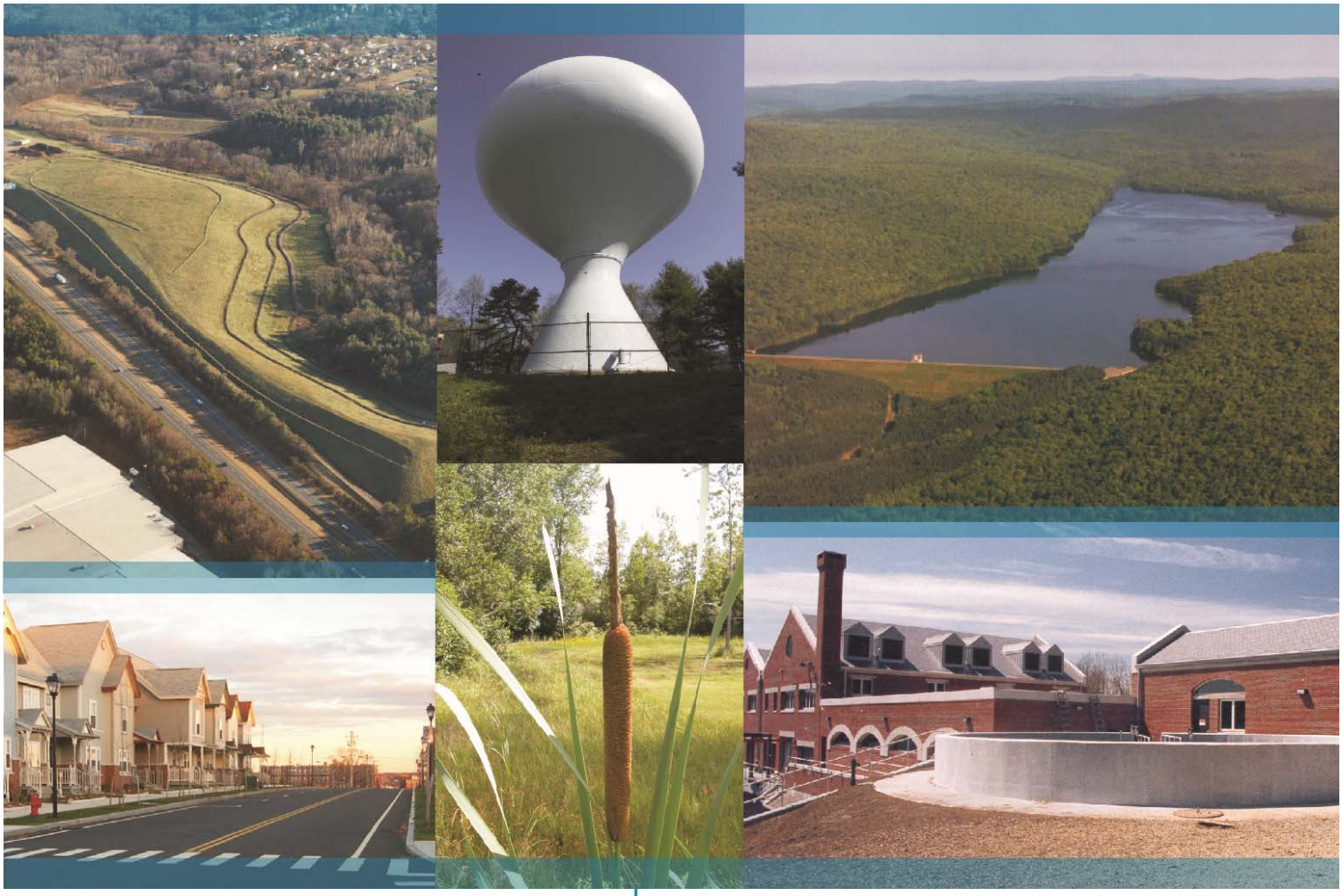


Tighe&Bond

Griswold Street and House Street /
Harris Street Intersection
Improvements
Glastonbury, Connecticut

Preliminary Design Report

Prepared For:

Town of Glastonbury
Department of Physical Services
Glastonbury, Connecticut

September 19, 2011

Section 1 Project Description

Section 2 Conclusion

Appendix

Section 1
Project Description

The Griswold Street and House Street / Harris Street Intersection Improvement Project involves the reconstruction of the project intersection located in the northern section of the Town of Glastonbury, Connecticut. The intersection reconstruction project will realign the House Street leg to be directly opposite from Harris Street, whereas the House Street approach is currently approximately 75 feet east of Harris Street. Minor sliver widening will be required on all approaches, except the westerly leg to maximize the intersection capacity. The project will also upgrade and modernize the existing traffic and pedestrian signal equipment, and provide new east-west traffic signal coordination amongst Main Street, Route 2 Eastbound Off-Ramp / Bantle Road, and House Street / Harris Street intersection to enhance traffic flow in the corridor. Minor modifications and signal timing adjustments will be required at the Griswold Street and Route 2 Eastbound Off-Ramp / Bantle Road intersection in order to coordinate the traffic signals. The sidewalks within the project intersection will be widened to five feet and the sidewalk ramps reconstructed to meet current ADA standards. The proposed pedestrian signals will be Accessible Pedestrian Signals equipped with audible signals and countdown signal heads, meeting the 2009 Manual on Uniform Traffic Control Devices. Naubuc School is located 0.3 miles west of the Griswold Street and House Street / Harris Street intersection, within the corridor. Providing the pedestrian accessibility improvements at the project location will benefit the residents along the Griswold Street and House Street / Harris Street intersection, which utilize the facilities at Naubuc School. The project goal is to reduce the existing congestion and vehicle queueing at the intersection during the peak travel hours. Figure 1 shows the project location in relative to the surrounding roadway network area.

1.1 Intersection Geometry and Roadway Classification

The existing Griswold Street and House Street / Harris Street intersection is a four-legged intersection with Griswold Street intersecting from east-west, House Street from the south, and Harris Street from the north. Figure 2 shows an aerial image of the intersection from 2009 and prior to the removal of the residence on the southwest corner of the intersection.

1.1.1 Griswold Street

Griswold Street at the project intersection is classified as a Minor Arterial roadway by both the Town of Glastonbury (the Town) and the Connecticut Department of Transportation (ConnDOT.) The arterial section begins at Main Street on the west, and runs eastward to Prospect Street. Griswold Street provides a half-interchange with the Connecticut Route 2 Expressway with an eastbound exit, and a westbound entrance immediate west of the project intersection.

1.1.1.1 Existing Condition

Griswold Street is approximately 29 feet wide from curb-to-curb with three-travel lanes at the House Street / Harris Street intersection. The three-travel lanes include a 9-foot wide left turn only lane, a 10-foot shared through and right turn lane, and a 10-foot departure lane. The posted speed limit on Griswold Street is 25 miles per hour. Concrete sidewalks are provided on both sides of Griswold Street with a maximum width of four feet. The existing Right-Of-Way (ROW) west of Harris Street is approximately 40± feet

wide; east of House Street, the existing ROW is 40± feet wide within 50 feet of the intersection, and then widens to 50 feet beyond the intersection.

1.1.1.2 Proposed Condition

Due to the limited width of available ROW, significant widening is not feasible without easements on Griswold Street west of Harris Street to provide standard travel lanes to meet minimum standards. However, it is recommended that the sidewalks be widened to 5 feet by removing the 1-foot grass strip maximizing the all-weather surface for improved pedestrian accessibility. The sidewalk ramps will also be reconstructed to meet current standards and improve pedestrian accessibility.

East of House Street, it is recommended Griswold Street be widened to provide three 10-foot travel lanes including two westbound travel lanes, and one eastbound travel lane. Sidewalks on both sides of Griswold Street should also be widened from 4 feet to 5 feet, and sidewalk ramps be reconstructed to meet current standard.

1.1.2 House Street

House Street intersecting the project intersection is classified as a Collector by the Town, and a Local Street by ConnDOT. House Street begins at the intersection of Griswold Street, runs southward, and terminates at its intersection with Hebron Avenue (Route 94,) serving as a north-south local cut-through route parallel to the Route 2 Expressway.

1.1.2.1 Existing Condition

House Street is approximately 30 feet wide between curbs with one 15-foot travel lane in each direction. The posted speed limit on House Street is 25 miles per hour. The existing Right-Of-Way is approximately 50± feet wide. A sidewalk is provided on the east side of House Street.

1.1.2.2 Proposed Condition

This project proposes to realign approximately 200 feet of House Street immediately south of Griswold Street, so that House Street will intersect Griswold Street approximately 75-feet west of its existing location and align directly opposite from Harris Street.

The new section of House Street will provide three travel lanes including a 12-foot wide northbound right turn only lane, a 12-foot northbound shared-through and left turn lane, and a 12 to 15-foot wide southbound departure lane. The existing sidewalk along the east side of House Street will be realigned to run parallel with the realigned House Street, and sidewalk ramps will be reconstructed to meet current standard.

1.1.3 Harris Street

Harris Street intersecting the project intersection is classified as a Collector by the Town, and a Local Street by ConnDOT. Harris Street begins at the intersection of Griswold, runs northward, and terminates at its intersection with Prospect Street.

1.1.3.1 Existing Condition

Harris Street is approximately 28 feet wide between curbs with no pavement marking to delineate the 14-foot wide travel lane in each direction. Posted speed limit on House Street is 25 miles per hour. Existing Right-Of-Way is approximately 50± feet wide. A 4-

foot sidewalk is provided on the east side of Harris Street, and a 5-foot sidewalk is provided on the west side of Harris Street.

1.1.3.2 Proposed Condition

This project proposes to widen Harris Street within 150 feet of the Griswold Street intersection to provide a new 12-foot southbound right turn only lane, a 12-foot southbound shared through and left-turn lane, and a 12-foot northbound departure lane. Sidewalks along both sides will be reconstructed to 5-foot width with sidewalk ramps meeting the current ADA requirements.

1.2 Traffic Volume Collection and Projection

Design year traffic volumes at the Griswold Street and House Street / Harris Street intersection were developed based on the 2007 existing and 2027 projected traffic volumes provided in the Town Center Traffic Study with a final report entitled *Envisioning Town Center 2027* published in March, 2008. The report provided intersection-turning movement volumes at the project intersection. Two design peak hours were selected when the intersection typically experiences the highest traffic volumes. These peak hours include the weekday afternoon peak hour, and Saturday midday peak hour for the 2007 existing, and 2027 future conditions.

For this project, the Town Center Traffic Study traffic volumes were further projected into 2010 and 2030 to represent the 2010 Existing traffic volumes and 2030 Design traffic volumes by increasing the 2007 and 2027 volumes by half a percent (0.5%) per year for 3 years, an identical methodology used in the Town Center Traffic Study.

In addition to intersection turning movement counts, 24-hour continuous traffic volume counts along Griswold Street, House Street and Harris Street obtained from the Town of Glastonbury with data collected in 2006 and 2008. Average daily traffic (ADT) on Griswold Street is 12,900 vehicles per day west of Harris Street, and 7,500 vehicles per day east of House Street. ADT on House Street is 4,800 vehicles per day, and 1,600 vehicles per day on Harris Street.

The 2010 Existing and 2030 Design hourly traffic volumes for the weekday afternoon, and Saturday midday peak hours are illustrated in Figures 3 through 6 of Appendix A.

1.3 Existing Intersection Operation and Analyses

1.3.1 Intersection Operation

The existing intersection is controlled by a fully actuated traffic signal operating with five phases including Griswold Street advance left turns, Griswold Street, exclusive pedestrian crossing phase, and separate phases for Harris Street and House Street. The existing offset House Street and Harris Street approaches constrain the traffic signal from operating both side streets concurrently resulting in less efficient operation. The traffic signal is also operating isolated, and is not coordinated with the existing traffic signal at the Route 2 Eastbound Off-Ramp / Bantle Street intersection 850 feet to the west.

The proposed traffic signal operation includes revising the signal phasing and timing to include actuated Griswold Street advance left turns, Griswold Street, exclusive

pedestrian crossing phase, House Street northbound advance, and House Street-Harris Street. The traffic signal will also be coordinated with the Route 2 Eastbound Off-Ramp / Bantle Street traffic signal to improve the traffic platooning along Griswold Street, and potentially further coordinate with the traffic signal at the Griswold Street and Main Street intersection in the future. Minor signal equipment and timing adjustments will be required at the Griswold Street and Route 2 Eastbound Off-Ramp / Bantle Street intersection to provide the desired coordinated operation.

1.3.2 Operational Analyses

Operational analyses performed included capacity, and queue analyses. The analyses were conducted using Trafficware *Synchro plus SimTraffic 7 – Traffic Signal Coordination Software* for the identified traffic signal timing programs. For intersection capacity, Levels of Service (LOS) criteria from A to F are utilized to categorize the average delay per vehicle during the analysis period. LOS A is considered the best LOS with less than 10 seconds of delay per vehicle on average, and LOS F being the worst with more than 80 seconds of delay per vehicle average in the study analysis period.

For vehicle queuing, the 95th percentile queue length is the maximum back of vehicle queue calculated during the analysis period; this is often used as the design queue length to determine the length of the storage required for turn lanes. The 50th percentile queue length is considered the approximate average queue length observed during the study peak hour analysis.

Three scenarios were analyzed including the 2010 Existing, 2030 Future (No-Build), and 2030 Future (Build.) The 2010 Existing scenario evaluates the existing traffic operation using the 2010 Existing traffic volumes, traffic signal phasing and timing, and detection at the project intersection. The 2030 Future (No-Build) scenario evaluates the future operating condition of the project intersection, if the project intersection was not reconstructed. The 2030 Future (Build) scenario evaluates the future operating condition of the project intersection, if the project is completed and operational with the 2030 Future design volumes. The analysis results are summarized in Table 1 in terms of LOS and Average Delay (seconds per vehicle), and Table 2 in terms of 50th and 95th Percentile. The detail analyses reports are included in various sections of the Appendix.

1.3.2.1 Capacity Analyses

The Griswold Street and House Street / Harris Street intersection operates at overall LOS F during the weekday afternoon peak hours and at an overall LOS D during the Saturday midday peak hours. The intersection overall LOS is expected to remain in the 2030 No-Build conditions with increased average delays.

With the proposed improvements, the intersection overall LOS will be improved to LOS D during the weekday afternoon peak hour, and LOS C during the Saturday midday peak hour. The intersection average delays will be reduced from 156 seconds per vehicle to 44 seconds per vehicle during the afternoon peak hours, and from 48 seconds per vehicle to 26 seconds per vehicle during the Saturday midday peak hours. The Griswold Street approach will be improved to operate and LOS E, with average delays reduced from 297 seconds per vehicle to 56 seconds per vehicle, a significant 81% reduction with resulting decreases in queue lengths

The Griswold Street and Route 2 Eastbound Off-Ramp / Bantle Street traffic signal operates at overall LOS B during both study peak hours currently, and will continue to operate at overall LOS B during the 2030 No-Build, and 2030 Building conditions.

Because the coordinated signal will be less traffic responsive to serve the demand coming off Route 2, therefore, the southbound approach will be impacted to operate at reduced LOS in order to improve the traffic flow on Griswold Street and the operation at the House Street / Harris Street intersection. However, the Off Ramp has significant storage for queued vehicles to accommodate this reduced operation.

1.3.2.2 Queue Analyses

The Griswold Street and House Street / Harris Street intersection currently operates with significant long 95th percentile queues on all approaches, except the Harris Street southbound, during both study peak hours, and expected to be worsen in the 2030 No-Build condition. Under the 2030 No-Build condition, the Griswold Street eastbound will operate with 50th percentile queue of 790 feet, and 95th percentile queue of 1,335 feet; the westbound will operate with 50th percentile queue of 395 feet, and 95th percentile queue of 815 feet. The House Street northbound will operate with 50th percentile queue of 260 feet, and 95th percentile queue of 615 feet.

With the proposed improvements, the Griswold Street eastbound 50th and 95th percentile queues will reduce to 640 feet and 1,210 feet respectively. The Griswold Street westbound 50th and 95th percentile queues will reduce to 280 feet and 710 feet respectively. The House Street northbound 50th and 95th percentile queues will reduce to 140 feet and 245 feet respectively. These are significant reductions in queuing on House Street during the peak hours.

The 95th percentile queue on Griswold Street will remain longer than desired, primarily due to the longer pedestrian crossing phase as required the current standards. This 95th percentile queues during the peak hours will likely occur only when the pedestrian phase is actuated, reducing the capacity of the intersection. The queue calculations assumed a minimum number of ten pedestrian actuations per hour. If these actuations are less, then the vehicle queuing will be potentially less than 1,000 feet. In addition, the 50th vehicle queues will be significantly reduced by a minimum of 20 percent, in additional to the aforementioned reduction in average delays.

Section 2
Conclusion

The Griswold Street and House Street / Harris Street Intersection Improvement Project is derived from long standing plans to realign the intersection with the most recent proposal in the Town Center Master Plan conducted by the Town of Glastonbury. The project includes the reconstruction of the project intersection, and realign House Street directly opposite from Harris Street. Minor widening and sidewalk reconstruction will also be performed on Harris Street and Griswold Street to improve traffic safety and pedestrian accessibility. The project will also modernize and upgrade the project intersection traffic signal, along with minor adjustment to the Griswold Street and Route 2 Eastbound Off-Ramp / Bantle Road intersection to provide a new east-west coordination system.

Upon completion of the project, the intersection and the corridor will operate more efficiently with standard intersection layout with opposing side street approaches, improved overall intersection LOS, reduced average delays, and reduced 50^{th} and 95^{th} percentile queues during the peak hours.

The project will provide a structural improvement in the roadway pavement with an improved condition rating from the new pavement structure. The roadway drainage system will be upgraded to address the realigned roadway and deficient storm water controls.

The project will provide for significant improvement in operations during the peak hours, with reduced congestion on all approaches at the Griswold Street and House Street / Harris Street intersection and improved geometry with the realigned House Street approach.

The intersection services thousands of travelers on a daily basis, who will benefit from the reduced travel times and delays through the intersection.

The intersection is of regional significance in the northern part of Glastonbury, serving the connections from Glastonbury center to north Glastonbury and into southern East Hartford and Manchester.

The improvements to the intersection will provide improved pedestrian accessibility with better sidewalk connectivity, pedestrian countdown traffic signals and improved traffic signal operation.

Griswold Street is considered a minor arterial roadway by the Town of Glastonbury.

TABLE 1
Intersection Operation Summary - Vehicular Levels of Service / Average Delay (sec/veh)

		Weekday Afternoon Peak Hour			Saturday Midday Peak Hour		
	Lane Use	2010 Existing	2030 No-Build	2030 Build	2010 Existing	2030 No-Build	2030 Build
Traffic Signal - Griswold Street at Route 2 Eastbound Off Ramp / Bentle Street							
Overall		**B / 15.5**	**B / 17.8**	**B / 18.6**	**B / 10.8**	**B / 13.3**	**B / 12.0**
Griswold St	EBT	B / 19.8	C / 23.8	B / 14.9	B / 12.3	B / 15.0	A / 5.5
Griswold St	WBT	A / 9.9	B / 11.8	B / 14.5	A / 9.8	B / 10.5	A / 5.1
Bentle St	NBT	A / 0.2	A / 0.2	A / 0.3	A / 7.0	B / 16.6	D / 37.3
Rt 2 EB Off Ramp	SBT	C / 24.3	C / 24.8	E / 55.8	B / 17.0	C / 22.4	E / 56.0
Rt 2 EB Off Ramp	SBR	A / 4.4	A / 4.3	A / 6.2	A / 5.0	A / 5.3	A / 8.9
Traffic Signal - Griswold Street at Harris Street / House Street							
Overall		**F / 136.6**	**F / 155.6**	**D / 43.6**	**D / 39.2**	**D / 48.4**	**C / 25.6**
Griswold St	EBL	C / 20.7	C / 21.6	A / 6.9	B / 17.7	B / 18.5	B / 11.0
Griswold St	EBT	F / 261.4	F / 297.1	E / 55.7	D / 45.7	E / 66.0	C / 23.4
Griswold St	WBL	C / 26.8	C / 29.6	D / 42.7	C / 26.0	C / 30.3	B / 12.9
Griswold St	WBT	D / 45.2	E / 58.4	C / 23.2	C / 32.6	D / 35.9	B / 19.9
House St	NBL	-- / --	-- / --	-- / --	-- / --	-- / --	-- / --
House St	NBT	D / 54.5	E / 70.0	-- / --	D / 44.0	D / 48.1	-- / --
House St	<NBT	-- / --	-- / --	E / 64.9	-- / --	-- / --	D / 47.4
House St	NBR	-- / --	-- / --	D / 35.8	-- / --	-- / --	C / 29.5
Harris St	SBT	D / 48.0	D / 48.4	-- / --	D / 47.2	D / 47.9	-- / --
Harris St	<SBT	-- / --	-- / --	D / 50.4	-- / --	-- / --	D / 43.8
Harris St	SBR	-- / --	-- / --	E / 60.9	-- / --	-- / --	E / 55.3

NOTE:
< Shared left and through lane
> Shared right and through lane

TABLE 2

Intersection Operation Summary - Vehicular 50th / 95th Percentile Queue (In Feet)

	Lane Use	Available Storage	Weekday Afternoon Peak Hour 2010 Existing	Weekday Afternoon Peak Hour 2030 No-Build	Weekday Afternoon Peak Hour 2030 Build	Saturday Midday Peak Hour 2010 Existing	Saturday Midday Peak Hour 2030 No-Build	Saturday Midday Peak Hour 2030 Build
Traffic Signal - Griswold Street at Route 2 Eastbound Off Ramp / Bentle Street								
Griswold St	EBT>	1800	170 / #453	195 / #505	88 / #922	99 / 202	136 / 310	220 / 57
Griswold St	<WBT	230	60 / 143	72 / 176	65 / m321	66 / 136	78 / 180	97 / 126
Bentle St	<NB>	>1000	0 / 0	0 / 0	0 / 0	1 / 24	12 / 45	30 / 67
Rt 2 EB Off Ramp	<SBT	>1000	61 / 118	65 / 125	159 / 223	21 / 68	39 / 109	97 / 162
Rt 2 EB Off Ramp	SBR	500	0 / 36	0 / 37	0 / 53	0 / 36	0 / 42	0 / 56
Traffic Signal - Griswold Street at Harris Street / House Street								
Griswold St	EBL	200	20 / 60	22 / 66	12 / m23	12 / 42	14 / 46	5 / m36
Griswold St	EBT>	750	~728 / #1251	~791 / #1336	638 / #1207	279 / #636	333 / #749	148 / #643
Griswold St	WBL	170	35 / #107	39 / #128	33 / #164	39 / #109	40 / #138	25 / 84
Griswold St	WBT>	>1000	314 / #710	~396 / #815	280 / #712	245 / #557	281 / #639	201 / #528
House St	<NBT>	>1000	228 / #538	260 / #612	-- / --	180 / #420	206 / #484	-- / --
House St	<NBT	>1000	-- / --	-- / --	141 / #244	-- / --	-- / --	99 / 166
House St	NBR	200	-- / --	-- / --	136 / 212	-- / --	-- / --	105 / 172
Harris St	SBT	>1000	43 / 102	48 / 110	-- / --	36 / 89	40 / 97	-- / --
Harris St	<SBT	>500	-- / --	-- / --	19 / 49	-- / --	-- / --	10 / 30
Harris St	SBR	100	-- / --	-- / --	40 / 83	-- / --	-- / --	36 / 77

NOTE:

< Shared left and through lane

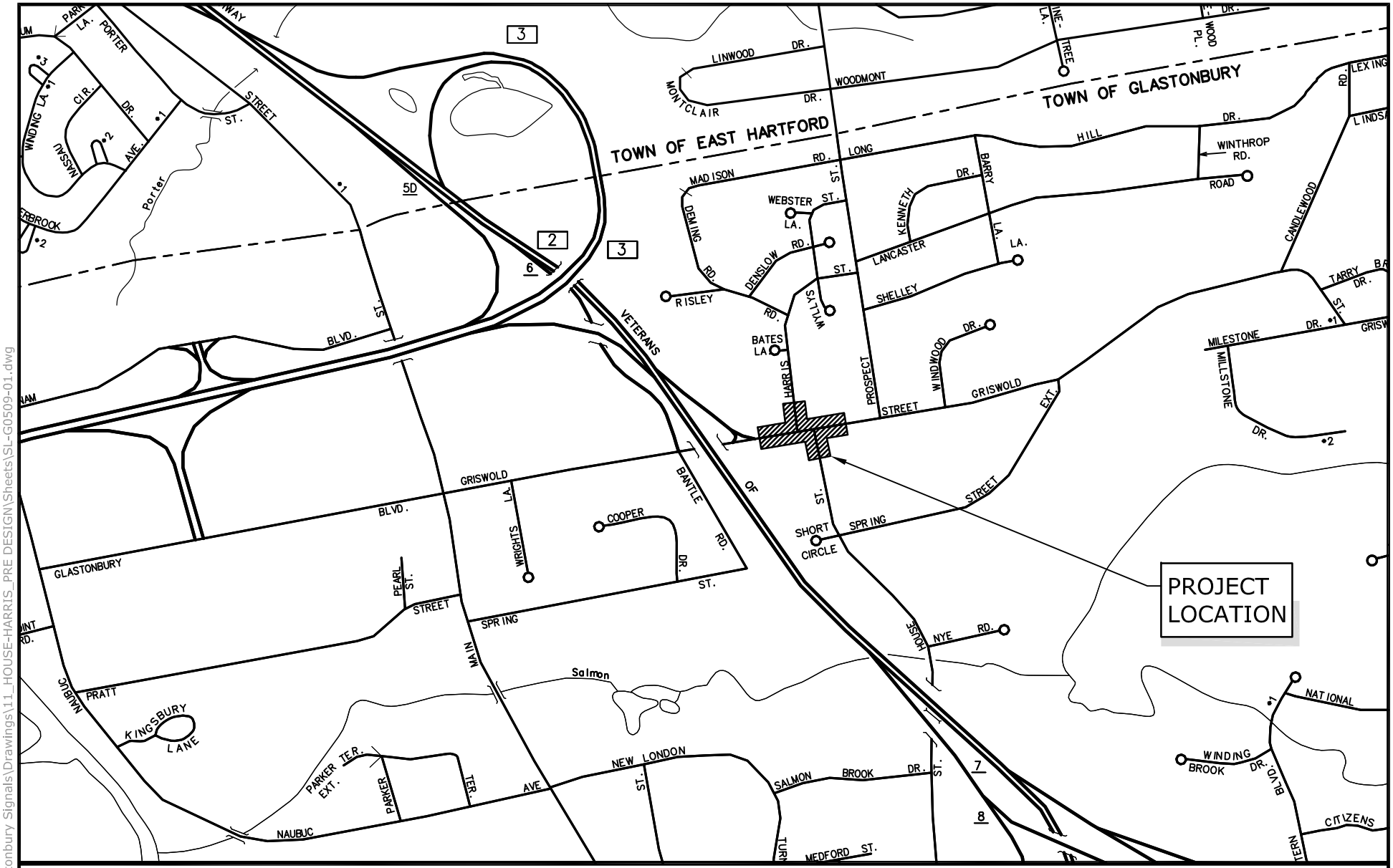
> Shared right and through lane

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

Appendix A
Figures



Griswold Street at House Street / Harris Street
Intersection Improvements

GLASTONBURY, CONNECTICUT

PROJECT LOCATION MAP

NORTH

1" = 1000'

FIGURE 1

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N

SCALE IN FEET

0 40' 80'

GRAPHIC SCALE

NOTE:
AERIAL IMAGE PROVIDED BY THE TOWN OF GLASTONBURY.

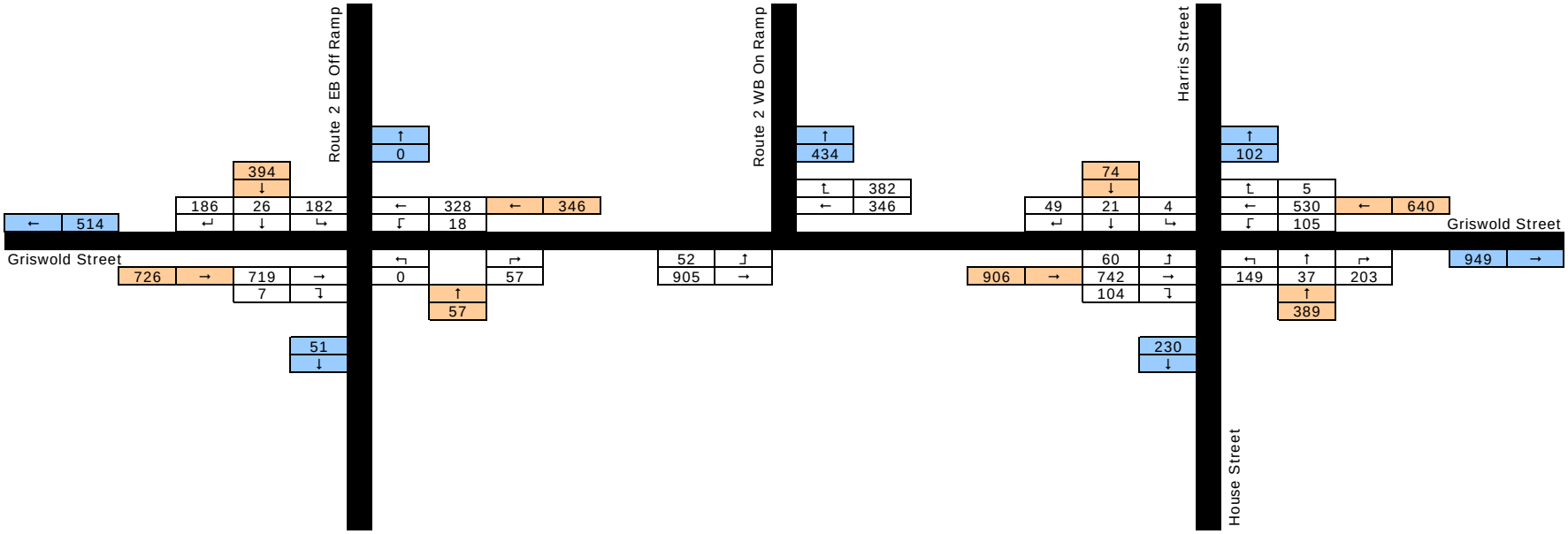
GRISWOLD STREET AT HOUSE STREET / HARRIS STREET INTERSECTION IMPROVEMENT PROJECT
GLASTONBURY, CONNECTICUT

EXISTING INTERSECTION CONDITION

DATE:	SEPT. 19, 2011
SCALE:	1" = 60'
FIGURE:	2

Tighe&Bond

09/02/2011



2010 Existing Traffic Volume
Weekend Afternoon Design Hour

Griswold Street and House Street / Harris Street
Intersection Improvement
Glastonbury, Connecticut

Figure 3

September 19, 2011

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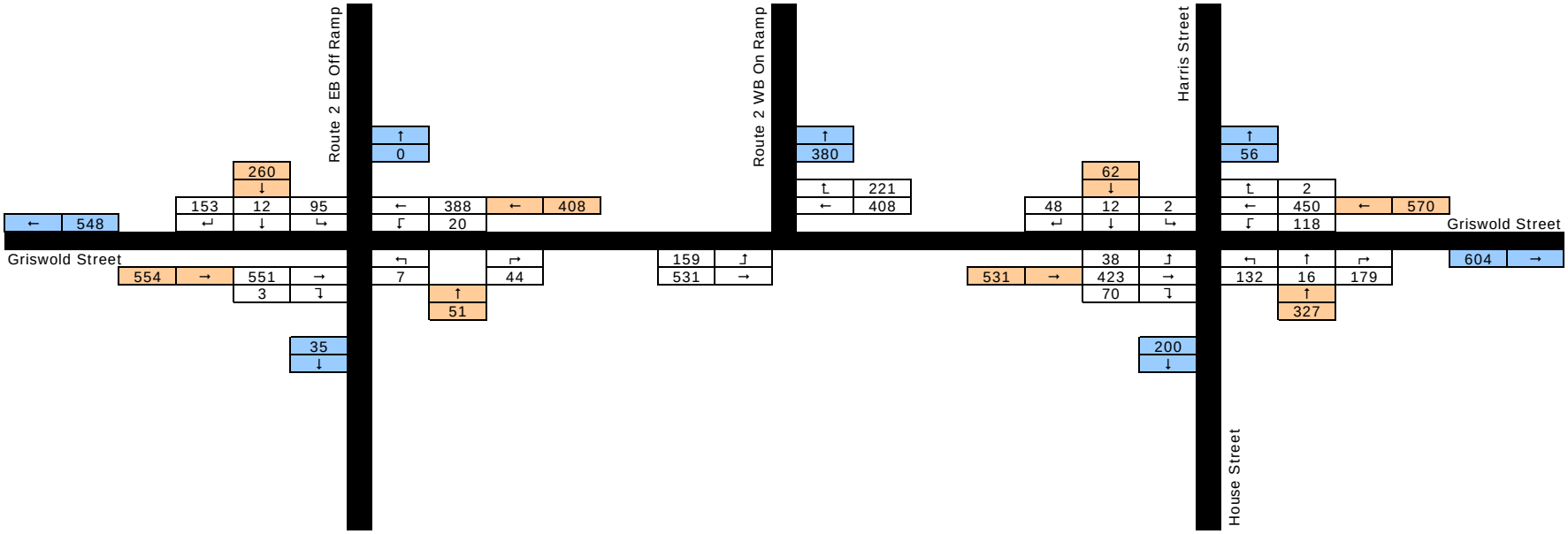
Environmental Specialists



2010 Existing Traffic Volume
Saturdya Midday Design Hour

Griswold Street and House Street / Harris Street
Intersection Improvement
Glastonbury, Connecticut

Figure 4

September 19, 2011

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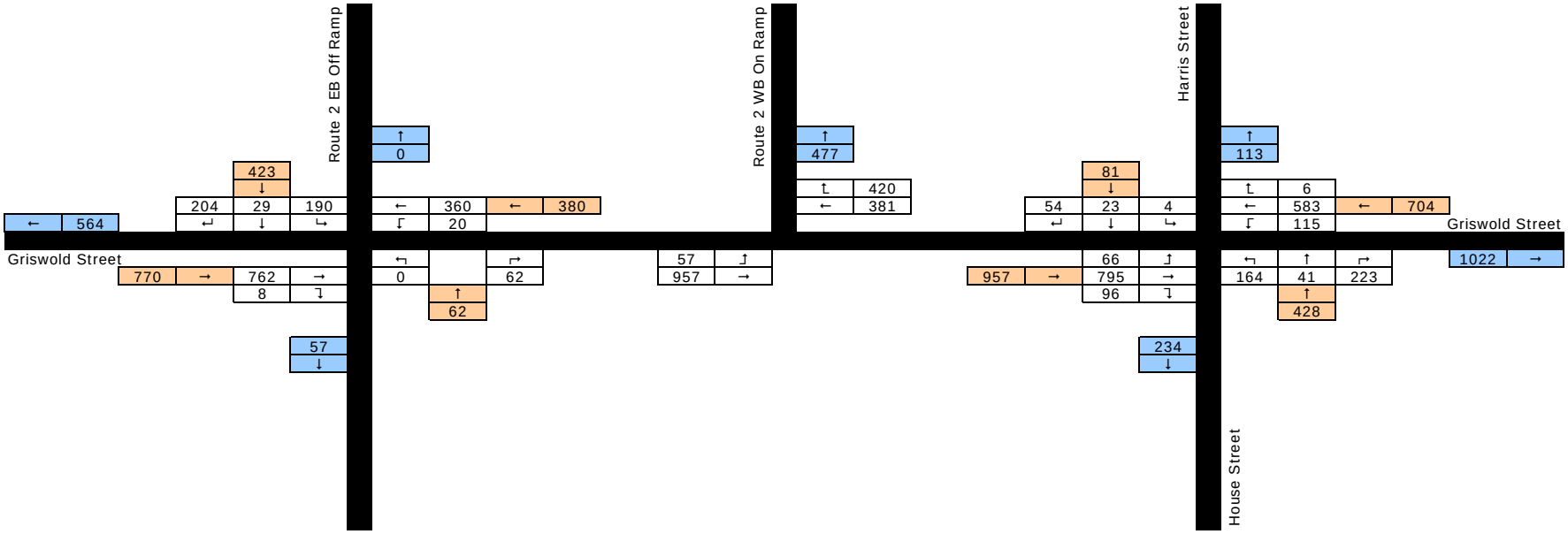
Environmental Specialists



2030 Design Traffic Volume
Weekend Afternoon Design Hour

Griswold Street and House Street / Harris Street
Intersection Improvement
Glastonbury, Connecticut

Figure 5

September 19, 2011

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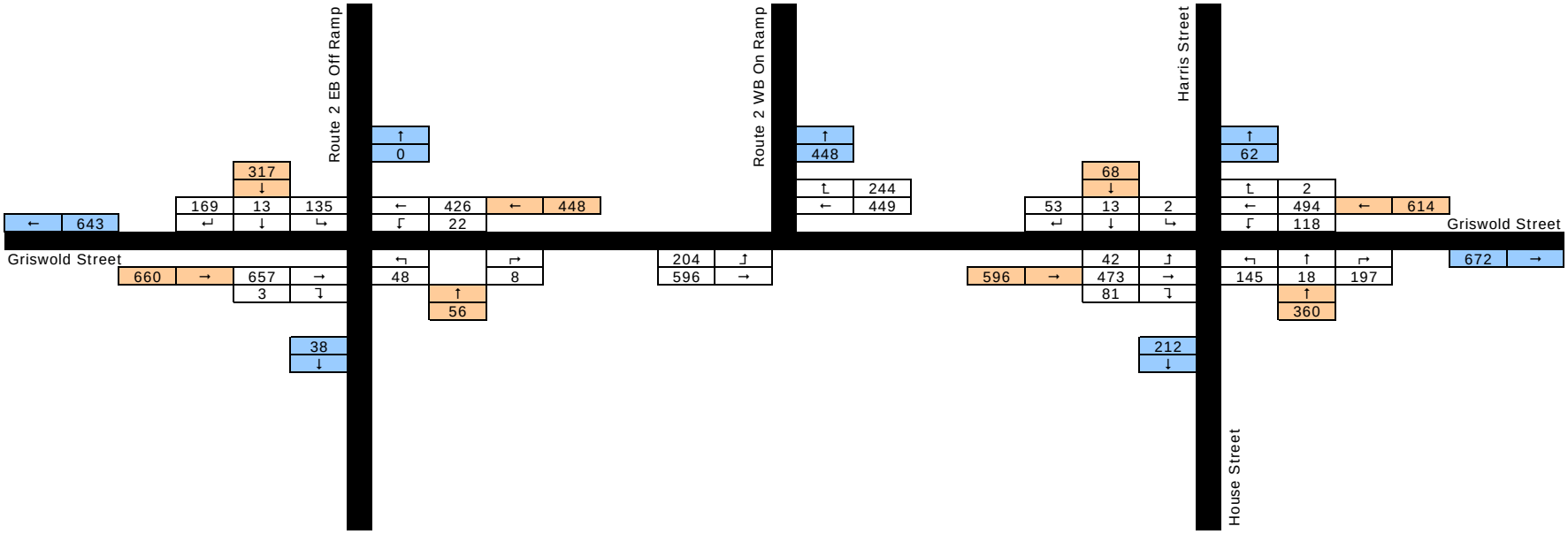
Environmental Specialists



2030 Design Traffic Volume
Saturdya Midday Design Hour

Griswold Street and House Street / Harris Street
Intersection Improvement
Glastonbury, Connecticut

Figure 6

September 19, 2011

Tighe&Bond
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Environmental Specialists

Appendix B
Description of Levels of Service

LEVELS OF SERVICE

The *Highway Capacity Manual* (2000) published by the Transportation Research Board is the basic guide for determining the level of service of roads, streets and intersections.

SIGNALIZED INTERSECTIONS

Definition

Level of service for signalized intersections is defined in terms of average delay. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average control delay per vehicle for a 15-minute analysis period. The criteria are given in the table below.

Delay may be measured in the field, or may be estimated using procedures presented in the *Highway Capacity Manual*. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group or approach in question.

Table 16-2
LEVEL OF SERVICE CRITERIA
Signalized Intersections

Level of Service	Average Control Delay (Seconds per Vehicle)
A	0 - 10
B	>10 – 20
C	>20 – 35
D	>35 – 55
E	>55 – 80
F	>80

Source: *Highway Capacity Manual 2000*, Transportation Research Board, National Research Council, Washington D.C., 2000

Descriptions

Level of Service A
Describes operations with very low delay, i.e., less than 10.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of Service B
Describes operations with delay in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level of Service C
Describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level of Service D
Describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At Level of Service 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 delay in the range of 55.1 to 80.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level of Service F
Describes operations with delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

UNSIGNALIZED INTERSECTIONS

Definition

The level of service criteria for unsignalized intersections is given in Table 17-2 of the *Highway Capacity Manual*. As used here, control delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position.

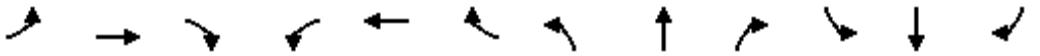
Table 17-2
LEVEL OF SERVICE CRITERIA
Two-Way Stop Controlled Intersections

Level of Service	Average Control Delay (Seconds per Vehicle)
A	0 - 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F	> 50

Source: *Highway Capacity Manual 2000*, Transportation Research Board, National Research Council, Washington, D.C., 2000

\\Srv\Data\Ntdata_Administrative\Traffic Engineering Documents\LEVELS OF SERVICE HCM 2000New.Doc

Appendix C
Capacity Analysis Reports: 2010 Existing



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	719	7	18	328	0	0	0	57	182	26	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		50	0		175
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999						0.865				0.850
Flt Protected					0.997						0.958	
Satd. Flow (prot)	0	1861	0	0	1857	0	0	1611	0	0	1785	1583
Flt Permitted					0.936						0.709	
Satd. Flow (perm)	0	1861	0	0	1744	0	0	1611	0	0	1321	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1						469				202
Link Speed (mph)		30			30			30			50	
Link Distance (ft)		761			350			729			389	
Travel Time (s)		17.3			8.0			16.6			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	782	8	20	357	0	0	0	62	198	28	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	790	0	0	377	0	0	62	0	0	226	202
Turn Type				Perm			Perm			Perm		Perm
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		4
Detector Phase		2		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)		20.0		20.0	20.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)		25.0		25.0	25.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	0.0	33.0	0.0	33.0	33.0	0.0	45.0	45.0	0.0	45.0	45.0	45.0
Total Split (%)	0.0%	33.0%	0.0%	33.0%	33.0%	0.0%	45.0%	45.0%	0.0%	45.0%	45.0%	45.0%
Maximum Green (s)		28.0		28.0	28.0		40.0	40.0		40.0	40.0	40.0
Yellow Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)		1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Lead/Lag							Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode		Min		Min	Min		None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		28.1			28.1			14.8			14.8	14.8
Actuated g/C Ratio		0.53			0.53			0.28			0.28	0.28
v/c Ratio		0.80			0.41			0.08			0.61	0.34
Control Delay		19.8			9.9			0.2			24.3	4.4
Queue Delay		0.0			0.0			0.0			0.0	0.0
Total Delay		19.8			9.9			0.2			24.3	4.4
LOS		B			A			A			C	A

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	22.0
Total Split (s)	22.0
Total Split (%)	22%
Maximum Green (s)	20.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		19.8			9.9			0.2			14.9	
Approach LOS		B			A			A			B	
Queue Length 50th (ft)		170			60			0			61	0
Queue Length 95th (ft)		#453			143			0			118	36
Internal Link Dist (ft)		681			270			649			309	
Turn Bay Length (ft)												175
Base Capacity (vph)		989			927			1336			1003	1250
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		0.80			0.41			0.05			0.23	0.16

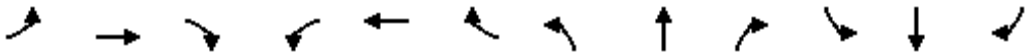
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 52.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 15.5		Intersection LOS: B	
Intersection Capacity Utilization 64.7%		ICU Level of Service C	
Analysis Period (min) 15			

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

Splits and Phases: 108: Griswold Street & Route 2 EB Off Ramp

Lane Group	ø3
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	742	104	105	530	5	149	37	203	4	21	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.999			0.929			0.911	
Flt Protected	0.950			0.950				0.981			0.998	
Satd. Flow (prot)	1770	1834	0	1805	1861	0	0	1732	0	0	1703	0
Flt Permitted	0.127			0.121				0.981			0.998	
Satd. Flow (perm)	237	1834	0	230	1861	0	0	1732	0	0	1703	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		496			399			748			685	
Travel Time (s)		11.3			9.1			17.0			15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	65	807	113	114	576	5	162	40	221	4	23	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	920	0	114	581	0	0	423	0	0	80	0
Turn Type	pm+pt			pm+pt			Split			Split		
Protected Phases	5	2		1	6		7	7		8	8	
Permitted Phases	2			6								
Detector Phase	5	2		1	6		7	7		8	8	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.0	25.0		11.0	25.0		12.0	12.0		11.0	11.0	
Total Split (s)	11.0	35.0	0.0	11.0	35.0	0.0	30.0	30.0	0.0	25.0	25.0	0.0
Total Split (%)	9.3%	29.7%	0.0%	9.3%	29.7%	0.0%	25.4%	25.4%	0.0%	21.2%	21.2%	0.0%
Maximum Green (s)	7.0	30.0		7.0	30.0		25.0	25.0		21.0	21.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	4.0	5.0	4.0	5.0	5.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	38.6	30.4		39.5	33.1			25.4			9.9	
Actuated g/C Ratio	0.42	0.33		0.43	0.36			0.28			0.11	
v/c Ratio	0.30	1.50		0.51	0.86			0.88			0.43	
Control Delay	20.7	261.4		26.8	45.2			54.5			48.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	20.7	261.4		26.8	45.2			54.5			48.0	

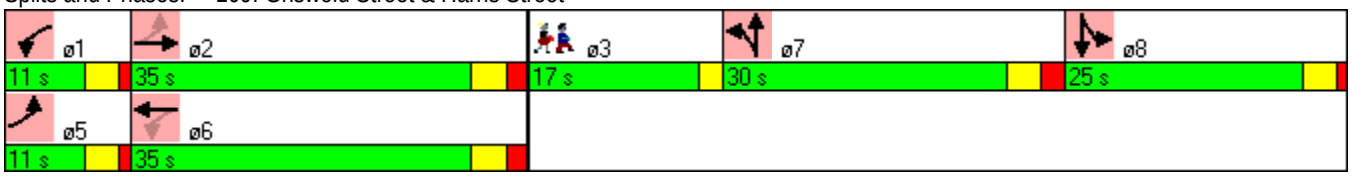
Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	14%
Maximum Green (s)	15.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	F		C	D			D			D	
Approach Delay		245.6			42.2			54.5			48.0	
Approach LOS		F			D			D			D	
Queue Length 50th (ft)	20	~728		35	314			228			43	
Queue Length 95th (ft)	60	#1251		#107	#710			#538			102	
Internal Link Dist (ft)		416			319			668			605	
Turn Bay Length (ft)	200			100								
Base Capacity (vph)	220	612		222	675			482			398	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.30	1.50		0.51	0.86			0.88			0.20	

Intersection Summary

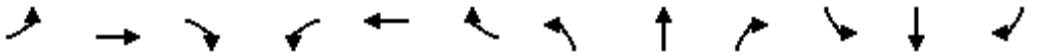
Area Type: Other
Cycle Length: 118
Actuated Cycle Length: 91.2
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.50
Intersection Signal Delay: 136.6 Intersection LOS: F
Intersection Capacity Utilization 92.2% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds 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: 109: Griswold Street & Harris Street



Lane Group	ø3
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	551	3	20	388	0	7	0	44	95	12	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		50	0		175
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999						0.884				0.850
Flt Protected					0.998			0.993			0.957	
Satd. Flow (prot)	0	1861	0	0	1859	0	0	1635	0	0	1783	1583
Flt Permitted					0.962			0.958			0.710	
Satd. Flow (perm)	0	1861	0	0	1792	0	0	1578	0	0	1323	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)								48				166
Link Speed (mph)		30			30			30			50	
Link Distance (ft)		761			350			729			389	
Travel Time (s)		17.3			8.0			16.6			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	599	3	22	422	0	8	0	48	103	13	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	602	0	0	444	0	0	56	0	0	116	166
Turn Type				Perm			Perm			Perm		Perm
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		4
Detector Phase		2		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)		20.0		20.0	20.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)		25.0		25.0	25.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	0.0	53.0	0.0	53.0	53.0	0.0	25.0	25.0	0.0	25.0	25.0	25.0
Total Split (%)	0.0%	53.0%	0.0%	53.0%	53.0%	0.0%	25.0%	25.0%	0.0%	25.0%	25.0%	25.0%
Maximum Green (s)		48.0		48.0	48.0		20.0	20.0		20.0	20.0	20.0
Yellow Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)		1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Lead/Lag							Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode		Min		Min	Min		None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		22.7			22.7			12.7			12.7	12.7
Actuated g/C Ratio		0.50			0.50			0.28			0.28	0.28
v/c Ratio		0.65			0.50			0.12			0.31	0.30
Control Delay		12.3			9.8			7.0			17.0	5.0
Queue Delay		0.0			0.0			0.0			0.0	0.0
Total Delay		12.3			9.8			7.0			17.0	5.0
LOS		B			A			A			B	A

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	22.0
Total Split (s)	22.0
Total Split (%)	22%
Maximum Green (s)	20.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		12.3			9.8			7.0			9.9	
Approach LOS		B			A			A			A	
Queue Length 50th (ft)		99			66			1			21	0
Queue Length 95th (ft)		202			136			24			68	36
Internal Link Dist (ft)		681			270			649			309	
Turn Bay Length (ft)												175
Base Capacity (vph)		1808			1741			730			589	797
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		0.33			0.26			0.08			0.20	0.21

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 45.5			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 10.8		Intersection LOS: B	
Intersection Capacity Utilization 57.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 108: Griswold Street & Route 2 EB Off Ramp

Lane Group	ø3
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	423	70	118	450	2	132	16	179	2	12	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.999			0.926			0.895	
Flt Protected	0.950			0.950				0.980			0.999	
Satd. Flow (prot)	1770	1829	0	1805	1861	0	0	1724	0	0	1672	0
Flt Permitted	0.280			0.148				0.980			0.999	
Satd. Flow (perm)	522	1829	0	281	1861	0	0	1724	0	0	1672	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		496			399			748			685	
Travel Time (s)		11.3			9.1			17.0			15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	41	460	76	128	489	2	143	17	195	2	13	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	536	0	128	491	0	0	355	0	0	67	0
Turn Type	pm+pt			pm+pt			Split			Split		
Protected Phases	5	2		1	6		7	7		8	8	
Permitted Phases	2			6								
Detector Phase	5	2		1	6		7	7		8	8	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.0	25.0		11.0	25.0		12.0	12.0		11.0	11.0	
Total Split (s)	11.0	35.0	0.0	11.0	35.0	0.0	30.0	30.0	0.0	25.0	25.0	0.0
Total Split (%)	9.3%	29.7%	0.0%	9.3%	29.7%	0.0%	25.4%	25.4%	0.0%	21.2%	21.2%	0.0%
Maximum Green (s)	7.0	30.0		7.0	30.0		25.0	25.0		21.0	21.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	4.0	5.0	4.0	5.0	5.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	38.7	30.6		40.6	35.6			24.4			9.3	
Actuated g/C Ratio	0.43	0.34		0.45	0.40			0.27			0.10	
v/c Ratio	0.13	0.86		0.52	0.67			0.76			0.39	
Control Delay	17.7	45.7		26.0	32.6			44.0			47.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	17.7	45.7		26.0	32.6			44.0			47.2	

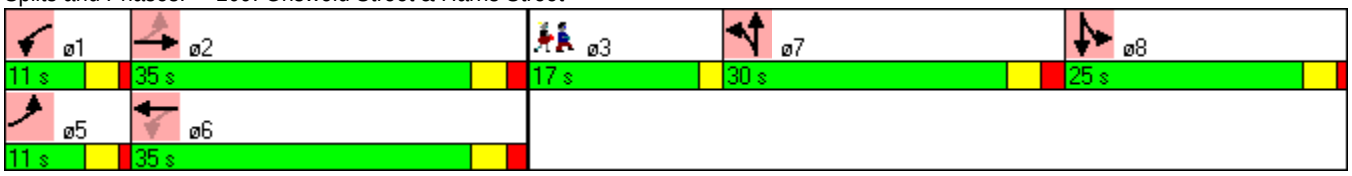
Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	14%
Maximum Green (s)	15.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	D		C	C			D			D	
Approach Delay		43.7			31.3			44.0			47.2	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)	12	279		39	245			180			36	
Queue Length 95th (ft)	42	#636		#109	#557			#420			89	
Internal Link Dist (ft)		416			319			668			605	
Turn Bay Length (ft)	200			100								
Base Capacity (vph)	324	623		248	737			489			399	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.13	0.86		0.52	0.67			0.73			0.17	

Intersection Summary			
Area Type:	Other		
Cycle Length: 118			
Actuated Cycle Length: 89.8			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 39.2		Intersection LOS: D	
Intersection Capacity Utilization 70.5%		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.

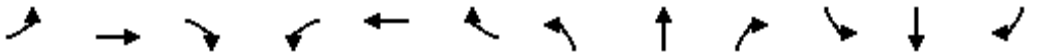
Splits and Phases: 109: Griswold Street & Harris Street



Lane Group	ø3
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Appendix D
Capacity Analysis Reports: 2030 No-Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	762	8	20	360	0	0	0	62	190	29	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		50	0		175
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999						0.865				0.850
Flt Protected					0.997						0.958	
Satd. Flow (prot)	0	1861	0	0	1857	0	0	1611	0	0	1785	1583
Flt Permitted					0.833						0.708	
Satd. Flow (perm)	0	1861	0	0	1552	0	0	1611	0	0	1319	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1						466				222
Link Speed (mph)		30			30			30			50	
Link Distance (ft)		761			350			729			389	
Travel Time (s)		17.3			8.0			16.6			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	828	9	22	391	0	0	0	67	207	32	222
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	837	0	0	413	0	0	67	0	0	239	222
Turn Type				Perm			Perm			Perm		Perm
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		4
Detector Phase		2		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)		20.0		20.0	20.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)		25.0		25.0	25.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	0.0	33.0	0.0	33.0	33.0	0.0	45.0	45.0	0.0	45.0	45.0	45.0
Total Split (%)	0.0%	33.0%	0.0%	33.0%	33.0%	0.0%	45.0%	45.0%	0.0%	45.0%	45.0%	45.0%
Maximum Green (s)		28.0		28.0	28.0		40.0	40.0		40.0	40.0	40.0
Yellow Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)		1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Lead/Lag							Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode		Min		Min	Min		None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		28.1			28.1			15.2			15.2	15.2
Actuated g/C Ratio		0.53			0.53			0.28			0.28	0.28
v/c Ratio		0.85			0.51			0.08			0.63	0.36
Control Delay		23.8			11.8			0.2			24.8	4.3
Queue Delay		0.0			0.0			0.0			0.0	0.0
Total Delay		23.8			11.8			0.2			24.8	4.3
LOS		C			B			A			C	A

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	22.0
Total Split (s)	22.0
Total Split (%)	22%
Maximum Green (s)	20.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		23.8			11.8			0.2			15.0	
Approach LOS		C			B			A			B	
Queue Length 50th (ft)		195			72			0			65	0
Queue Length 95th (ft)		#505			176			0			125	37
Internal Link Dist (ft)		681			270			649			309	
Turn Bay Length (ft)												175
Base Capacity (vph)		980			817			1327			992	1246
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		0.85			0.51			0.05			0.24	0.18

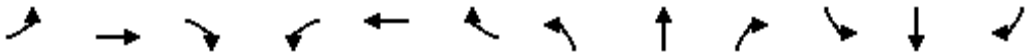
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 53.4			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 17.8		Intersection LOS: B	
Intersection Capacity Utilization 67.6%		ICU Level of Service C	
Analysis Period (min) 15			

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

Splits and Phases: 108: Griswold Street & Route 2 EB Off Ramp

Lane Group	ø3
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	795	96	115	583	6	164	41	223	4	23	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.998			0.930			0.909	
Flt Protected	0.950			0.950				0.981			0.998	
Satd. Flow (prot)	1770	1837	0	1805	1859	0	0	1733	0	0	1699	0
Flt Permitted	0.127			0.121				0.981			0.998	
Satd. Flow (perm)	237	1837	0	230	1859	0	0	1733	0	0	1699	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		496			399			748			685	
Travel Time (s)		11.3			9.1			17.0			15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	72	864	104	125	634	7	178	45	242	4	25	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	968	0	125	641	0	0	465	0	0	88	0
Turn Type	pm+pt			pm+pt			Split			Split		
Protected Phases	5	2		1	6		7	7		8	8	
Permitted Phases	2			6								
Detector Phase	5	2		1	6		7	7		8	8	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.0	25.0		11.0	25.0		12.0	12.0		11.0	11.0	
Total Split (s)	11.0	35.0	0.0	11.0	35.0	0.0	30.0	30.0	0.0	25.0	25.0	0.0
Total Split (%)	9.3%	29.7%	0.0%	9.3%	29.7%	0.0%	25.4%	25.4%	0.0%	21.2%	21.2%	0.0%
Maximum Green (s)	7.0	30.0		7.0	30.0		25.0	25.0		21.0	21.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	4.0	5.0	4.0	5.0	5.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	38.6	30.5		39.6	33.1			25.4			10.3	
Actuated g/C Ratio	0.42	0.33		0.43	0.36			0.28			0.11	
v/c Ratio	0.33	1.58		0.57	0.95			0.97			0.46	
Control Delay	21.6	297.1		29.6	58.4			70.0			48.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	21.6	297.1		29.6	58.4			70.0			48.4	

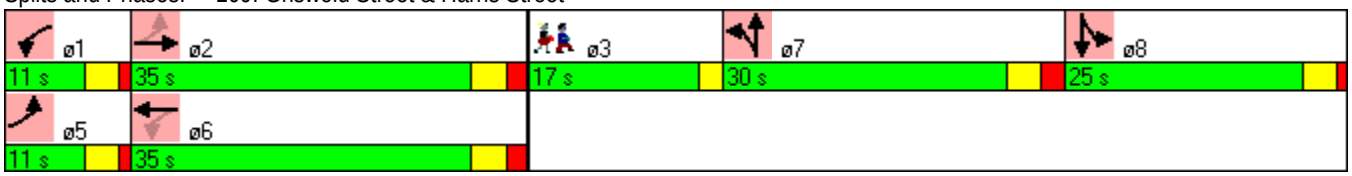
Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	14%
Maximum Green (s)	15.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	F		C	E			E			D	
Approach Delay		278.0			53.7			70.0			48.4	
Approach LOS		F			D			E			D	
Queue Length 50th (ft)	22	~791		39	~396			260			48	
Queue Length 95th (ft)	66	#1336		#128	#815			#612			110	
Internal Link Dist (ft)		416			319			668			605	
Turn Bay Length (ft)	200			100								
Base Capacity (vph)	219	611		221	672			480			395	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.33	1.58		0.57	0.95			0.97			0.22	

Intersection Summary

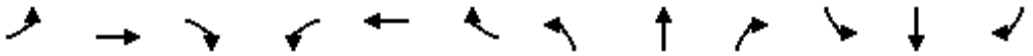
Area Type: Other
Cycle Length: 118
Actuated Cycle Length: 91.7
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.58
Intersection Signal Delay: 155.6 Intersection LOS: F
Intersection Capacity Utilization 97.3% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds 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: 109: Griswold Street & Harris Street



Lane Group	ø3
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	657	3	22	426	0	48	0	8	135	13	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		50	0		175
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999						0.980				0.850
Flt Protected					0.998			0.959			0.956	
Satd. Flow (prot)	0	1861	0	0	1859	0	0	1751	0	0	1781	1583
Flt Permitted					0.955			0.700			0.701	
Satd. Flow (perm)	0	1861	0	0	1779	0	0	1278	0	0	1306	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)								8				184
Link Speed (mph)		30			30			30			50	
Link Distance (ft)		761			350			729			389	
Travel Time (s)		17.3			8.0			16.6			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	714	3	24	463	0	52	0	9	147	14	184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	717	0	0	487	0	0	61	0	0	161	184
Turn Type				Perm			Perm			Perm		Perm
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		4
Detector Phase		2		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)		20.0		20.0	20.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)		25.0		25.0	25.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	0.0	53.0	0.0	53.0	53.0	0.0	25.0	25.0	0.0	25.0	25.0	25.0
Total Split (%)	0.0%	53.0%	0.0%	53.0%	53.0%	0.0%	25.0%	25.0%	0.0%	25.0%	25.0%	25.0%
Maximum Green (s)		48.0		48.0	48.0		20.0	20.0		20.0	20.0	20.0
Yellow Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)		1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Lead/Lag							Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode		Min		Min	Min		None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		27.6			27.6			14.5			14.5	14.5
Actuated g/C Ratio		0.53			0.53			0.28			0.28	0.28
v/c Ratio		0.73			0.52			0.17			0.44	0.32
Control Delay		15.0			10.5			16.6			22.4	5.3
Queue Delay		0.0			0.0			0.0			0.0	0.0
Total Delay		15.0			10.5			16.6			22.4	5.3
LOS		B			B			B			C	A

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	22.0
Total Split (s)	22.0
Total Split (%)	22%
Maximum Green (s)	20.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

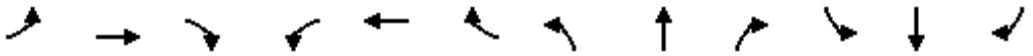
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		15.0			10.5			16.6			13.3	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)		136			78			12			39	0
Queue Length 95th (ft)		310			180			45			109	42
Internal Link Dist (ft)		681			270			649			309	
Turn Bay Length (ft)												175
Base Capacity (vph)		1668			1594			511			517	738
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		0.43			0.31			0.12			0.31	0.25

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 52.5			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 13.3		Intersection LOS: B	
Intersection Capacity Utilization 58.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 108: Griswold Street & Route 2 EB Off Ramp

Lane Group	ø3
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	473	81	118	494	2	145	18	197	2	13	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.999			0.926			0.894	
Flt Protected	0.950			0.950				0.980			0.999	
Satd. Flow (prot)	1770	1827	0	1805	1861	0	0	1724	0	0	1670	0
Flt Permitted	0.212			0.113				0.980			0.999	
Satd. Flow (perm)	395	1827	0	215	1861	0	0	1724	0	0	1670	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		496			399			748			685	
Travel Time (s)		11.3			9.1			17.0			15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	46	514	88	128	537	2	158	20	214	2	14	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	602	0	128	539	0	0	392	0	0	74	0
Turn Type	pm+pt			pm+pt			Split			Split		
Protected Phases	5	2		1	6		7	7		8	8	
Permitted Phases	2			6								
Detector Phase	5	2		1	6		7	7		8	8	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.0	25.0		11.0	25.0		12.0	12.0		11.0	11.0	
Total Split (s)	11.0	35.0	0.0	11.0	35.0	0.0	30.0	30.0	0.0	25.0	25.0	0.0
Total Split (%)	9.3%	29.7%	0.0%	9.3%	29.7%	0.0%	25.4%	25.4%	0.0%	21.2%	21.2%	0.0%
Maximum Green (s)	7.0	30.0		7.0	30.0		25.0	25.0		21.0	21.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	4.0	5.0	4.0	5.0	5.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	38.6	30.4		40.4	35.4			25.4			9.7	
Actuated g/C Ratio	0.42	0.33		0.44	0.39			0.28			0.11	
v/c Ratio	0.17	0.99		0.58	0.75			0.81			0.42	
Control Delay	18.5	66.0		30.3	35.9			48.1			47.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	18.5	66.0		30.3	35.9			48.1			47.9	

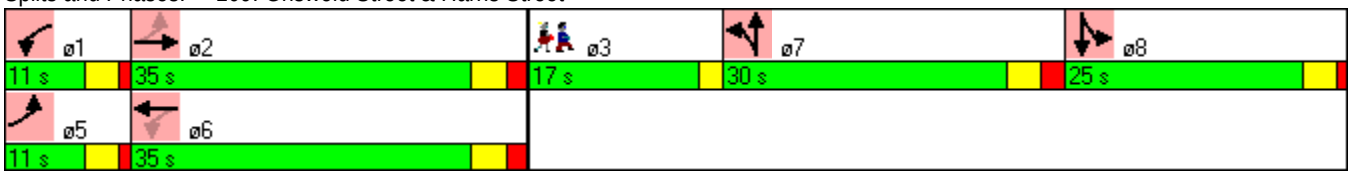
Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	15.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	14%
Maximum Green (s)	15.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	E		C	D			D			D	
Approach Delay		62.6			34.9			48.1			47.9	
Approach LOS		E			C			D			D	
Queue Length 50th (ft)	14	333		40	281			206			40	
Queue Length 95th (ft)	46	#749		#138	#639			#484			97	
Internal Link Dist (ft)		416			319			668			605	
Turn Bay Length (ft)	200			100								
Base Capacity (vph)	275	611		219	723			481			391	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.17	0.99		0.58	0.75			0.81			0.19	

Intersection Summary

Area Type: Other
Cycle Length: 118
Actuated Cycle Length: 91
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 48.4 Intersection LOS: D
Intersection Capacity Utilization 75.7% 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.

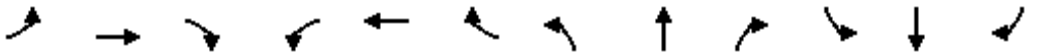
Splits and Phases: 109: Griswold Street & Harris Street



Lane Group	ø3
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Appendix E
Capacity Analysis Reports: 2030 Build



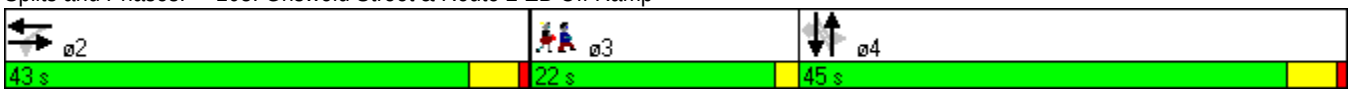
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	762	8	20	360	0	0	0	62	190	29	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		50	0		175
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999						0.865				0.850
Flt Protected					0.997						0.958	
Satd. Flow (prot)	0	1861	0	0	1857	0	0	1611	0	0	1785	1583
Flt Permitted					0.926						0.708	
Satd. Flow (perm)	0	1861	0	0	1725	0	0	1611	0	0	1319	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1						405				222
Link Speed (mph)		30			30			30			50	
Link Distance (ft)		761			350			729			389	
Travel Time (s)		17.3			8.0			16.6			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	828	9	22	391	0	0	0	67	207	32	222
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	837	0	0	413	0	0	67	0	0	239	222
Turn Type				Perm			Perm			Perm		Perm
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		4
Detector Phase		2		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)		20.0		20.0	20.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)		25.0		25.0	25.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	0.0	43.0	0.0	43.0	43.0	0.0	45.0	45.0	0.0	45.0	45.0	45.0
Total Split (%)	0.0%	39.1%	0.0%	39.1%	39.1%	0.0%	40.9%	40.9%	0.0%	40.9%	40.9%	40.9%
Maximum Green (s)		38.0		38.0	38.0		40.0	40.0		40.0	40.0	40.0
Yellow Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)		1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Lead/Lag							Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode		C-Min		C-Min	C-Min		None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		70.0			70.0			25.6			25.6	25.6
Actuated g/C Ratio		0.64			0.64			0.23			0.23	0.23
v/c Ratio		0.71			0.38			0.10			0.78	0.41
Control Delay		14.9			14.5			0.3			55.8	6.2
Queue Delay		0.0			0.0			0.0			0.0	0.0
Total Delay		14.9			14.5			0.3			55.8	6.2
LOS		B			B			A			E	A

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	22.0
Total Split (s)	22.0
Total Split (%)	20%
Maximum Green (s)	20.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		14.9			14.5			0.3			31.9	
Approach LOS		B			B			A			C	
Queue Length 50th (ft)		88			65			0			159	0
Queue Length 95th (ft)		#922			m321			0			223	53
Internal Link Dist (ft)		681			270			649			309	
Turn Bay Length (ft)												175
Base Capacity (vph)		1184			1097			844			480	717
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			0.38			0.08			0.50	0.31

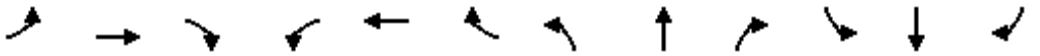
Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 17 (15%), Referenced to phase 2:EBWB, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 67.6%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 108: Griswold Street & Route 2 EB Off Ramp



Lane Group	ø3
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



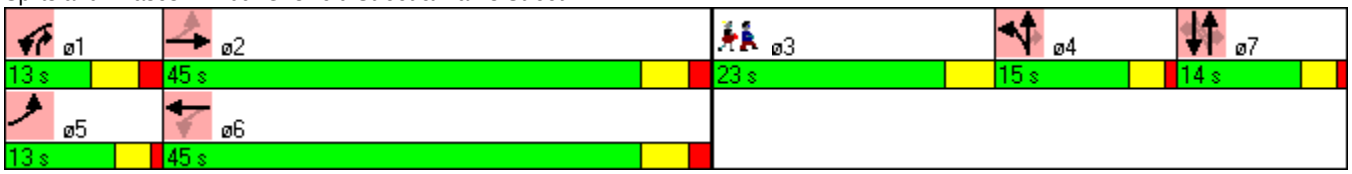
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	795	96	115	583	6	164	41	223	4	23	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	9	10	12	10	10	12	12	11	11	12	11	11
Storage Length (ft)	200		100	100		0	0		0	0		50
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.998				0.850			0.850
Flt Protected	0.950			0.950				0.962			0.993	
Satd. Flow (prot)	1593	1714	0	1685	1735	0	0	1767	1561	0	1819	1531
Flt Permitted	0.280			0.067				0.750			0.932	
Satd. Flow (perm)	469	1714	0	119	1735	0	0	1378	1561	0	1707	1531
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			20			30	
Link Distance (ft)		467			428			127			687	
Travel Time (s)		10.6			9.7			4.3			15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	72	864	104	125	634	7	178	45	242	4	25	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	968	0	125	641	0	0	223	242	0	29	59
Turn Type	pm+pt			pm+pt			D.P+P		pm+ov	Perm		Perm
Protected Phases	5	2		1	6		4	4 7	1		7	
Permitted Phases	2			6			7		4 7	7		7
Detector Phase	5	2		1	6		4	4	1	7	7	7
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0		7.0	7.0	7.0	7.0
Minimum Split (s)	12.0	21.0		13.0	21.0		11.0		13.0	11.0	11.0	11.0
Total Split (s)	13.0	45.0	0.0	13.0	45.0	0.0	15.0	29.0	13.0	14.0	14.0	14.0
Total Split (%)	11.8%	40.9%	0.0%	11.8%	40.9%	0.0%	13.6%	26.4%	11.8%	12.7%	12.7%	12.7%
Maximum Green (s)	9.0	39.0		7.0	39.0		11.0		7.0	10.0	10.0	10.0
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0		4.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0		2.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	4.0	4.0	6.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag		Lead			
Lead-Lag Optimize?							Yes					
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0		3.0	3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None		None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	70.2	60.7		70.0	64.4			18.5	32.7		8.9	8.9
Actuated g/C Ratio	0.64	0.55		0.64	0.59			0.17	0.30		0.08	0.08
v/c Ratio	0.19	1.02		0.71	0.63			0.82	0.52		0.21	0.48
Control Delay	6.9	55.7		42.7	23.2			64.9	35.8		50.4	60.9
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	19.0
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	21%
Maximum Green (s)	19.0
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	12.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	6.9	55.7		42.7	23.2			64.9	35.8		50.4	60.9
LOS	A	E		D	C			E	D		D	E
Approach Delay		52.3			26.4			49.7			57.5	
Approach LOS		D			C			D			E	
Queue Length 50th (ft)	12	638		33	280			141	136		19	40
Queue Length 95th (ft)	m23	#1207		#164	#712			#244	212		49	83
Internal Link Dist (ft)		387			348			47			607	
Turn Bay Length (ft)	200			100								50
Base Capacity (vph)	398	945		175	1015			271	464		155	139
Starvation Cap Reductn	0	0		0	0			0	0		0	0
Spillback Cap Reductn	0	0		0	0			0	0		0	0
Storage Cap Reductn	0	0		0	0			0	0		0	0
Reduced v/c Ratio	0.18	1.02		0.71	0.63			0.82	0.52		0.19	0.42

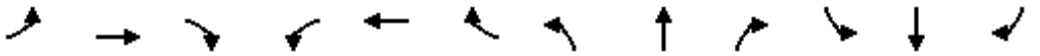
Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 26 (24%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 43.6		Intersection LOS: D	
Intersection Capacity Utilization 85.3%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 109: Griswold Street & Harris Street



Lane Group	ø3
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	657	3	22	426	0	48	0	8	135	13	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		50	0		175
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999						0.980				0.850
Flt Protected					0.998			0.959			0.956	
Satd. Flow (prot)	0	1861	0	0	1859	0	0	1751	0	0	1781	1583
Flt Permitted					0.954			0.562			0.739	
Satd. Flow (perm)	0	1861	0	0	1777	0	0	1026	0	0	1377	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)								8				184
Link Speed (mph)		30			30			30			50	
Link Distance (ft)		761			350			729			389	
Travel Time (s)		17.3			8.0			16.6			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	714	3	24	463	0	52	0	9	147	14	184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	717	0	0	487	0	0	61	0	0	161	184
Turn Type				Perm			Perm			Perm		Perm
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		4
Detector Phase		2		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)		20.0		20.0	20.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)		25.0		25.0	25.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	0.0	53.0	0.0	53.0	53.0	0.0	25.0	25.0	0.0	25.0	25.0	25.0
Total Split (%)	0.0%	53.0%	0.0%	53.0%	53.0%	0.0%	25.0%	25.0%	0.0%	25.0%	25.0%	25.0%
Maximum Green (s)		48.0		48.0	48.0		20.0	20.0		20.0	20.0	20.0
Yellow Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)		1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Lead/Lag							Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode		C-Min		C-Min	C-Min		None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		73.4			73.4			16.6			16.6	16.6
Actuated g/C Ratio		0.73			0.73			0.17			0.17	0.17
v/c Ratio		0.52			0.37			0.34			0.71	0.44
Control Delay		5.5			5.1			37.3			56.0	8.9
Queue Delay		0.0			0.0			0.0			0.0	0.0
Total Delay		5.5			5.1			37.3			56.0	8.9
LOS		A			A			D			E	A

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	22.0
Total Split (s)	22.0
Total Split (%)	22%
Maximum Green (s)	20.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

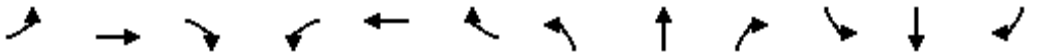
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		5.5			5.1			37.3			30.9	
Approach LOS		A			A			D			C	
Queue Length 50th (ft)		220			97			30			97	0
Queue Length 95th (ft)		57			126			67			162	56
Internal Link Dist (ft)		681			270			649			309	
Turn Bay Length (ft)												175
Base Capacity (vph)		1367			1305			212			275	464
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		0.52			0.37			0.29			0.59	0.40

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 55 (55%), Referenced to phase 2:EBWB, Start of Yellow			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 58.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 108: Griswold Street & Route 2 EB Off Ramp

Lane Group	ø3
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



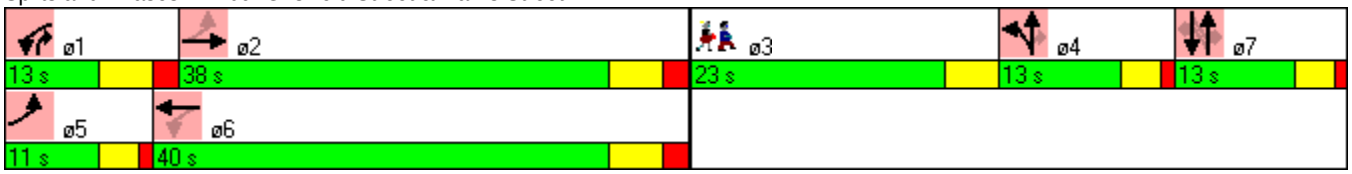
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	473	81	118	494	2	145	18	197	2	13	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	9	10	12	10	10	12	12	11	11	12	11	11
Storage Length (ft)	200		0	100		0	0		0	0		50
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.999				0.850			0.850
Flt Protected	0.950			0.950				0.958			0.994	
Satd. Flow (prot)	1593	1705	0	1685	1737	0	0	1760	1561	0	1821	1531
Flt Permitted	0.372			0.230				0.739			0.953	
Satd. Flow (perm)	624	1705	0	408	1737	0	0	1357	1561	0	1746	1531
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			20			30	
Link Distance (ft)		467			428			127			687	
Travel Time (s)		10.6			9.7			4.3			15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	46	514	88	128	537	2	158	20	214	2	14	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	602	0	128	539	0	0	178	214	0	16	58
Turn Type	pm+pt			pm+pt			D.P+P		pm+ov	Perm		Perm
Protected Phases	5	2		1	6		4	4 7	1		7	
Permitted Phases	2			6			7		4 7	7		7
Detector Phase	5	2		1	6		4	4 7	1	7	7	7
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0		7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	21.0		13.0	21.0		11.0		13.0	11.0	11.0	11.0
Total Split (s)	11.0	38.0	0.0	13.0	40.0	0.0	13.0	26.0	13.0	13.0	13.0	13.0
Total Split (%)	11.0%	38.0%	0.0%	13.0%	40.0%	0.0%	13.0%	26.0%	13.0%	13.0%	13.0%	13.0%
Maximum Green (s)	7.0	32.0		7.0	34.0		9.0		7.0	9.0	9.0	9.0
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0		4.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0		2.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	4.0	4.0	6.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag		Lead			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes		Yes			
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0		3.0	3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None		None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	60.1	51.1		61.7	57.5			17.3	32.3		8.3	8.3
Actuated g/C Ratio	0.60	0.51		0.62	0.58			0.17	0.32		0.08	0.08
v/c Ratio	0.10	0.69		0.38	0.54			0.65	0.42		0.11	0.46
Control Delay	11.0	23.4		12.9	19.9			47.4	29.5		43.8	55.3
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	19.0
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	23%
Maximum Green (s)	19.0
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	12.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	11.0	23.4		12.9	19.9			47.4	29.5		43.8	55.3
LOS	B	C		B	B			D	C		D	E
Approach Delay		22.5			18.6			37.6			52.8	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	5	148		25	201			99	105		10	36
Queue Length 95th (ft)	m36	#643		84	#528			166	172		30	77
Internal Link Dist (ft)		387			348			47			607	
Turn Bay Length (ft)	200			100								50
Base Capacity (vph)	443	871		341	998			281	504		157	138
Starvation Cap Reductn	0	0		0	0			0	0		0	0
Spillback Cap Reductn	0	0		0	0			0	0		0	0
Storage Cap Reductn	0	0		0	0			0	0		0	0
Reduced v/c Ratio	0.10	0.69		0.38	0.54			0.63	0.42		0.10	0.42

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 12 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 25.6		Intersection LOS: C	
Intersection Capacity Utilization 65.3%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 109: Griswold Street & Harris Street



Lane Group	ø3
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

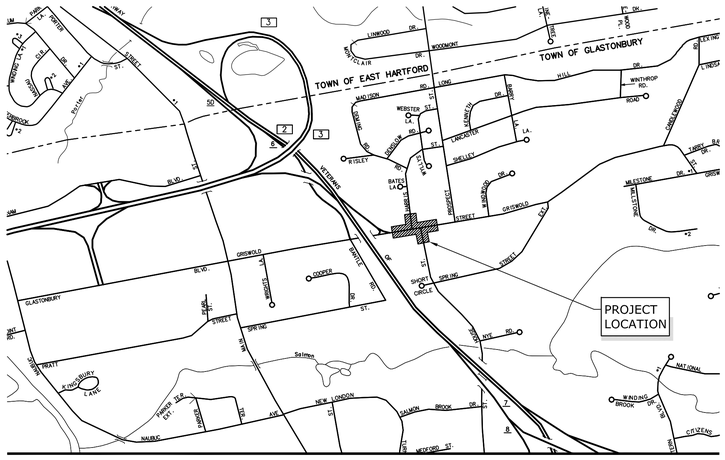
Intersection Summary

TOWN OF GLASTONBURY, CONNECTICUT

GRISWOLD STREET AND HOUSE STREET / HARRIS STREET INTERSECTION IMPROVEMENTS (PRELIMINARY DESIGN)

SEPTEMBER 19, 2011

LIST OF DRAWINGS	
SHEET NO.	TITLE
	COVER SHEET
TS-01	TYPICAL SECTIONS
RW-01	INTERSECTION IMPROVEMENT PLAN
SG-01	TRAFFIC CONTROL SIGNAL PLAN



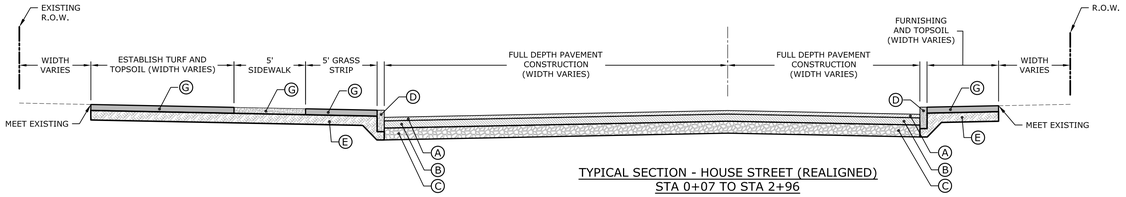
LOCATION MAP
SCALE: 1"=1000'

PREPARED BY:

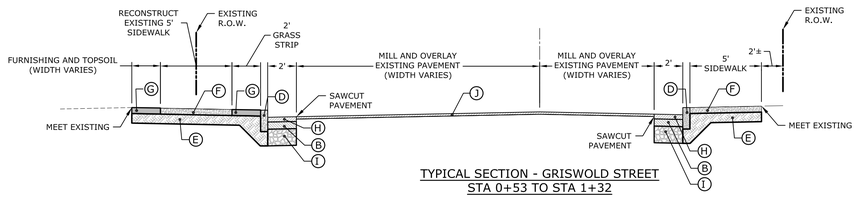
Tighe&Bond
www.tighebond.com
1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

PREPARED FOR:

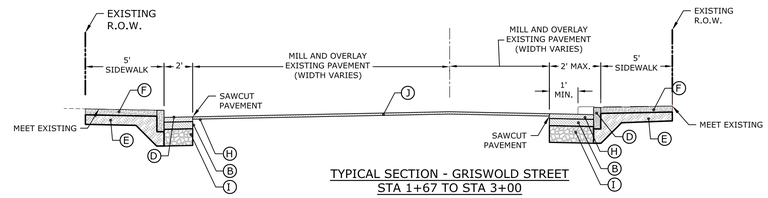
TOWN OF GLASTONBURY
DEPARTMENT OF PHYSICAL SERVICES
GLASTONBURY, CONNECTICUT



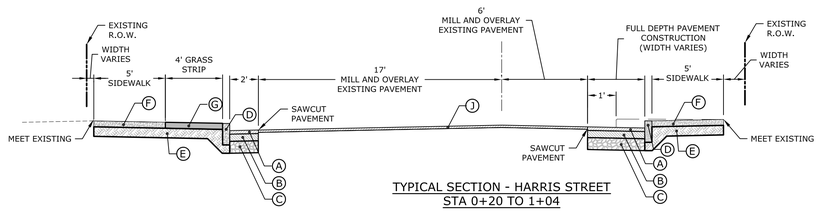
TYPICAL SECTION - HOUSE STREET (REALIGNED)
STA 0+07 TO STA 2+96



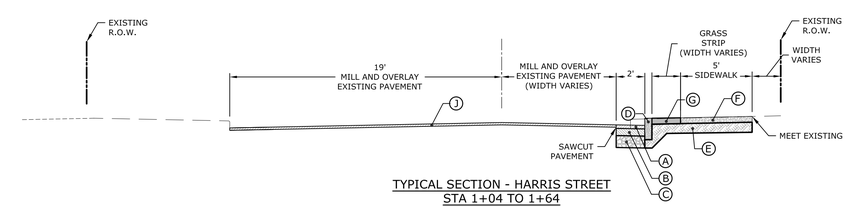
TYPICAL SECTION - GRISWOLD STREET
STA 0+53 TO STA 1+32



TYPICAL SECTION - GRISWOLD STREET
STA 1+67 TO STA 3+00



TYPICAL SECTION - HARRIS STREET
STA 0+20 TO 1+04



TYPICAL SECTION - HARRIS STREET
STA 1+04 TO 1+64

TYPICAL SECTION LEGEND

- (A) 3" SUPERPAVE (HMA S0.5) (TYP.) - 2 LIFTS
- (B) 6" SUPERPAVE (HMA S1.0) (TYP.) - 2 LIFTS
- (C) 10" PROCESSED AGGREGATE BASE (TYP.)
- (D) CONCRETE CURB
- (E) COMPACTED 8" GRANULAR FILL - 2 LIFTS
- (F) CONCRETE SIDEWALK
- (G) 4" TOPSOIL & SEED
- (H) 4" SUPERPAVE (HMA S0.5) (TYP.) - 2 LIFTS
- (I) 14" PROCESSED AGGREGATE BASE (TYP.)
- (J) 2" SUPERPAVE (HMA S0.5) - MILL AND OVERLAY

Tighe&Bond
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1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

PRELIMINARY DESIGN

Griswold Street at House Street/Harris Street Intersection Improvements

Town of Glastonbury

Glastonbury, CT

September 19, 2011

MARK	DATE	DESCRIPTION

PROJECT NO:	G-0509
FILE:	
DRAWN BY:	ECW
CHECKED:	COG
APPROVED:	JCB

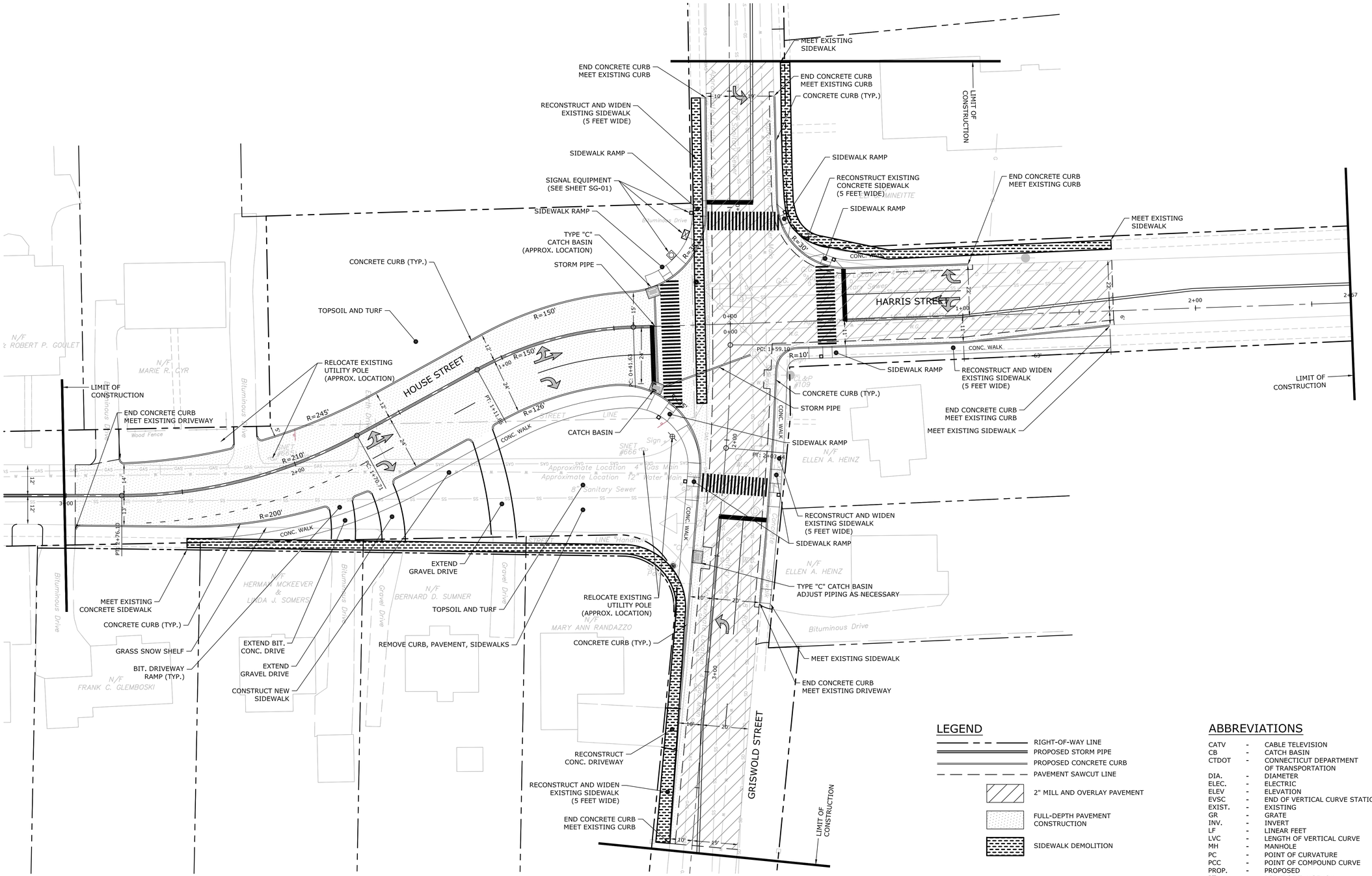
TYPICAL SECTIONS

SCALE: 1" = 5'

TS-01

09/16/2011

Sep 16, 2011-12:05pm Plotted By: adm
Tighe & Bond, Inc. J:\G\G0509-Glastonbury Signals\Drawings\11_HOUSE-HARRIS_PRE DESIGN\Sheets\TS-G0509-01.dwg



LEGEND

- RIGHT-OF-WAY LINE
- PROPOSED STORM PIPE
- PROPOSED CONCRETE CURB
- PAVEMENT SAWCUT LINE
- 2" MILL AND OVERLAY PAVEMENT
- FULL-DEPTH PAVEMENT CONSTRUCTION
- SIDEWALK DEMOLITION

ABBREVIATIONS

CATV	-	CABLE TELEVISION
CB	-	CATCH BASIN
CTDOT	-	CONNECTICUT DEPARTMENT OF TRANSPORTATION
DIA.	-	DIAMETER
ELEC.	-	ELECTRIC
ELEV	-	ELEVATION
EVSC	-	END OF VERTICAL CURVE STATION
EXIST.	-	EXISTING
GR	-	GRATE
INV.	-	INVERT
LF	-	LINEAR FEET
LVC	-	LENGTH OF VERTICAL CURVE
MH	-	MANHOLE
PC	-	POINT OF CURVATURE
PCC	-	POINT OF COMPOUND CURVE
PROP.	-	PROPOSED
PT	-	POINT OF TANGENCY
PVC	-	POLYVINYL CHLORIDE PIPE
PVI	-	POINT OF VERTICAL INFLECTION
RCP	-	REINFORCED CONCRETE PIPE
RF	-	ROOF LEADER
SAN	-	SANITARY
STA	-	STATION
STD.	-	STANDARD
TEL	-	TELEPHONE
TD	-	TRENCH DRAIN

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N

PRELIMINARY DESIGN

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

Griswold Street at House Street/Harris Street Intersection Improvements

Town of Glastonbury

Glastonbury, CT

September 19, 2011

MARK	DATE	DESCRIPTION

PROJECT NO:	G-0509
FILE:	RW-G0509-02.dwg
DRAWN BY:	ECW
CHECKED:	COG
APPROVED:	JCB

INTERSECTION IMPROVEMENT PLAN

SCALE: 1" = 20'

RW-01

Sep 16, 2011-12:09pm Plotted By: adm
Tighe & Bond, Inc. J:\G\G0509-Glastonbury Signals\Drawings\11_HOUSE+HARRIS_PRE DESIGN\Sheets\RW-G0509-02.dwg

09/16/2011

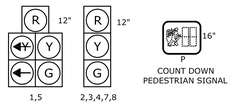
MOVEMENT DIAGRAM

		NTOR	PHASE 1			PHASE 2			PHASE 3			PHASE 4			PHASE 5			PHASE 6			PHASE 7			PHASE 8		
		FLASH	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL
FACE #	1		←	←Y	←R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R			
	2		R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
	3		R	R	R	R	R	R	R	R	R	←G	←Y	G	G	R	R	R	R	R	R	R	R			
	4		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R			
	5		R	R	R	G	Y	R	R	R	R	R	R	R	←	←Y	←R	R	R	R	R	R	R			
	6		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R			
	8		R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R			
	PED		←	DW	→	←	DW	→	WØ	FDW	DW	←	DW	→	←	DW	→	←	DW	→	←	DW	→			
						← YIELD PT.												← YIELD PT.								
	MIN.																									
	MAX.																									
INTERVALS	MIN GRN		7			15						7			7			15			7					
	WALK								7	AUDIBLE PEDESTRIAN SIGNAL																
	PED CLR								12																	
	VEH EXT																									
	MAX 1																									
	MAX 2																									
	YELLOW			4			4			4			3			4			4			3				
	RED				2			2		0.1				1			2			2			1			
	ADD INIT									COUNTDOWN PEDESTRIAN SIGNAL																
	MAX INIT																									
	TBR																									
	TTR																									
	MIN GAP																									
MODE			NON-LOCK			MIN. RECALL			NON-LOCK			NON-LOCK			NON-LOCK			MIN. RECALL			NON-LOCK			OFF		
INT START						THIS PHASE												THIS PHASE								

ENERGY BY	TOWN	ADDRESS #
MAINT LEVEL	TBD	SERVICE POLE TBD
UNMETERED SERVICE		

INTERSECTION #

SIGNAL FACES



COUNT DOWN PEDESTRIAN SIGNAL

ALL INDICATIONS SHALL BE LED TYPE

PRE-EMPTION SETTINGS

	PRE-EMPT 1
PRIORITY	NO
DET. LOCK	YES
DELAY	0
ALT. MIN. GREEN	5
ALT. YELLOW	PARENT
ALT. RED	PARENT
ALT. PED. CLR.	0
HOLD GREEN	15
HOLD YELLOW	3
HOLD RED	1
HOLD PHASE	8
EXIT PHASE	2
EXIT CALL	NONE

TOWN SIGNAL

OFFICE RECORD

STC # SM #

SIGNAL IN OPERATION

TRAFFIC CONTROL SIGNAL

TOWN OF GLASTONBURY
GRISWOLD STREET AT
HOUSE STREET / HARRIS STREET

REV #	TRAFFIC		ELECTRICAL	
		DATE		DATE
ENGINEER	TIGHE & BOND SHELTON, CONNECTICUT		SEPT 19, 2011	
DRAWN BY				
CHECKED BY				
SUBMITTED BY				
APPROVED BY				
DATE				

DETECTORS

IDENT	SIZE (WXL)	TURNS	MODE

PROGRAM

FUNCTION	TIME	DAYS

COORDINATION TYPE

CYCLE	OFFSET SEC	OFFSET %	PHASE SPLITS SEC / % Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8

PERMIS PERIOD Ø	SEC

SYSTEM LOC MASTER: XXX-XXX

TECHNICAL NOTES

STANDARD OVERLAP SKIP FEATURES APPLY

PHASE 4 MUST BE FOLLOWED BY PHASE 7.

LEGEND:

R	RED	←R	RED ARROW
Y	YELLOW	←Y	YELLOW ARROW
G	GREEN	←	GREEN ARROW
FL.	FLASHING	WØ	WALK/ PED. CLR
		D.W.	DON'T WALK

DIVISION OF TRAFFIC ENGINEERING CADD

CONSTRUCTION NOTES

ALL MATERIAL AND CONSTRUCTION METHODS SHALL CONFORM TO THE FOLLOWING CURRENT D.O.T. DOCUMENTS WHICH CAN BE ACCESSED ON THE D.O.T. WEBSITE

- *STANDARD SPECIFICATION FOR ROADS, BRIDGES AND INCIDENTAL CONSTRUCTION (FORM 816)
- *SUPPLEMENTAL SPECIFICATIONS TO FORM 816
- *SPECIAL PROVISIONS TO FORM 816. MAY BE MODIFIED AS NEEDED FOR THIS PROJECT.
- *TYPICAL INSTALLATION DRAWINGS.

ALL TRAFFIC SIGNAL EQUIPMENT IS NEW.

STAKE ALL R.O.W. PRIOR TO EXCAVATION.

ANY PROPOSED REVISIONS TO THE LOCATION OF THE APPURTENANCES SHOWN ON THE PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE DIVISION OF TRAFFIC ENGINEERING PRIOR TO INSTALLATION.

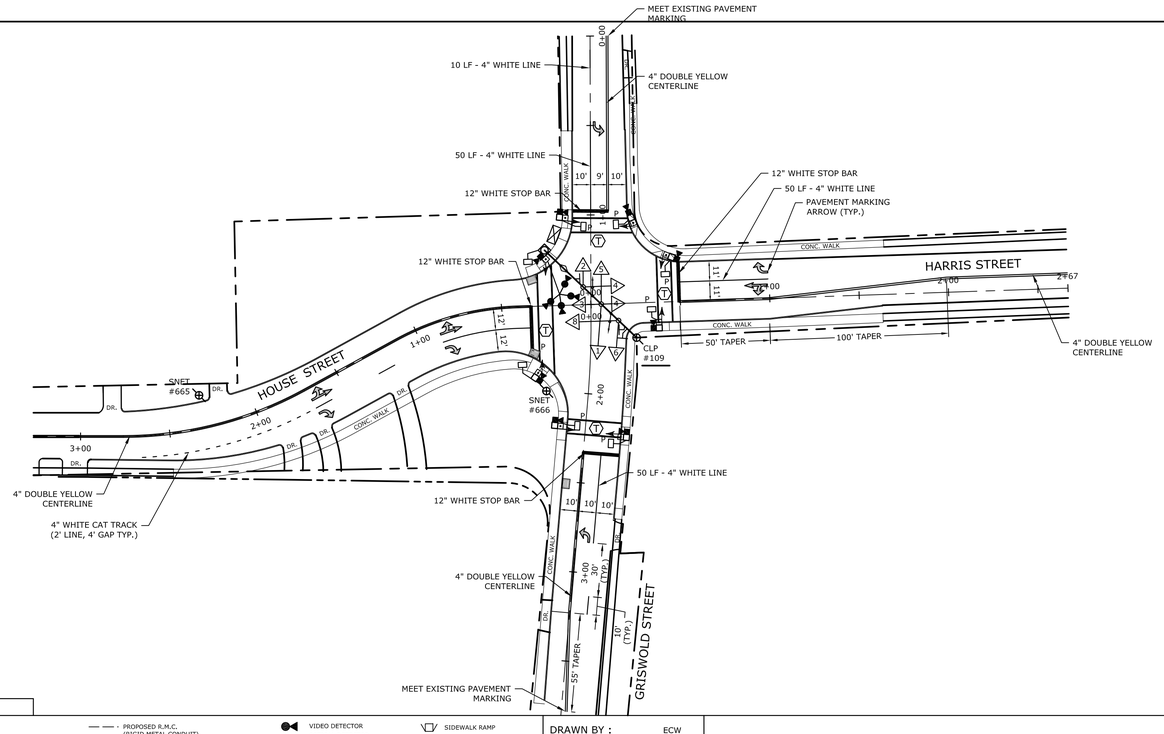
THE LOCATION OF TRAFFIC SIGNAL APPURTENANCES (MAST ARMS, SPAN POLES, PEDESTALS, AND HAND HOLES) WHEN IN OR ADJACENT TO SIDEWALKS SHALL BE VERIFIED PRIOR TO INSTALLATION TO PROVIDE A FREE PATH OF NOT LESS THAN 3 FEET. IF A MINIMUM 3 FOOT FREE PATH IS UNAVAILABLE THE CONTRACTOR MUST CONTACT THE DIVISION OF TRAFFIC ENGINEERING.

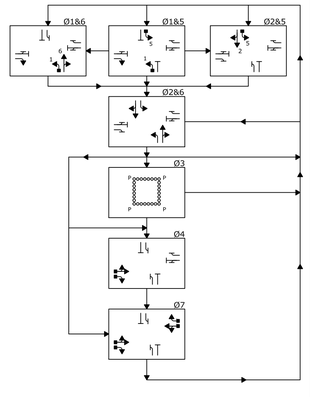
INSTALL CONTROLLER AND SPAN POLE FOUNDATIONS ADJACENT TO AND WITHIN R.O.W.

CABINET DOOR TO OPEN FIELD SIDE.

ALL 30" X 30" HANDHOLE. ALL OTHERS TYPE II.

INSTALL HANDHOLES APPROX. 1' BEHIND CURB OR IF NO CURB, 2' BEHIND EDGE OF ROAD UNLESS OTHERWISE SPECIFIED.





NOTES:

TOWN TO MAINTAIN ALL PAVEMENT MARKINGS AND SIGNING.

(T) BAR TYPE CROSSWALK. (16"X16"X8' MIN.) TOWN MAINTAINED.

TOWN SIGNAL

SCALE 1" = 40'

SG-G0509-01.dwg

- PROPOSED WOOD SPAN POLE
- EXISTING WOOD SPAN POLE
- PROPOSED STEEL SPAN POLE
- EXISTING STEEL SPAN POLE
- PROPOSED UTILITY POLE
- EXISTING UTILITY POLE
- PEDESTRIAN SIGNAL FACE
- DIRECTIONAL ARW. FOR PUSH BUTTON
- PROPOSED CONTROLLER TRAFFIC
- SIGNAL FACE
- PEDESTRIAN PUSH BUTTON & SIGN
- PEDESTAL MOUNTING
- PROPOSED R.M.C. (RIGID METAL CONDUIT)
- EXISTING R.M.C. (RIGID METAL CONDUIT)
- DET. LEADS IN SAW CUT
- AUXILIARY TERMINATION CABINET
- AUXILIARY EQUIPMENT CABINET
- VIDEO DETECTOR
- OPTICAL DETECTOR
- SYSTEM DETECTOR
- EXISTING CONTROLLER
- PROPOSED HANDHOLE
- EXISTING HANDHOLE
- SIDEWALK RAMP
- SONIC DETECTOR
- GUY WIRE LOOP
- DETECTOR MAGNETIC
- DETECTOR CABLE
- CLOSURE

DRAWN BY :	ECW
DESIGNED BY :	ECW
DATE PLOTTED :	Sep 16, 2011

TOWN OF GLASTONBURY
GRISWOLD STREET AT
HOUSE STREET / HARRIS STREET

REV #	INTERSECTION #

NO.	DATE	INIT.	DESCRIPTION

REVISIONS

PRELIMINARY DESIGN

Tighe&Bond
www.tighebond.com
1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

TOWN:	PROJECT NO.
GLASTONBURY	G0509
	DRAWING NO. SG-G0509-01.dwg
DRAWING TITLE: TRAFFIC CONTROL SIGNAL PLAN	SHEET NO. SG-01