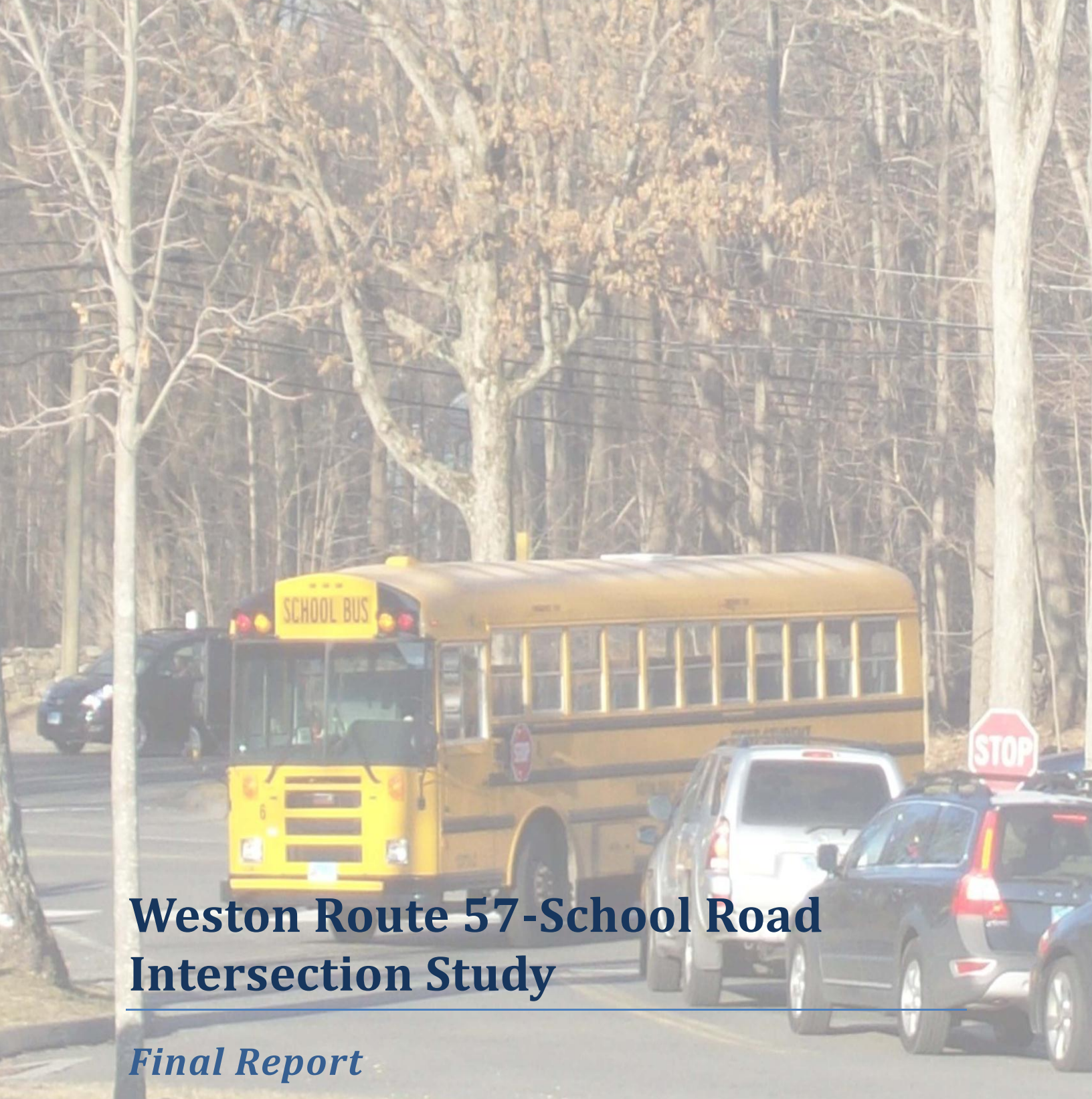

Weston Route 57-School Road Intersection Study

Final Report

Prepared for the South Western Regional Planning Agency

7/25/2012

SWRPA
South Western Regional Planning Agency

MILONE & MACBROOM®

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1 Introduction

The South Western Regional Planning Agency (SWRPA) in conjunction with the Connecticut Department of Transportation (CTDOT) and the Town of Weston identified the need to undertake improvements at the intersection of State Route 57 and School Road in Weston, Connecticut. The study intersection serves as a major access point to four schools within the town. As a result, this intersection is often subject to congestion and excessive delays during peak school hours. The absence of pedestrian facilities such as sidewalks and crosswalks at the intersection also presents some safety concerns. Signage in this school zone is also inadequate and needs to be improved. A previous study undertaken by Purcell Associates in 1996 recommended a number of traffic operations and geometric improvements for the intersection, none of which have been implemented to date.

The primary objectives of this latest study are to:

- Collect and review all available traffic and safety data
- Analyze data and develop improvement alternatives
- Consider the needs of all users, in particular students from the neighboring schools
- Produce a final technical report with recommendations for a preferred alternative

The SWRPA contracted with Milone & MacBroom, Inc. (MMI) to serve as the primary consultant on this intersection improvement study for Route 57 and School Road. MMI subcontracted with VN Engineers (DBE) to assist in accident analysis.

This report summarizes the existing and future conditions assessment and proposed improvement alternatives for the intersection of Route 57 and School Road.

2 Existing Conditions

2.1 Existing Roadway Conditions

The intersection of Route 57 and School Road is a signal-controlled "T" intersection. Route 57 is a north/south urban minor arterial characterized by one 12-foot travel lane in each direction with two-foot shoulders. School Road is a two-way local roadway characterized by two 12-foot approach lanes and one exiting lane at its intersection with Route 57 with no shoulders. School Road serves as the main access to four schools located on School Road. The traffic signal at the intersection of Route 57 and School Road is fully actuated and is owned and maintained by the state. Approximately 70 feet east of the study intersection is a driveway to the Hurlbutt Elementary School. This intersection is stop controlled on the elementary school driveway and the School Road westbound approach.

There is currently a pedestrian push button signal at the intersection of Route 57 and School Road; however, there are no handicap ramps or sidewalks. There are no crosswalks at the study intersection; however, there is an unsignalized mid-block pedestrian crossing on Route 57 between School Road and Norfield Road, which is located south of School Road. Route 57 at the intersection with Norfield Road is currently signalized. This traffic signal is also owned and maintained by the state. It is understood that this intersection will be improved with new traffic signal equipment and pedestrian facilities (State Project # 173-403). Signage within the study area is also quite limited and needs to be improved.

Figure 1: Site Location Map

2.1.1 Vehicular Speeds

Vehicular travel speed data on Route 57 was obtained from CTDOT. Route 57 has a regulatory posted speed limit of 35 miles per hour in this area. In 2009, it was found that the 85th percentile speed for northbound traveling vehicles on Route 57 was 42 miles per hour. Southbound vehicles on Route 57 had an 85th percentile speed of 43 miles per hour. The 85th percentile speed is the speed at or below which 85 percent of the vehicles were recorded to have traveled. The average speed of vehicles traveling on Route 57 through this area was recorded to be 40 miles per hour.

2.2 School Data

As indicated, there are currently four schools located on School Road. These schools are:

- Hurlbutt Elementary School
- Weston Intermediate School
- Weston Middle School
- Weston High School

Information on the schools was provided by the Weston Board of Education and is summarized below:

	School Hours
Hurlbutt Elementary School	8:30 a.m. to 3:15 p.m.
Weston Intermediate School	8:30 a.m. to 3:15 p.m.
Weston Middle School	7:45 a.m. to 2:30 p.m.
Weston High School	7:45 a.m. to 2:30 p.m.
Total Number of Students	2,500
Total Number of Staff/Teachers	377
Number of School Buses	22
Percentage of Students via bus	63%
Percentage of Students via car	37%
Percentage of Staff via car	100%

Source: Weston Board of Education

School bus and parent pickup/drop-off activity information was also provided for the four schools. The driveways to the intermediate, middle, and high schools are located approximately one-half mile to one mile from the intersection of Route 57 and School Road; therefore, school bus and parent pickup/drop-off activity at these schools do not directly impact traffic operations at the study intersection. The driveway to the Hurlbutt Elementary School, however, is located in close proximity to the study intersection, which results in pickup/drop-off activity at the elementary school directly impacting the study intersection. Parent pickup/drop-off activity at the elementary school occurs in front of the school building via the first driveway while school bus pickup/drop-off occurs in the rear of the building via a second driveway located further up School Road.

2.3 Existing Traffic Conditions

The intersection of Route 57 and School Road experiences significant delays and congestion during the morning and afternoon school peak periods due to the heavy volume of traffic accessing School Road during these hours. In addition, the close proximity of the Hurlbutt Elementary School driveway exacerbates the existing traffic situation and leads to further congestion and delays. Currently, these intersections require the services of a police officer at the intersection of Route 57 and School Road and a traffic person at the intersection of School Road and the elementary school driveway during school peak hours. It is also our understanding, based on information provided by the Weston Board of Education, that there are on average two sporting events per week and one concert/play per month at the schools, which generates higher than normal traffic on School Road.

2.3.1 Traffic Volumes

A review of traffic data at the nearest CTDOT traffic monitoring station on Route 57 in the vicinity of the study intersection was undertaken. The traffic data is presented in **Table 1** below.

TABLE 1
Two-Way Annual Daily Traffic (ADT) on Route 57

Year	ADT
2010	10,700
2007	10,400
2004	11,200

Source: Connecticut Department of Transportation

The most recent data indicates that Route 57 carries approximately 10,700 vehicles daily. This segment of Route 57 has experienced fluctuating traffic volumes over the past decade or so with a decline in traffic volumes from 2004 to 2007 and some marginal growth from

2007 to 2010. 2008 vehicle classification data provided by CTDOT indicates that approximately 98.5 percent of the traffic on Route 57 was comprised of light vehicles with 1.5 percent heavy vehicle traffic. The light vehicle traffic was broken up as passenger cars – 88 percent and four-tire single unit trucks – 10.5 percent. The heavy vehicle traffic was broken up as buses – 0.1 percent, three- or four-axle single unit trucks – 1.3 percent, and single trailer trucks – 0.1 percent. There were no multitrailer trucks recorded on Route 57.

To supplement the CTDOT data, turning movement traffic counts were manually conducted at the intersections of Route 57 at School Road and School Road at the elementary school driveway during the morning and afternoon peak periods on Wednesday, January 25, 2012. The counts were performed from 7:00 a.m. and 9:00 a.m. and from 2:00 p.m. and 6:00 p.m. in order to capture both the school dismissal and commuter peak periods. The peak hour traffic counts were found to be comparable to the CTDOT 2010 traffic data.

Figures 2 and **3** illustrate the peak hour traffic volumes that were extracted from the counts. The weekday morning peak hour occurred from 7:30 a.m. to 8:30 a.m. while the afternoon peak hour occurred from 2:45 p.m. to 3:45 p.m. These afternoon traffic volumes depict the school dismissal peak. A separate, less noticeable commuter peak did occur later in the afternoon. However, the total volume of traffic through the study area during the later commuter peak was significantly less than during the school dismissal peak. The afternoon commuter peak was not analyzed as a result.

The volume of traffic experienced at the intersection was observed to be greater during the morning peak hour than during the afternoon peak hour. This is due to the school arrival period and commuter period coinciding during the morning, whereas during the afternoon the dismissal and commuter peak periods occur separately.

Buses were enumerated during both morning and afternoon count periods. As illustrated in Figures 2 and 3, approximately 42 buses were observed entering and exiting the study intersection during the morning peak period while 32 buses were observed during the afternoon peak period. During the morning peak hour, the majority of buses traveling along Route 57 arrived from the south, turned right onto School Road, and continued through past the elementary school driveway. A notable number of buses also traveled westbound on School Road and turned left into the elementary school driveway during the morning peak hour.


School Road
Weston Road (Route 57)
203 (6)
44 (20)
44 (2)
225 (5)
24
66 (1)
476
96 (3)
(12) 333
(1) 109
224 (4)
346 (10)
Route 57 at School Road
Weston, CT
Figure: 2
Existing Traffic Volumes
Weekday Morning Peak Hour
7:30 AM - 8:30 AM
00 = All Vehicles
(00) = Buses
Source:
Aerial: Microsoft Bing Aerial
N
Milone & MacBroom


School Road
Route 57
254 (13)
19
49 (2)
290 (11)
18
85
260 (1)
36 (5)
(15) 145
24
316 (3)
133 (10)
Route 57 at School Road
Weston, CT
Figure: 3
Existing Traffic Volumes
Weekday Afternoon Peak Hour
2:45 PM - 3:45 PM
00 = All Vehicles
(00) = Buses
Source:
Aerial: Microsoft Bing Aerial
N
Milone & MacBroom

During the afternoon peak hour, similar to the morning, the majority of bus traffic along Route 57 arrived from the south, turned right onto School Road, and continued past the driveway. The opposite predominant flow also occurred during the afternoon peak hour where a large percentage of buses arrived from the east along School Road and turned left onto Route 57.

2.3.2 Pedestrian Activity

No pedestrian activity was observed during the morning peak hour. During the afternoon peak hour, however, a number of pedestrians were observed to cross traffic. The pedestrians were all students. Five pedestrians crossed at the intersection of Route 57 and School Road. At the intersection of School Road and the school driveway, nine pedestrians were observed to cross the street. It should be noted that these pedestrian counts were conducted in January and could therefore be considerably higher during the warmer months of the year.

2.4 Capacity Analysis

The adequacy of the intersections to handle the peak hour traffic volumes was evaluated using the *Synchro* Program. This software package adheres to the methodologies outlined in the *Highway Capacity Manual* (HCM)[1] to determine Level of Service (LOS). LOS is a qualitative measure of the efficiency of intersection operations in terms of delay and inconvenience to motorists.

A description of the various LOS designations, A through F, for signalized and unsignalized intersections is presented in the Appendix. **Table 2** summarizes the analysis results for the intersection of Route 57 and School Road.

As mentioned above, the intersections handle more traffic during the morning peak hour than during the afternoon peak hour. As a result, operations are better during the afternoon peak hour. The intersection of Route 57 and School Road operates overall at LOS E during the morning peak hour. A large volume of traffic makes a right turn from Route 57 onto School Road during this period. Accordingly, the northbound approach operates at LOS F during the morning peak hour. During the afternoon peak hour, the intersection operates overall at LOS C while the School Road westbound left-turn movement operates at LOS E.

At the intersection of the school driveway intersection with School Road, the stop sign controlled school driveway approach operates at LOS F during the morning peak hour and LOS C during the afternoon peak hour.

[1] *Highway Capacity Manual*, Transportation Research Board.

TABLE 2
Capacity Analysis Summary
Existing (2012) Traffic Volumes

LOCATION/MOVEMENTS	LEVEL OF SERVICE	
	WEEKDAY MORNING	WEEKDAY AFTERNOON
SIGNALIZED		
Route 57 at School Road		
Route 57 Northbound Approach	F	C
Route 57 Southbound Approach	D	A
School Road Westbound Left	E	E
School Westbound Right	A	A
Overall	**E**	**C**
UNSIGNALIZED		
School Road at school driveway		
Driveway Northbound Approach	F	C
School Road Westbound Approach	B	B

2.5 Accident History

Information on three years of traffic accidents occurring from 2006 through 2008 was obtained from CTDOT for the segment of Route 57 from mile marker 4.50 to 4.60. This segment of Weston Road is about 500 feet in length and includes the intersection with School Road. **Table 3** exhibits a summary of these accidents by severity and collision type.

TABLE 3
Accident Summary
Route 57 at School Road

LOCATION: Route 57, Weston, CT STUDY DURATION: 1/1/2006 to 12/31/2008	ACCIDENT SEVERITY				TYPE OF COLLISION												
					TURN												
	FATALITY	INJURY	PROPERTY DAMAGE ONLY	**TOTAL**	SAME DIRECTION	OPPOSITE DIRECTION	INTERSECTING PATHS	REAR-END	HEAD-ON	BACKING	ANGLE	OVERTURN	SIDE SWIPE (Same Direction)	PEDESTRIAN / BICYCLIST	ANIMAL IMPACT	FIXED OBJECT	**TOTAL**
Route 57 (Weston Road) at School Road (Mile Marker 4.50 to 4.60)	0	1	6	**7**	0	0	0	6	0	0	0	0	1	0	0	0	**7**
TOTAL	0	1	6	**7**	0	0	0	6	0	0	0	0	1	0	0	0	**7**

During the three-year study period, seven collisions occurred within the vicinity of this intersection, with one crash resulting in a personal injury. Most of the accidents were rear-end type collisions that transpired with no adverse weather or road surface conditions, and all reported accidents occurred during daylight hours. Of the six rear-end collisions, two occurred north of the intersection in the southbound direction while two occurred south of the intersection in the northbound direction. One rear-end accident occurred north of the intersection traveling north while the sideswipe accident occurred north of the intersection traveling south. A collision diagram of the study intersection is presented in **Figure 4**. Subsequently, additional accident data from 2009 through 2011 was obtained from the Weston Police Department. Three accidents were reported at the study intersection during this period (2009-2011). All three accidents involved property damage. There were no injuries or fatalities.

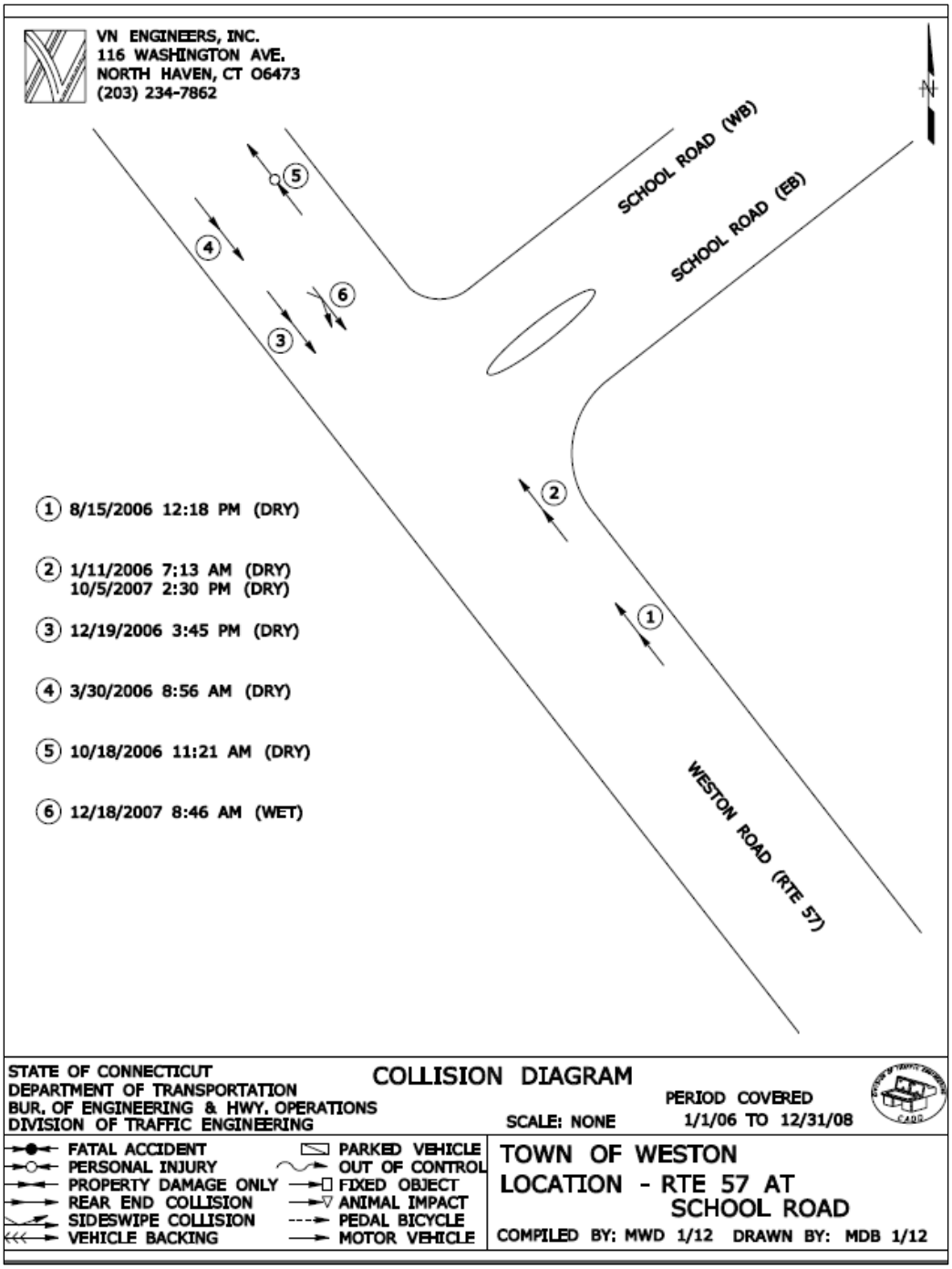


Figure 4: Collision Diagram

2.6 Sightlines

Based on the 85th percentile speed on Route 57, the minimum acceptable intersection sight distance per the CTDOT guidelines is 390 feet. The measured sight distances looking left and right from the School Road approach are approximately 650 feet and 200 feet, respectively. The sightline looking right is restricted by a stone wall and vegetation. This sightline can be improved by relocating the stone wall and some clearing of the vegetation on the northeastern corner of the intersection.

3 Future Conditions

3.1 Future Traffic Conditions

A future (2030) planning year horizon was utilized for this study. A review of traffic data at the nearest CTDOT traffic monitoring station on Route 57 in the vicinity of the study intersection indicates fluctuating traffic volumes over the past decade or so with a decline in traffic volumes from 2004 to 2007 and some marginal growth from 2007 to 2010. However, a one (1) percent per year ambient roadway traffic growth into the future was conservatively assumed for this study. The growth rate was vetted and approved by CTDOT. The existing intersection traffic volumes were, therefore, projected to year 2030 using a one percent annual growth factor.

CTDOT was also contacted to determine whether there were any approved or yet to be constructed projects in the immediate vicinity of the study intersection to include as part of the future (2030) background traffic. CTDOT determined that there were no such projects to include. **Figures 5** and **6** illustrate the future (2030) weekday morning and afternoon peak hour traffic volumes.

3.2 Capacity Analysis

The adequacy of the study intersection to handle the peak-hour traffic volumes under 2030 conditions was evaluated using the *Synchro* program. This software package adheres to the methodologies outlined in the *Highway Capacity Manual* (HCM)[2] to determine Level of Service (LOS).

A description of the various LOS designations, A through F, for signalized and unsignalized intersections is presented in the Appendix. **Table 4** summarizes the analysis results for the intersection of Route 57 and School Road and the intersection of School Road at the Hurlbutt Elementary school driveway under future (2030) peak hour conditions.

[2] *Highway Capacity Manual*, Transportation Research Board.


Weston Road (Route 57)
School Road
245 (10)
55 (25)
55 (5)
270 (10)
575
120 (5)
30
80 (5)
(15) 400
(5) 135
270 (5)
420 (15)
Route 57 at School Road
Weston, CT
Figure: 5
Future Traffic Volumes
Weekday Morning Peak Hour
7:30 AM - 8:30 AM
00 = All Vehicles
(00) = Buses
Source:
Aerial: Microsoft Bing Aerial
N
Milone & MacBroom


School Road
Route 57
305 (20)
25 (5)
60 (5)
350 (15)
315 (5)
45 (10)
25
105
(20) 175
30
380 (5)
160 (15)
Route 57 at School Road
Weston, CT
Figure: 6
Future Traffic Volumes
Weekday Afternoon Peak Hour
2:45 PM - 3:45 PM
00 = All Vehicles
(00) = Buses
Source:
Aerial: Microsoft Bing Aerial
N
Milone & MacBroom

TABLE 4
Capacity Analysis Summary
Future (2030) Traffic Volumes

LOCATION/MOVEMENTS	LEVEL OF SERVICE	
	A.M. PEAK	P.M. PEAK
SIGNALIZED		
Route 57 at School Road		
Route 57 Northbound Approach	F	D
Route 57 Southbound Approach	F	A
School Road Westbound Left	F	F
School Westbound Right	A	A
Overall	**F**	**E**
UNSIGNALIZED		
School Road at school driveway		
Driveway Northbound Approach	F	D
School Road Westbound Approach	C	B

Under future (2030) conditions, the intersection of Route 57 and School Road will operate overall at LOS F during the morning peak hour and LOS E during the afternoon peak hour. It is projected that approximately 420 vehicles will make a right turn from Route 57 onto School Road during future (2030) morning peak hour conditions. Accordingly, the northbound approach will operate at LOS F during the morning peak hour. During the afternoon peak hour, the School Road westbound left-turn movement will operate at LOS F.

At the intersection of the Hurlbutt school driveway at School Road, the stop sign controlled school driveway northbound approach will operate at LOS F during the future morning peak hour and LOS D during the future afternoon peak hour. The westbound approach on School Road will operate at LOS C and LOS B during future (2030) morning and afternoon peak hours, respectively.

4 Preliminary Improvement Alternatives

The traffic and safety issues at the intersection of Route 57 and School Road and its immediate environs necessitate the need for traffic/geometric improvements. For this study, two (2) near- and two (2) long-term improvement alternatives were developed for the intersection.

The near-term alternatives were identified as improvements that can be implemented within a one- to five-year time frame. These improvements would usually involve minimal to no property, utility, or environmental impacts. Costs associated with these improvements are not expected to exceed $500,000.

The long-term alternatives were identified as improvements that will most likely be implemented beyond a five-year time frame. These improvements would involve property, utility, or environmental impacts and would, therefore, involve some permitting process. Costs associated with these improvements are expected to exceed $500,000.

In a nut shell, the major difference between the near term and long term alternatives for this location relates to the cost of construction. A description of the proposed improvement alternatives is presented in sections below.

4.1 Preliminary Near-Term Alternatives

Preliminary Near-Term Alternative 1

This alternative would involve the relocation of the existing parent pickup/drop-off driveway to the Hurlbutt Elementary School further to the east on School Road along the lower western boundary of the baseball field. The relocation would create more separation from the Route 57- School Road intersection and reduce the number of conflict points at that location. A stop control would be installed on the driveway approach while School Road will be free flow. In addition, signal timing improvements and potential coordination with the newly redesigned traffic signal at the intersection of Route 57 and Norfield Road to the south would be implemented.

The proposed improvements would involve impacts to the school property. **Figure 7** presents a conceptual layout of *Preliminary Near-Term Alternative 1*.

Figure 7: Preliminary Near-Term Alternative 1

Preliminary Near-Term Alternative 2

Preliminary Near-Term Alternative 2 would involve the construction of a new parent pickup/drop-off driveway to the Hurlbutt Elementary School further to the east on School Road along the eastern boundary of the baseball field, while leaving the existing driveway open for bus access only to the school bus depot. This new configuration would create more separation from the Route 57- School Road intersection and reduce the number of conflict points within the study area. Similar to *Preliminary Near-Term Alternative 1*, signal timing improvements and potential coordination with the newly redesigned traffic signal at the intersection of Route 57 and Norfield Road to the south would be implemented. In addition, the existing stop sign on School Road westbound would be removed making School Road free flow. The proposed improvements would involve impacts to the school property. **Figure 8** presents a conceptual layout of *Preliminary Near-Term Alternative 2*.

Figure 8: Preliminary Near-Term Alternative 2

4.2 Preliminary Long-Term Alternatives

Preliminary Long-Term Alternative 1

Preliminary Long-Term Alternative 1 would involve widening the Route 57 northbound approach along its eastern edge to provide an exclusive right-turn lane and a through lane. This improvement would reduce queuing on the Route 57 northbound approach. A new sidewalk would be installed along the eastern edge of Route 57 from School Road to Norfield Road with a mid-block crosswalk and advance crosswalk signage. The proposed improvements would involve some right-of-way (ROW) impacts. **Figure 9** presents a conceptual layout of *Preliminary Long-Term Alternative 1*.

Figure 9: Preliminary Long-Term Alternative 1

Preliminary Long-Term Alternative 2

Preliminary Long-Term Alternative 2 would involve widening the Route 57 northbound approach along its eastern edge to provide an exclusive right-turn lane and a through lane. The Route 57 southbound approach would also be widened along the eastern edge to provide a 20-foot bypass to help minimize queuing on this approach. Similar to *Preliminary Long- Term Alternative 1*, a new sidewalk would be installed along the eastern edge of Route 57 from School Road to Norfield Road with a mid-block crosswalk and advance crosswalk signage. This alternative would involve some ROW impacts. **Figure 10** presents a conceptual layout of *Preliminary Long-Term Alternative 2*.

Figure 10: Preliminary Long-Term Alternative 2

4.3 Capacity Analysis of Alternatives

The proposed improvement alternatives were analyzed to determine LOS under future (2030) peak-hour conditions. The *Synchro* program was utilized in the capacity analysis of the improvement alternatives. **Table 5** summarizes the analysis results for the future conditions with and without the proposed improvements.

TABLE 5
Capacity Analysis of Alternatives
Future (2030) Peak-Hour Traffic Volumes

LOCATION/MOVEMENTS	No-Build		Near-Term Alt.1		Near-Term Alt. 2		Long-Term Alt. 1		Long-Term Alt. 2	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Route 57 at School Road										
Overall LOS	**F**	**E**	**D**	**C**	**D**	**C**	**B**	**C**	**B**	**C**
Route 57 NB Approach	F	D	B	B	B	B	A	B	A	B
Route 57 NB Through	-	-	-	-	-	-	B	B	B	B
Route 57 NB Right Turn	-	-	-	-	-	-	A	A	A	A
Route 57 SB Approach	F	A	D	A	D	A	B	A	A	A
School Road WB Left Turn	F	F	D	D	D	D	D	D	D	D
School Road WB Right Turn	A	A	A	A	A	A	A	A	A	A

Under Preliminary Near-Term Alternative 1, the intersection of Route 57 and School Road is anticipated to operate at overall LOS D and LOS C during future 2030 morning and afternoon peak hours, respectively. During the morning peak hour, the LOS on the Route 57 northbound approach is expected to improve from LOS F under the no-build condition to LOS B with the proposed improvements in place while the Route 57 southbound approach is anticipated to improve from LOS F to LOS D. The westbound left-turn movement on School Road is expected to improve from LOS F to LOS D during future 2030 morning and afternoon peak hours.

Under Preliminary Near-Term Alternative 2, the intersection of Route 57 and School Road is anticipated to also operate at overall LOS D and LOS C during future 2030 morning and afternoon peak hours, respectively. During the morning peak hour, the LOS on the Route 57 northbound approach is expected to improve from LOS F under the no-build condition to LOS B with the proposed improvements in place while the Route 57 southbound approach is anticipated to improve from LOS F to LOS D. The westbound left-turn movement on School Road is expected to improve from LOS F to LOS D during future 2030 morning and afternoon peak hours.

Under Preliminary Long-Term Alternative 1, the study intersection is anticipated to operate overall at LOS B and LOS C during future (2030) morning and afternoon peak hours, respectively. With the exception of the School Road westbound left-turn movement, which will operate at LOS D, all other movements are anticipated to operate at LOS B or better with the proposed improvements in place.

Under Preliminary Long-Term Alternative 2, the study intersection is anticipated to operate overall at LOS B and LOS C during future (2030) morning and afternoon peak hours, respectively. With the exception of the School Road westbound left-turn movement, which will operate at LOS D, all other movements are anticipated to operate at LOS B or better with the proposed improvement in place.

4.4 Refinement of Preliminary Alternatives

The preliminary alternatives were presented to officials from SWRPA and the Town of Weston for review and vetting at a stakeholder meeting. Some of the items that were considered in the review of the alternatives include ROW and utility impacts, traffic improvements, and safety improvements.

For *Preliminary Near-Term Alternative 1*, it was agreed that the proposed elementary school driveway should be realigned to avoid impacts to the existing infiltration system in that area. This alternative with the proposed revisions was acceptable to SWRPA and the Town as a near-term improvement for the intersection.

For Preliminary Near-Term Alternative 2, the town indicated that school children would have to cross the proposed driveway to get from the school playground to the ball field during recess, which was a source of concern. In addition, the town indicated that there is an existing sewage system located where the new driveway is proposed. Of the two near-term alternatives, *Preliminary Near-Term Alternative 2* was the least preferred option.

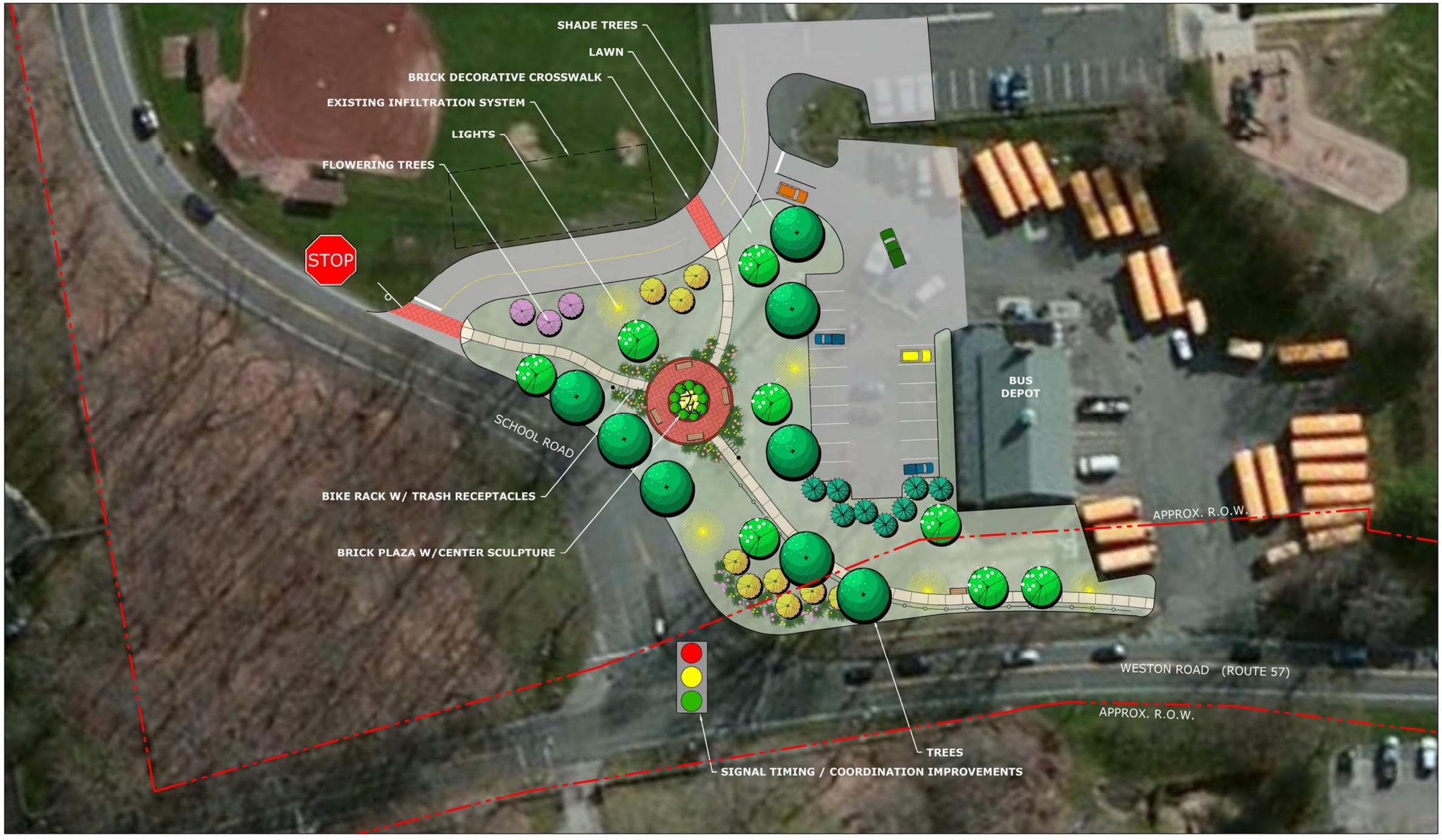
For the Long-Term Alternatives, it was decided that the Route 57 roadway widening improvements would serve as one standalone long-term alternative while the sidewalk improvements would serve as a second long-term alternative.

The preliminary alternatives were revised in accordance with comments provided by SWRPA and the Town of Weston into Preferred Improvement Alternatives. It was agreed that the Preferred Alternatives would be presented to CTDOT for further review and input prior to finalizing the alternatives.

5 Preferred Improvement Alternatives

Preferred Near-Term Alternative

The *Preferred Near-Term Alternative* for the study intersection is presented in ***Figure 11***. This alternative would involve the relocation of the existing driveway to the Hurlbutt Elementary School further to the east on School Road and aligned to avoid any impacts to the existing infiltration system on the school ball field. The proposed relocation would create more separation from and reduce the number of conflict points at the Route 57-School Road intersection. Stop control at the proposed driveway or possibly All-Way stop control at the proposed school driveway - School Road intersection would be provided. In addition, signal timing improvements and potential coordination with the newly redesigned traffic signal at the intersection of Route 57 and Norfield Road to the south would be implemented. Furthermore, a landscaped parklet with street lighting could be provided in the area bounded by the new school driveway, School Road, and Route 57. The proposed improvements would involve impacts to the school property. The order of magnitude cost for this alternative is anticipated to be approximately **$537,000** inclusive of a 40% incidentals/contingency factor. Approximately half of the construction cost comprises costs associated with the parklet and traffic signal upgrade. It should also be noted that costs associated with ROW impacts, permitting, and environmental compliance were not included in the cost estimates. A breakdown of the cost estimates is presented in the Appendix.



PREFERRED NEAR TERM ALTERNATE

WESTON (ROUTE 57) & SCHOOL ROAD INTERSECTION

WESTON, CONNECTICUT MAY 2012

FIGURE 11

MILONE & MACBROOM®
Engineering, Landscape Architecture and Environmental Science
99 Realty Drive
Cheshire, Connecticut 06410
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www.miloneandmacbroom.com

0 20' 40' 60' 80'

NORTH

Preferred Long-Term Alternative 1

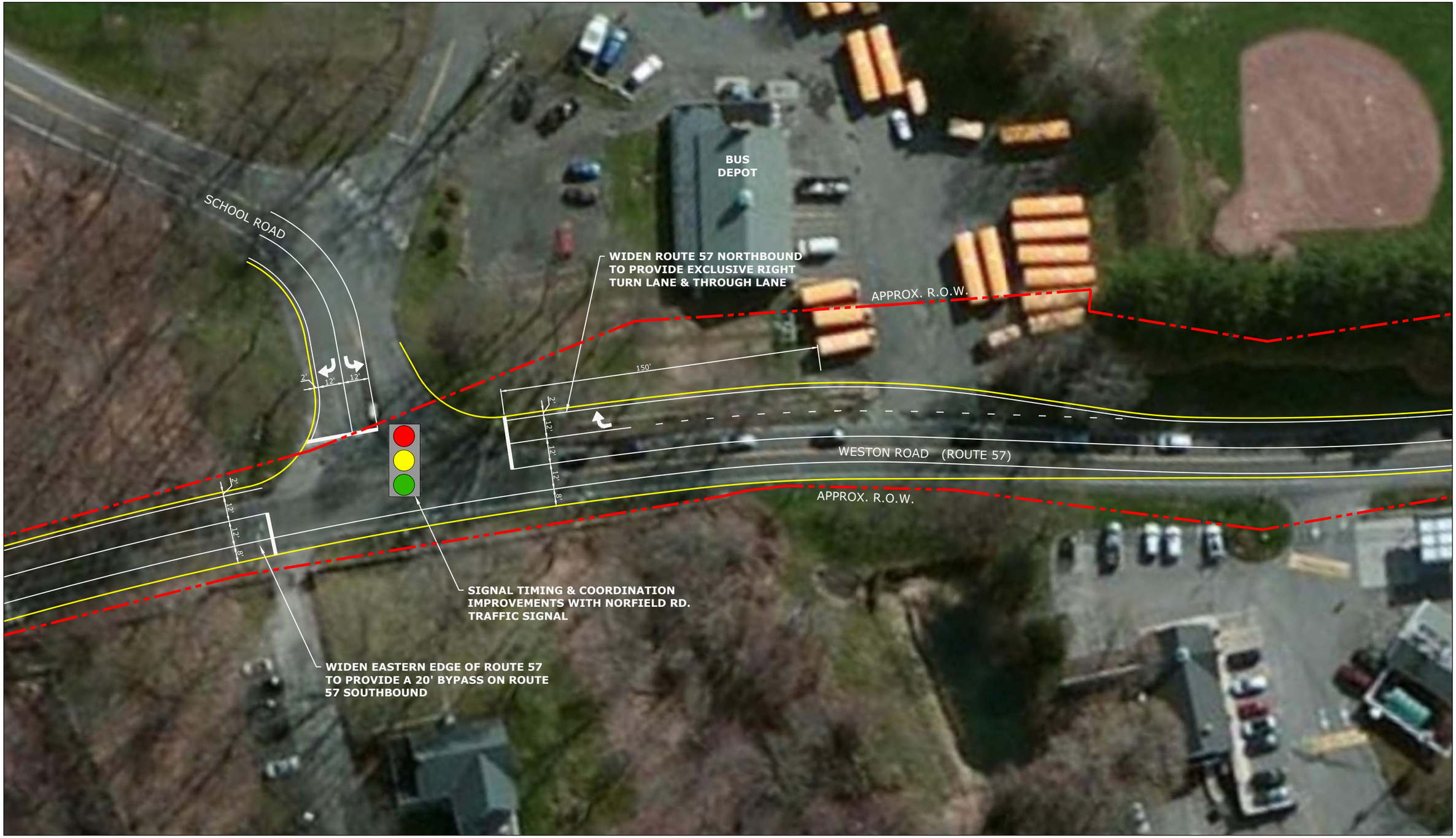
Preferred Long-Term Alternative 1 for the study intersection is presented in ***Figure 12***. This alternative would involve widening the Route 57 northbound approach along its eastern edge to provide an exclusive right-turn lane and a through lane. The Route 57 southbound approach would also be widened along the eastern edge to provide a 20-foot bypass to help minimize queuing on this approach. These improvements would involve little to no ROW impacts. The order of magnitude cost for this alternative is anticipated to be approximately **$866,000** inclusive of a 40% incidentals/contingency factor. It should be noted that costs associated with ROW impacts, permitting, and environmental compliance were not included in the cost estimates. A breakdown of the cost estimates is presented in the Appendix.

Preferred Long-Term Alternative 2

Preferred Long-Term Alternative 1 for the study intersection is presented in ***Figure 13***. This alternative would involve installing a new sidewalk along the eastern edge of Route 57 from School Road to Norfield Road with a mid-block crosswalk and advance crosswalk signage. This alternative would involve some ROW impacts. In addition, landscaping and street lighting would be provided along the sidewalk. The order of magnitude cost for this alternative is anticipated to be approximately **$709,000** inclusive of a 40% incidentals/contingency factor. It should be noted that costs associated with ROW impacts, permitting, and environmental compliance were not included in the cost estimates. A breakdown of the cost estimates is presented in the Appendix.

5.1 Right-of-Way Impacts

As indicated in previous sections of this report, the *Preferred Long-Term Alternatives* will be constructed within the existing ROW; therefore, no impacts are anticipated. The *Preferred Near-Term Alternative* on the other hand will be undertaken on town/school property. The estimated area of impact for this alternative is approximately 37,000 square feet



PREFERRED LONG TERM ALTERNATIVE 1

WESTON (ROUTE 57) & SCHOOL ROAD INTERSECTION

WESTON, CONNECTICUT MAY 2012

FIGURE 12

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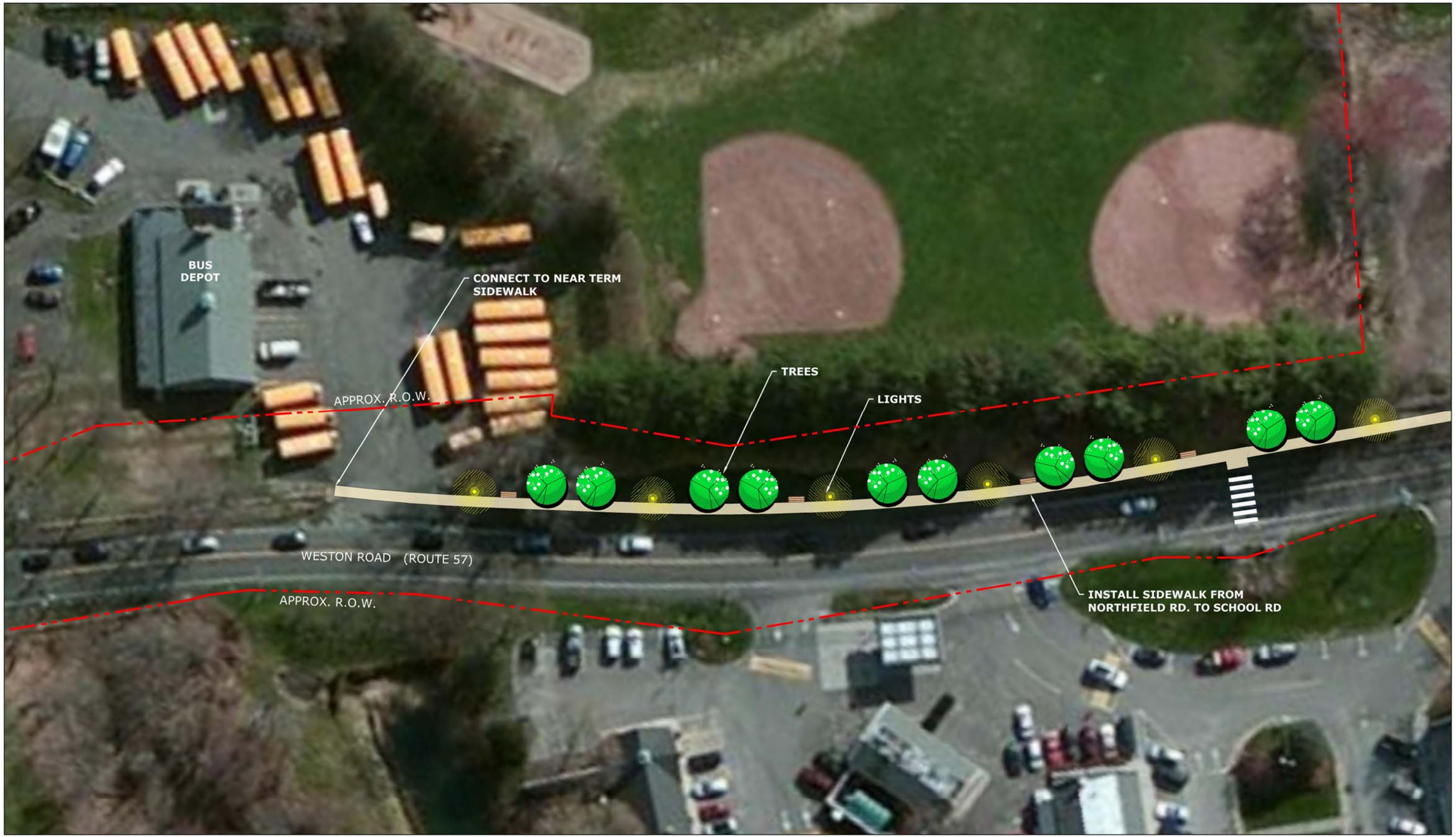
NORTH



PREFERRED LONG TERM ALTERNATIVE 2

WESTON (ROUTE 57) & SCHOOL ROAD INTERSECTION

WESTON, CONNECTICUT MAY 2012

FIGURE 13

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5.2 Summary of Preferred Improvement Alternatives

TABLE 6
Summary of Preferred Alternatives

Weston Route 57-School Road Intersection Study				
Improvement	**Description**	**Cost***	**R.O.W Impacts**	**Oversight Agency**
Preferred Near-Term Alternative	◦ Relocate existing driveway to the Hurlbutt Elementary School further to the east of School Road. ◦ Provide Stop Control at proposed driveway or All-Way Stop Control at proposed school driveway. ◦ Provide signal timing improvements and potential coordination with newly redesigned traffic signal at the intersection of Route 57 and Norfield Road to the south. ◦ Landscaped parklet with street lighting in the area bounded by the new driveway, School Road, and Route 57.	$537,000	37,000 S.F	Town of Weston CT DOT
Preferred Long-Term Alternative 1	◦ Widen the Route 57 northbound approach along its eastern edge to provide an exclusive right-turn lane and through lane. ◦ Widen Route 57 Southbound approach along the eastern edge to provide a 20 foot bypass.	$866,000	Little or no ROW impacts	Town of Weston CT DOT
Preferred Long-Term Alternative 2	◦ Install new sidewalk along eastern edge of Route 57 from School Road to Norfield Road with a mid-block crosswalk and advance crosswalk signage. ◦ Provide landscaping and street lighting along new sidewalk.	$709,000	Little or no ROW impacts	Town of Weston CT DOT

*Includes a 40% incidentals/contingency factor.

6 Project Funding

The process of advancing a project from its conceptual phase through implementation is not guaranteed. The reality is that many projects do not get implemented due to the lack of funds.

The fiscal constraints brought about by the downturn of the U.S. economy means that funding for projects has become increasingly difficult to come by, and towns and agencies constantly have to compete for the limited funds available. The proposed near-term and long-term improvement projects at the intersection of Route 57 and School Road are no exception. It will, therefore, be prudent to identify sources of funding early on in the process to improve the chances of implementing these improvement projects. The following are potential sources of funding for the proposed improvements at the intersection of Route 57 and School Road.

- ***Small Town Economic Assistance Program (STEAP)*** – This program, which is administered by the Connecticut Office of Policy and Management, provides funding for projects that promote economic development, community conservation, and quality of life. Examples of such projects include roadway construction, roadway repair, environmental protection, and public safety improvements.

- ***Surface Transportation Program (STP) - Urban Program*** – This program is one of the Surface Transportation programs with funding for projects on minor arterials and collector roads in urban areas. Candidate projects include roadway widening, capacity enhancements, and transit enhancements.

- ***STP – Transportation Alternatives*** – This newly enacted federally funded program replaces the previous STP-Enhancement program. This new program consolidates the twelve previously eligible activities under the Enhancement program into six main eligible categories. Eligible projects include planning, design and construction of on and off road trail facilities for pedestrians, bicyclists and non-motorized forms of transportation, safe routes for non-drivers, conversion of railroad corridors for bicycle and pedestrian use, construction of turnouts, overlooks and viewing areas, community improvement and preservation, and environmental mitigation activities.

APPENDIX

Level of Service Criteria

LEVEL OF SERVICE
SIGNALIZED INTERSECTIONS

Level of Service (LOS) for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (the absence of traffic control, geometric delay, any incidents, and any other vehicles). Specifically, LOS criteria for traffic signals are stated in terms of the average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables including the quality of progression, the cycle length, the green ratio, and the volume to capacity (v/c) ratio for the lane group. The criteria are given below.

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	CONTROL DELAY (seconds/vehicle)
A	<10
B	>10 and <20
C	>20 and <35
D	>35 and <55
E	>55 and <80
F	>80

Specific descriptions of each LOS for signalized intersections are provided below:

Level of Service A describes operations with very low control delay, up to 10 seconds per vehicle (s/veh.). This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.

Level of Service B describes operations with delay greater than 10 and up to 20 s/veh. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.

Level of Service C describes operations with control delay greater than 20 and up to 35 s/veh. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level though many still pass through the intersection without stopping.

Level of Service D describes operations with control delay greater than 35 and up to 55 s/veh. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E describes operations with control delay greater than 55 and up to 80 s/veh. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.

Level of Service F describes operations with control delay in excess of 80 s/veh. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.

LEVEL OF SERVICE
UNSIGNALIZED INTERSECTIONS

The LOS for a TWSC (two-way stop controlled) intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS is not defined for the intersection as a whole. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS criteria are given in the table below.

LEVEL OF SERVICE CRITERIA FOR TWSC INTERSECTIONS

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (seconds/vehicle)
A	0-10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

Reference: Highway Capacity Manual 2010, Transportation Research Board, 2010.

Capacity Analysis Worksheets

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	225	44	224	346	96	476
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1770	1538	1700	0	0	1845
Flt Permitted	0.950					0.304
Satd. Flow (perm)	1770	1538	1700	0	0	565
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		80	129			
Link Speed (mph)	25		30			30
Link Distance (ft)	106		324			282
Travel Time (s)	2.9		7.4			6.4
Peak Hour Factor	0.71	0.55	0.68	0.68	0.91	0.91
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	317	80	838	0	0	628
Turn Type		Prot			D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases					2	
Detector Phase	4	4	2			2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0		7.0	
Minimum Split (s)	12.0	12.0	21.0		10.1	
Total Split (s)	19.0	19.0	31.0	0.0	18.1	49.1
Total Split (%)	27.9%	27.9%	45.5%	0.0%	26.6%	72.1%
Maximum Green (s)	14.0	14.0	25.0		15.0	
Yellow Time (s)	3.0	3.0	3.5		3.0	
All-Red Time (s)	2.0	2.0	2.5		0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	4.0	3.1	3.1
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.5		3.0	
Recall Mode	None	None	Min		Max	
Walk Time (s)	9.0	9.0				
Flash Dont Walk (s)	1.0	1.0				
Pedestrian Calls (#/hr)	0	0				
Act Effct Green (s)	13.6	13.6	25.0			42.9
Actuated g/C Ratio	0.20	0.20	0.37			0.63
v/c Ratio	0.89	0.22	1.18			0.98
Control Delay	56.4	7.9	116.7			44.5
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	56.4	7.9	116.7			44.5
LOS	E	A	F			D
Approach Delay	46.7		116.7			44.5
Approach LOS	D		F			D
Queue Length 50th (ft)	129	0	~397			145
Queue Length 95th (ft)	#173	8	#367			#356
Internal Link Dist (ft)	26		244			202
Turn Bay Length (ft)						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Base Capacity (vph)	366	382	710			642
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.87	0.21	1.18			0.98

Intersection Summary			
Area Type:	Other		
Cycle Length: 68.1			
Actuated Cycle Length: 67.7			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.18			
Intersection Signal Delay: 77.4		Intersection LOS: E	
Intersection Capacity Utilization 88.3%		ICU Level of Service E	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	270	55	270	420	120	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1770	1538	1700	0	0	1843
Flt Permitted	0.950					0.223
Satd. Flow (perm)	1770	1538	1700	0	0	415
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		100	130			
Link Speed (mph)	25		30			30
Link Distance (ft)	106		324			282
Travel Time (s)	2.9		7.4			6.4
Peak Hour Factor	0.71	0.55	0.68	0.68	0.91	0.91
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	380	100	1015	0	0	764
Turn Type		Prot			D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases					2	
Detector Phase	4	4	2			2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0		7.0	
Minimum Split (s)	12.0	12.0	21.0		10.1	
Total Split (s)	19.0	19.0	31.0	0.0	18.1	49.1
Total Split (%)	27.9%	27.9%	45.5%	0.0%	26.6%	72.1%
Yellow Time (s)	3.0	3.0	3.5		3.0	
All-Red Time (s)	2.0	2.0	2.5		0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	4.0	3.1	3.1
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	Min		Max	
Act Effct Green (s)	14.0	14.0	25.0			42.9
Actuated g/C Ratio	0.21	0.21	0.37			0.63
v/c Ratio	1.04	0.25	1.44			1.33
Control Delay	89.6	7.5	226.2			177.9
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	89.6	7.5	226.2			177.9
LOS	F	A	F			F
Approach Delay	72.5		226.2			177.9
Approach LOS	E		F			F
Queue Length 50th (ft)	~176	0	~559			~349
Queue Length 95th (ft)	#226	7	#499			#553
Internal Link Dist (ft)	26		244			202
Turn Bay Length (ft)						
Base Capacity (vph)	364	396	706			576
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	1.04	0.25	1.44			1.33

Intersection Summary		
Area Type:	Other	
Cycle Length: 68.1		
Actuated Cycle Length: 68.1		
Natural Cycle: 150		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 1.44		
Intersection Signal Delay: 177.2		Intersection LOS: F
Intersection Capacity Utilization 104.3%		ICU Level of Service G
Analysis Period (min) 15		

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	290	49	316	133	36	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1736	1553	1744	0	0	1825
Flt Permitted	0.950					0.927
Satd. Flow (perm)	1709	1553	1744	0	0	1702
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		75	43			
Link Speed (mph)	25		30			30
Link Distance (ft)	106		324			282
Travel Time (s)	2.9		7.4			6.4
Confl. Peds. (#/hr)	5	3		5	3	
Peak Hour Factor	0.71	0.65	0.79	0.79	0.80	0.80
Heavy Vehicles (%)	4%	4%	2%	8%	14%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	408	75	568	0	0	370
Turn Type		Prot			D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases					2	
Detector Phase	4	4	2			2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0		7.0	
Minimum Split (s)	12.0	12.0	21.0		10.1	
Total Split (s)	19.0	19.0	31.0	0.0	10.1	41.1
Total Split (%)	31.6%	31.6%	51.6%	0.0%	16.8%	68.4%
Yellow Time (s)	3.0	3.0	3.5		3.0	
All-Red Time (s)	2.0	2.0	2.5		0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	4.0	3.1	3.1
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	Min		Max	
Act Effct Green (s)	14.1	14.1	21.7			31.7
Actuated g/C Ratio	0.25	0.25	0.38			0.56
v/c Ratio	0.95	0.17	0.82			0.39
Control Delay	60.0	6.7	26.1			6.9
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	60.0	6.7	26.1			6.9
LOS	E	A	C			A
Approach Delay	51.7		26.1			6.9
Approach LOS	D		C			A
Queue Length 50th (ft)	~151	0	155			52
Queue Length 95th (ft)	#210	13	212			75
Internal Link Dist (ft)	26		244			202
Turn Bay Length (ft)						
Base Capacity (vph)	428	440	793			1063
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Reduced v/c Ratio	0.95	0.17	0.72			0.35

Intersection Summary			
Area Type:	Other		
Cycle Length: 60.1			
Actuated Cycle Length: 57			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 29.8		Intersection LOS: C	
Intersection Capacity Utilization 67.6%		ICU Level of Service C	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	350	60	380	160	45	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1736	1553	1744	0	0	1825
Flt Permitted	0.950					0.731
Satd. Flow (perm)	1709	1553	1744	0	0	1342
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		92	43			
Link Speed (mph)	25		30			30
Link Distance (ft)	106		324			282
Travel Time (s)	2.9		7.4			6.4
Confl. Peds. (#/hr)	5	3		5	3	
Peak Hour Factor	0.71	0.65	0.79	0.79	0.80	0.80
Heavy Vehicles (%)	4%	4%	2%	8%	14%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	493	92	684	0	0	450
Turn Type		Prot			D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases					2	
Detector Phase	4	4	2			2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0		7.0	
Minimum Split (s)	12.0	12.0	21.0		10.1	
Total Split (s)	19.0	19.0	31.0	0.0	10.1	41.1
Total Split (%)	31.6%	31.6%	51.6%	0.0%	16.8%	68.4%
Yellow Time (s)	3.0	3.0	3.5		3.0	
All-Red Time (s)	2.0	2.0	2.5		0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0	4.0	3.1	3.1
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	Min		Max	
Act Effct Green (s)	14.0	14.0	23.9			33.9
Actuated g/C Ratio	0.24	0.24	0.40			0.57
v/c Ratio	1.20	0.21	0.93			0.54
Control Delay	136.4	6.5	38.9			8.9
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	136.4	6.5	38.9			8.9
LOS	F	A	D			A
Approach Delay	116.0		38.9			8.9
Approach LOS	F		D			A
Queue Length 50th (ft)	~227	0	211			67
Queue Length 95th (ft)	#272	14	#325			94
Internal Link Dist (ft)	26		244			202
Turn Bay Length (ft)						
Base Capacity (vph)	412	438	764			851
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Reduced v/c Ratio	1.20	0.21	0.90			0.53

Intersection Summary			
Area Type:	Other		
Cycle Length: 60.1			
Actuated Cycle Length: 59.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.20			
Intersection Signal Delay: 57.3		Intersection LOS: E	
Intersection Capacity Utilization 80.9%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	270	55	270	420	120	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.918			
Flt Protected	0.950					0.991
Satd. Flow (prot)	1770	1538	1700	0	0	1843
Flt Permitted	0.950					0.541
Satd. Flow (perm)	1770	1538	1700	0	0	1006
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		60	134			
Link Speed (mph)	25		30			30
Link Distance (ft)	200		324			282
Travel Time (s)	5.5		7.4			6.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Adj. Flow (vph)	293	60	293	457	130	625
Shared Lane Traffic (%)						
Lane Group Flow (vph)	293	60	750	0	0	755
Turn Type		Prot			D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases					2	
Detector Phase	4	4	2		1	1 2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0		7.0	
Minimum Split (s)	12.0	12.0	21.0		10.1	
Total Split (s)	26.0	26.0	53.0	0.0	11.0	64.0
Total Split (%)	28.9%	28.9%	58.9%	0.0%	12.2%	71.1%
Maximum Green (s)	21.0	21.0	48.0		7.9	
Yellow Time (s)	3.0	3.0	3.0		3.0	
All-Red Time (s)	2.0	2.0	2.0		0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	3.1	3.1
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.5		3.0	
Recall Mode	None	None	C-Min		Min	
Act Effct Green (s)	18.1	18.1	50.9			60.7
Actuated g/C Ratio	0.20	0.20	0.57			0.67
v/c Ratio	0.82	0.17	0.74			1.00
Control Delay	53.4	9.1	17.8			49.1
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	53.4	9.1	17.8			49.1
LOS	D	A	B			D
Approach Delay	45.9		17.8			49.1
Approach LOS	D		B			D
Stops (vph)	249	13	443			330
Fuel Used(gal)	4	0	7			10
CO Emissions (g/hr)	304	17	468			720

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	59	3	91			140
VOC Emissions (g/hr)	70	4	108			167
Dilemma Vehicles (#)	0	0	0			0
Queue Length 50th (ft)	158	0	253			~206
Queue Length 95th (ft)	#260	31	430			#526
Internal Link Dist (ft)	120		244			202
Turn Bay Length (ft)						
Base Capacity (vph)	413	405	1020			752
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.71	0.15	0.74			1.00

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:NBSB, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 35.9		Intersection LOS: D	
Intersection Capacity Utilization 103.5%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: School Road & Route 57

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	400	135	55	245	80	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.966				0.963	
Flt Protected				0.991	0.965	
Satd. Flow (prot)	1773	0	0	1700	1731	0
Flt Permitted				0.991	0.965	
Satd. Flow (perm)	1773	0	0	1700	1731	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	200			135	97	
Travel Time (s)	5.5			3.7	2.6	
Peak Hour Factor	0.61	0.61	0.60	0.60	0.29	0.29
Heavy Vehicles (%)	4%	2%	45%	3%	2%	2%
Adj. Flow (vph)	656	221	92	408	276	103
Shared Lane Traffic (%)						
Lane Group Flow (vph)	877	0	0	500	379	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 61.5%		ICU Level of Service B	
Analysis Period (min) 15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	350	60	380	160	45	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.960			
Flt Protected	0.950					0.994
Satd. Flow (prot)	1770	1538	1783	0	0	1849
Flt Permitted	0.950					0.900
Satd. Flow (perm)	1770	1538	1783	0	0	1674
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		65	32			
Link Speed (mph)	25		30			30
Link Distance (ft)	200		324			282
Travel Time (s)	5.5		7.4			6.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Adj. Flow (vph)	380	65	413	174	49	342
Shared Lane Traffic (%)						
Lane Group Flow (vph)	380	65	587	0	0	391
Turn Type		Prot			D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases					2	
Detector Phase	4	4	2		1	1 2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0		7.0	
Minimum Split (s)	12.0	12.0	21.0		10.1	
Total Split (s)	31.0	31.0	48.0	0.0	11.0	59.0
Total Split (%)	34.4%	34.4%	53.3%	0.0%	12.2%	65.6%
Maximum Green (s)	26.0	26.0	43.0		7.9	
Yellow Time (s)	3.0	3.0	3.0		3.0	
All-Red Time (s)	2.0	2.0	2.0		0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	3.1	3.1
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.5		3.0	
Recall Mode	None	None	C-Min		Min	
Act Effct Green (s)	22.6	22.6	46.6			56.2
Actuated g/C Ratio	0.25	0.25	0.52			0.62
v/c Ratio	0.86	0.15	0.63			0.37
Control Delay	50.9	7.4	19.2			8.9
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	50.9	7.4	19.2			8.9
LOS	D	A	B			A
Approach Delay	44.6		19.2			8.9
Approach LOS	D		B			A
Stops (vph)	320	12	367			169
Fuel Used(gal)	5	0	6			2
CO Emissions (g/hr)	381	17	385			166

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	74	3	75			32
VOC Emissions (g/hr)	88	4	89			38
Dilemma Vehicles (#)	0	0	0			0
Queue Length 50th (ft)	202	0	222			90
Queue Length 95th (ft)	#322	29	355			148
Internal Link Dist (ft)	120		244			202
Turn Bay Length (ft)						
Base Capacity (vph)	511	491	938			1064
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.74	0.13	0.63			0.37

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:NBSB, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 24.3		Intersection LOS: C	
Intersection Capacity Utilization 79.9%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	270	55	270	420	120	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25	25		25	25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950					0.991
Satd. Flow (prot)	1770	1538	1863	1568	0	1843
Flt Permitted	0.950					0.887
Satd. Flow (perm)	1770	1538	1863	1568	0	1649
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		60		457		
Link Speed (mph)	25		30			30
Link Distance (ft)	200		324			282
Travel Time (s)	5.5		7.4			6.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Adj. Flow (vph)	293	60	293	457	130	625
Shared Lane Traffic (%)						
Lane Group Flow (vph)	293	60	293	457	0	755
Turn Type		Prot		Perm	D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases				2	2	
Detector Phase	4	4	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0	15.0	7.0	
Minimum Split (s)	12.0	12.0	21.0	21.0	10.1	
Total Split (s)	26.0	26.0	53.0	53.0	11.0	64.0
Total Split (%)	28.9%	28.9%	58.9%	58.9%	12.2%	71.1%
Maximum Green (s)	21.0	21.0	48.0	48.0	7.9	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	3.1	3.1
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.5	2.5	3.0	
Recall Mode	None	None	C-Min	C-Min	Min	
Act Effct Green (s)	18.1	18.1	50.9	50.9		60.7
Actuated g/C Ratio	0.20	0.20	0.57	0.57		0.67
v/c Ratio	0.82	0.17	0.28	0.42		0.67
Control Delay	53.4	9.1	11.6	2.4		12.1
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	53.4	9.1	11.6	2.4		12.1
LOS	D	A	B	A		B
Approach Delay	45.9		6.0			12.1
Approach LOS	D		A			B

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Stops (vph)	249	13	135	26		418
Fuel Used(gal)	4	0	2	1		6
CO Emissions (g/hr)	304	17	144	99		388
NOx Emissions (g/hr)	59	3	28	19		76
VOC Emissions (g/hr)	70	4	33	23		90
Dilemma Vehicles (#)	0	0	0	0		0
Queue Length 50th (ft)	158	0	83	0		191
Queue Length 95th (ft)	#260	31	137	43		306
Internal Link Dist (ft)	120		244			202
Turn Bay Length (ft)				150		
Base Capacity (vph)	413	405	1054	1085		1129
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.71	0.15	0.28	0.42		0.67

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:NBSB, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 77.7%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	350	60	380	160	45	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25	25		25	25	
Satd. Flow (prot)	1770	1538	1863	1568	0	1849
Flt Permitted	0.950					0.923
Satd. Flow (perm)	1770	1538	1863	1568	0	1717
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		65		174		
Link Speed (mph)	25		30			30
Link Distance (ft)	200		324			282
Travel Time (s)	5.5		7.4			6.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	380	65	413	174	0	391
Turn Type		Prot		Perm	D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases				2	2	
Detector Phase	4	4	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0	15.0	7.0	
Minimum Split (s)	12.0	12.0	21.0	21.0	10.1	
Total Split (s)	31.0	31.0	48.0	48.0	11.0	59.0
Total Split (%)	34.4%	34.4%	53.3%	53.3%	12.2%	65.6%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	3.1	3.1
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	C-Min	Min	
Act Effct Green (s)	22.6	22.6	46.6	46.6		56.2
Actuated g/C Ratio	0.25	0.25	0.52	0.52		0.62
v/c Ratio	0.86	0.15	0.43	0.19		0.36
Control Delay	50.9	7.4	16.1	2.8		8.8
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	50.9	7.4	16.1	2.8		8.8
LOS	D	A	B	A		A
Approach Delay	44.6		12.1			8.8
Approach LOS	D		B			A
Stops (vph)	320	12	232	16		169
Fuel Used(gal)	5	0	3	1		2
CO Emissions (g/hr)	381	17	244	41		166
NOx Emissions (g/hr)	74	3	47	8		32
VOC Emissions (g/hr)	88	4	56	9		38
Dilemma Vehicles (#)	0	0	0	0		0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	202	0	143	0		90
Queue Length 95th (ft)	#322	29	229	32		148
Internal Link Dist (ft)	120		244			202
Turn Bay Length (ft)				150		
Base Capacity (vph)	511	491	964	896		1087
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.74	0.13	0.43	0.19		0.36

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:NBSB, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 21.4		Intersection LOS: C	
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	270	55	270	420	120	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16
Storage Length (ft)	0	0		150	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25	25		25	25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950					0.991
Satd. Flow (prot)	1770	1538	1863	1568	0	2089
Flt Permitted	0.950					0.887
Satd. Flow (perm)	1770	1538	1863	1568	0	1869
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		60		457		
Link Speed (mph)	25		30			30
Link Distance (ft)	200		324			282
Travel Time (s)	5.5		7.4			6.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Adj. Flow (vph)	293	60	293	457	130	625
Shared Lane Traffic (%)						
Lane Group Flow (vph)	293	60	293	457	0	755
Turn Type		Prot		Perm	D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases				2	2	
Detector Phase	4	4	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0	15.0	7.0	
Minimum Split (s)	12.0	12.0	21.0	21.0	10.1	
Total Split (s)	26.0	26.0	53.0	53.0	11.0	64.0
Total Split (%)	28.9%	28.9%	58.9%	58.9%	12.2%	71.1%
Maximum Green (s)	21.0	21.0	48.0	48.0	7.9	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	3.1	3.1
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.5	2.5	3.0	
Recall Mode	None	None	C-Min	C-Min	Min	
Act Effct Green (s)	18.1	18.1	50.9	50.9		60.7
Actuated g/C Ratio	0.20	0.20	0.57	0.57		0.67
v/c Ratio	0.82	0.17	0.28	0.42		0.59
Control Delay	53.4	9.1	11.6	2.4		9.9
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	53.4	9.1	11.6	2.4		9.9
LOS	D	A	B	A		A
Approach Delay	45.9		6.0			9.9

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	D		A			A
Stops (vph)	249	13	135	26		371
Fuel Used(gal)	4	0	2	1		5
CO Emissions (g/hr)	304	17	144	99		348
NOx Emissions (g/hr)	59	3	28	19		68
VOC Emissions (g/hr)	70	4	33	23		81
Dilemma Vehicles (#)	0	0	0	0		0
Queue Length 50th (ft)	158	0	83	0		177
Queue Length 95th (ft)	#260	31	137	43		273
Internal Link Dist (ft)	120		244			202
Turn Bay Length (ft)				150		
Base Capacity (vph)	413	405	1054	1085		1280
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.71	0.15	0.28	0.42		0.59

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:NBSB, Start of Yellow			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 77.7%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: School Road & Route 57

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	350	60	380	160	45	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16
Storage Length (ft)	0	0		150	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25	25		25	25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950					0.994
Satd. Flow (prot)	1770	1538	1863	1568	0	2096
Flt Permitted	0.950					0.923
Satd. Flow (perm)	1770	1538	1863	1568	0	1946
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		65		174		
Link Speed (mph)	25		30			30
Link Distance (ft)	200		324			282
Travel Time (s)	5.5		7.4			6.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	3%	3%	2%
Adj. Flow (vph)	380	65	413	174	49	342
Shared Lane Traffic (%)						
Lane Group Flow (vph)	380	65	413	174	0	391
Turn Type		Prot		Perm	D.P+P	
Protected Phases	4	4	2		1	1 2
Permitted Phases				2	2	
Detector Phase	4	4	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0	15.0	7.0	
Minimum Split (s)	12.0	12.0	21.0	21.0	10.1	
Total Split (s)	31.0	31.0	48.0	48.0	11.0	59.0
Total Split (%)	34.4%	34.4%	53.3%	53.3%	12.2%	65.6%
Maximum Green (s)	26.0	26.0	43.0	43.0	7.9	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	0.1	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	3.1	3.1
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.5	2.5	3.0	
Recall Mode	None	None	C-Min	C-Min	Min	
Act Effct Green (s)	22.6	22.6	46.6	46.6		56.2
Actuated g/C Ratio	0.25	0.25	0.52	0.52		0.62
v/c Ratio	0.86	0.15	0.43	0.19		0.32
Control Delay	50.9	7.4	16.1	2.8		8.1
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	50.9	7.4	16.1	2.8		8.1
LOS	D	A	B	A		A
Approach Delay	44.6		12.1			8.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	D		B			A
Stops (vph)	320	12	232	16		158
Fuel Used(gal)	5	0	3	1		2
CO Emissions (g/hr)	381	17	244	41		158
NOx Emissions (g/hr)	74	3	47	8		31
VOC Emissions (g/hr)	88	4	56	9		37
Dilemma Vehicles (#)	0	0	0	0		0
Queue Length 50th (ft)	202	0	143	0		87
Queue Length 95th (ft)	#322	29	229	32		141
Internal Link Dist (ft)	120		244			202
Turn Bay Length (ft)				150		
Base Capacity (vph)	511	491	965	896		1233
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.74	0.13	0.43	0.19		0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:NBSB, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 21.2		Intersection LOS: C	
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: School Road & Route 57

Cost Estimates

CONCEPTUAL LEVEL CONSTRUCTION COST OPINION
NEAR TERM 1
ROUTE 57 AT SCHOOL ROAD
WESTON, CONNECTICUT

ITEM/DESCRIPTION	UNIT	QTY	UNIT COST	COST
Pavement	SY	520	$ 74.00	$38,480.00
Earthwork	CY	350	$ 30.00	$10,500.00
Pavement Removal, Turf, Topsoil	SY	600	$ 20.00	$12,000.00
Curbing	LF	470	$ 50.00	$23,500.00
				$84,480.00
Drainage (20%)				$ 16,896.00
				$101,376.00
Minor Items (30%)				$ 30,412.80
				$131,788.80
Lump Sum Items (14.5%)				$ 19,109.38
Traffic Person	EA	1	$ 12,000.00	$12,000.00
			Roadway Cost:	***$162,898.18***
Traffic Signal Modifications/Upgrade	Ea.	1	$ 100,000.00	$100,000.00
Streetscape (Lighting and Landscaping)	Est.	1	$ 120,000.00	$120,000.00
			Construction Cost:	***$382,898.18***
			Contingency ±10%:	$38,289.82
			Incidentals to Construction ±30%	$114,869.45
			2012 Project Total:	**$536,057.45**
			2012 Project Total (Rounded):	**$537,000.00**

Note:
Exclusions: Right of Way Impacts, Permitting, Environmental Compliance, Handling of Harzadous materials

CONCEPTUAL LEVEL CONSTRUCTION COST OPINION
LONG TERM 1-ROADWAY
ROUTE 57 AT SCHOOL ROAD
WESTON, CONNECTICUT

ITEM/DESCRIPTION	UNIT	QTY	UNIT COST	COST
Pavement	SY	1,360	$ 74.00	$100,640.00
Earthwork	CY	904	$ 30.00	$27,120.00
Mill	SY	5,010	$ 6.00	$30,060.00
2" Overlay	TON	576	$ 110.00	$63,376.50
Tack Coat	GAL	501	$ 9.00	$4,509.00
Curbing	CF	2,400	$ 10.00	$24,000.00
				$249,705.50
Drainage (20%)				$49,941.10
				$299,646.60
Minor Items (30%)				$ 89,893.98
				$ 389,540.58
Lump Sum Items (14.5%)				$ 56,483.38
Traffic Person	EA	1		$72,000.00
			Roadway Cost:	***$ 518,023.96***
Traffic Signal Modifications/Upgrade	Ea.	1	$ 100,000.00	$100,000.00
			Construction Cost:	***$ 618,023.96***
			Contingency ±10%:	$61,802.40
			Incidentals to Construction ±30%	$185,407.19
			2012 Project Total:	**$865,233.55**
			2012 Project Total (Rounded):	**$866,000.00**

Note:
Exclusions: Right of Way Impacts, Permitting, Environmental Compliance, Handling of Harzadous materials

CONCEPTUAL LEVEL CONSTRUCTION COST OPINION
LONG TERM 2- SIDEWALK
ROUTE 57 AT SCHOOL ROAD
WESTON, CONNECTICUT

ITEM/DESCRIPTION	UNIT	QTY	UNIT COST	COST
Sidewalk	SF	6,900	$ 15.00	$103,500.00
Minor Items (20%)				$ 20,700.00
Traffic Person	EA	1	$ 12,000.00	$ 12,000.00
				$136,200.00
Lump Sum Items (14.5%)				$ 19,749.00
			Roadway Cost:	***$155,949.00***
Streetscape (Lighting and Landscaping)	LF	1,000	$ 350.00	$350,000.00
			Construction Cost:	***$505,949.00***
			Contingency ±10%:	$50,594.90
			Incidentals to Construction ±30%	$151,784.70
			2012 Project Total:	**$708,328.60**
			2012 Project Total (Rounded):	**$709,000.00**

Note:
Exclusions: Right of Way Impacts, Permitting, Environmental Compliance, Handling of Harzadous materials

Report of Meetings

KICK-OFF MEETING NOTES

Weston Route 57-School Road Intersection Study

Westport Route 136 – Bayberry Lane Extension Intersection Study

Held on December 7, 2011

In attendance:

Gayle Weinstein	-	Weston First Selectman
Chief John Troxell	-	Weston Police Department
Chief Dale Call	-	Westport Police Department
Peter Ratkiewich	-	Town of Westport Department of Public Works
Barry Hammons	-	Town of Westport Department of Public Works
Sue Prosi	-	South Western Regional Planning Agency (SWRPA)
Alex Karman	-	South Western Regional Planning Agency (SWRPA)
Ron Malone		
Steve Halstead		
Dave Sullivan	-	Milone & MacBroom (MMI)
Kwesi Brown	-	Milone & MacBroom (MMI)

1. Introductions and Study Overview

Sue Prosi from SWRPA welcomed everyone and led introductions around the room. Dave Sullivan from MMI gave a brief overview of the study while Kwesi Brown from MMI discussed the study approach, tasks, deliverables and schedule for the two studies.

2. Discussion Items

Weston Route 57 - School Road Intersection

- Data Collection
  - Traffic data collection effort should not be limited to school peak hours but should include commuter hours as well.
  - Collection of school information should be coordinated through Joann Keating, Weston Board of Education.
  - Traffic issues at the Route 57-School Road intersection are also due to the geometric layout of intersection.

- SWRPA will provide available information including previous reports and GIS/survey information.
- There are potential wetland issues north of school road to consider.
- SWRPA to look into obtaining wetland delineation resources.
- MMI to contact CTDOT for wetlands mapping, available information, past studies (including the Project Development Unit review of the intersection, and the current signal upgrade.
- Weston Police Department will provide accident records for study area. This data will cover CTDOT's most recent three year period and accidents that have occurred since then.

- Analysis
  - Anticipated land use changes
    - Possible relocation of school bus depot to town highway department not likely to materialize.
    - Potential long term conversion of school bus depot area to a senior center or some other use. This will not impact current intersection study.

- Alternatives
  - Improvement recommendations from previous Purcell Study required ROW acquisition for turn lanes. The property owner directly opposite School Road was opposed to it.
  - Recommended alternatives for the Route 57-School Road intersection should not be limited to signal improvements. Geometric improvements such as turn lanes should be considered as well.
  - There are currently limited-to-no pedestrian accommodations at the study intersection.
  - The provision of sidewalks along the western side of Route 57 to Northfield Road should be considered at a minimum and as one of the full build alternatives.
  - The "Safe Routes to School" program would be a good source of funding for some of the pedestrian and bicyclist improvements within the study area.
  - MMI to coordinate with Fred Kulakowski and Joe Ouellette of the CTDOT on the
    - CTDOT improvements at Route 57 - School Road intersection.
    - Upgrade of existing signal at Northfield Road.

- Schedule
  - Data collection effort would likely begin after the holidays.
  - Both studies will run concurrent to each other.

Westport Route 136 – Bayberry Lane Extension Intersection

- Data Collection
    - MMI will contact CTDOT Traffic for available information and previous reports, studies, and design concepts.
    - Barry Hammons and Peter Ratkiewich of Westport DPW will provide GIS mapping /shapefiles and CADD based survey files for study area.
    - Westport Police Department will provide accident records for study area. This data will cover CTDOT's most recent three year period and accidents that have occurred since then.

- Analysis
    - The study should consider that there is an elementary school south of Berkley Road.
    - The northwestern corner of the intersection of Route 136 at Bayberry Lane is sometimes used as a pull over area by trucks.

- Alternatives
    - Attendees agreed that bicycle and pedestrian usage was not significant, though will be considered in the analysis as part of the complete streets approach.
    - MMI to develop a roundabout alternative for intersection.
    - MMI to develop alternatives that look into sight line improvement and maintenance issues on Route 136.
    - Vehicular speeds are an issue on Route 136. MMI to look at posted speeds and advance signage improvements.
    - Property, utility and environmental impacts
        - There is currently a Tenneco gas pipeline going through the parcel north of the intersection.
        - There is a seasonal pond on the parcel north of the intersection.
        - There are some other wetlands in the study area.

- Schedule
    - Both studies will run concurrent.

- Meetings
    - Possible consolidation of second meeting for the two studies into one meeting.

MEETING NOTES ON PRELIMINARY IMPROVEMENT ALTERNATIVES

Weston Route 57-School Road Intersection Study

Westport Route 136 – Bayberry Lane Extension Intersection Study

Held on April 10, 2012

In attendance:

Gayle Weinstein	-	Weston First Selectman
Chief John Troxell	-	Weston Police Department
John Conte	-	Town of Weston
Dan Clarke	-	Weston Schools
Jo-Ann Keating	-	Weston Schools
Peter Ratkiewich	-	Town of Westport Department of Public Works
Sue Prosi	-	South Western Regional Planning Agency (SWRPA)
Alex Karman	-	SWRPA
Dave Sullivan	-	Milone & MacBroom (MMI)
Kwesi Brown	-	MMI

1. Introductions and Study Update

Dave Sullivan from MMI welcomed everyone and led introductions around the room. Kwesi Brown gave an update on the existing and future conditions assessment for the two study sites and presented the preliminary near term and long term improvement alternatives that were being considered for the intersection of Route 57 at School Road in Weston and the intersection of Route 136 at Bayberry Lane in Westport.

2. Weston Route 57- School Road Intersection Preliminary Alternatives

The following improvements were presented as potential improvement alternatives for the intersection of Route 57 at School Road:

<u>Weston Near Term 1</u>

- Close the existing parent-pickup drop off driveway and relocate it further to the east on School Road along the lower western boundary of the baseball field. This will create more separation from the Route 57/School Road intersection and reduce the number of conflict points at that location.

- Implement signal timing improvements and potential coordination with the re-designed traffic signal at the intersection of Route 57 at Norfield Road to the south.
- Remove the existing stop sign on School Road westbound so that School Road becomes free flow.

Weston Near Term 2

- Construct a new parent pickup/drop off driveway further to the east on School along the eastern boundary of the baseball field. While leaving the existing driveway open only for bus access to the school bus depot. This will create more separation from the Route 57/School Road intersection and reduce the number of conflict points within that area.
- Implement signal timing improvements and potential coordination with the re-designed traffic signal at the intersection of Route 57 at Norfield Road to the south.
- Remove the existing stop sign on School Road westbound so that School Road becomes free flow.

Weston Long Term 1

- Widen the Route 57 northbound approach along the eastern side to provide an exclusive right turn lane and a through lane. This would reduce queuing on the northbound approach.
- Install a new sidewalk along the eastern edge of Route 57 from School Road to Norfield Road with a mid-block crosswalk. Provide appropriate signage in advance of the mid-block crosswalk.

Weston Long Term 2

- Widen the Route 57 northbound approach along the eastern side to provide an exclusive right turn lane and a through lane.
- Widen the Route 57 southbound approach along the eastern side to provide a 20 foot bypass to reduce queuing on this approach.
- Install a new sidewalk along the eastern edge of Route 57 from School Road to Norfield Road with a mid-block crosswalk. Provide appropriate signage in advance of the mid-block crosswalk.

Comments on Weston Improvements

- Near Term 1 - Realign the proposed driveway to minimize impacts to the ball field and utilities in that area. Also, provide an All Way Stop at the School Road/new driveway intersection. This alternative with the proposed revisions was acceptable to all as a near term improvement.
- Near Term 2 – According to the town, this alternative would not work as students would have to cross the proposed driveway to get from the playground to the ball field. Also there is currently a sewage system located where the new roadway is proposed. Of the two near term alternatives, Near Term 2 was the least preferred option by the town.
- Long Term Alternatives – It was decided that the sidewalk improvements would serve as one standalone long term alternative while the Route 57 roadway widening improvements would serve as the second long term alternative. The proposed location of the sidewalks along the eastern edge of Route 57 was acceptable to all.

3. Westport Route 136- Bayberry Lane Extension Intersection Preliminary Alternatives

The following improvements were recommended for the intersection of Route 136 at Bayberry Lane:

<u>Westport Near Term 1</u>

- Realign the intersection of Route 136 at Bayberry Lane to slow vehicles down; the Bayberry Lane Extension westbound approach will remain unchanged.
- Provide an All Way Stop control at the intersection of Route 136 at Bayberry Lane to reduce vehicular speeds and improve sightlines.

<u>Westport Near Term</u> 2

- Construct a three point single lane roundabout at the intersection of Route 136 at Bayberry Lane to calm traffic and also to improve sightlines.

<u>Westport Long Term 1</u>

- Reconfigure the intersection into a four-legged intersection with Two-Way stop sign control on the Bayberry Lane approaches.
- The proposed intersection reconfiguration will involve impacts to the property on northwestern quadrant of the intersection.

Westport Long Term 2

- Reconfigure the intersection and construct a four point single lane roundabout. The intersection reconfiguration will involve impacts to the property on northwestern quadrant of the intersection.

Comments on Westport Improvements

- Near Term 1 – It was agreed that the proposed All Way Stop at the intersection may get some push back from the Connecticut Department of Transportation (CTDOT).
- Near Term 2 – It is likely that CTDOT would be open to a roundabout at the intersection.
- Long Term Alternatives – The long term may be a viable option if the town is able to acquire the property on the northwestern quadrant of the intersection. The town of Westport was in favor of all four improvement alternatives

4. Other Items

- There was a discussion on potential funding sources for the two studies. SWRPA identified the STP Urban Grant, the Safe Routes to School Program and the Small Town Economic Assistance Program (STEAP) as potential funding sources. SWRPA also talked about helping the towns of Weston and Westport sign up for the Safe Routes to School Program. It was agreed that MMI should have a section on funding sources in the final report.
- It was decided that MMI will forward the alternatives to CTDOT for their review and input.
- It was confirmed that MMI would quantify ROW impacts by calculating area of impacts as well as conduct cost estimates of the proposed improvements.