

TRAFFIC IMPACT AND ACCESS STUDY

**PROPOSED RESIDENTIAL DEVELOPMENT
STONEHAM, MASSACHUSETTS**



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PREPARED FOR:

**WEISS FARM APARTMENTS, LLC
C/O PETER MAHONEY
100 GRANDVIEW ROAD, SUITE 207
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JUNE 2014



***Traffic Impact and Access Study
Proposed Residential Development
Stoneham, Massachusetts
June 2014***

TECHNICAL MEMORANDUM

REF: MAX-2013051

DATE: June 20, 2014

TO: Weiss Farm Apartments, LLC
c/o Mr. Peter Mahoney
100 Grandview Road, Suite 207
Braintree, Massachusetts 02184

FROM: Ms. Heather L. Monticup, P.E., Project Manager
Ms. Susannah E. Barnes, E.I.T., Engineer

RE: Traffic Impact and Access Study
Proposed Residential Development
Stoneham, Massachusetts

EXECUTIVE SUMMARY

Greenman-Pedersen, Inc. (GPI) has prepared this *Traffic Impact and Access Study* (TIAS) for a proposed residential development to be located at 170 Franklin Street in Stoneham, Massachusetts. The subject site is currently a business which sells and distributes landscape products. The proposed redevelopment consists of razing the existing 2 barns on the site, retaining the residential home and 1 story wood frame barn behind the residential home, and constructing 264 dwelling units with a $\pm 1,000$ square foot leasing office. Access is proposed to be provided via one full access/egress driveway on Franklin Street. This TIAS evaluates the traffic impacts and access/egress requirements for the proposed residential development.



Existing Conditions

Baseline conditions within the study area were developed by conducting traffic counts in September 2013; comparing the traffic-count data to average-month condition traffic volumes; researching collision history; inventorying roadways, intersections, and traffic controls; and assessing the availability of public transportation. The study area consists of ten intersections, four unsignalized and six signalized. Base traffic conditions within the study area were developed by conducting automatic traffic recorder (ATR) counts along Franklin Street in the vicinity of the site for a 48-hour period to obtain weekday daily data and collecting manual turning movement counts (TMCs) and vehicle classification counts during the weekday AM peak period (6:00 to 9:00 AM) and the weekday PM peak period (4:00 to 6:00 PM) at the study area locations. In addition, pedestrian and bicycle counts were conducted in April 2014 during the peak hours of each study area intersection.

Future Conditions

Future conditions were derived by projecting baseline volumes to the year 2018, representing a five-year design horizon to be consistent with the state guidelines at the time that the traffic study had begun. The future No-Build peak-hour traffic volumes were developed by applying a 1.0 percent compounded annual growth rate to the existing volumes and by adding traffic associated with the assisted living facility that is currently in construction on Franklin Street.

The proposed development project consists of razing the existing two barns on the site, retaining the residential home and 1 story wood frame barn behind the residential home, and constructing 264 dwelling units with a $\pm 1,000$ square foot leasing office. Access is proposed to be provided via one full access/egress driveway on Franklin Street. The proposed project is expected to generate 1,774 vehicle trips on a weekday. During the critical peak hours, the proposed redevelopment project is expected to generate 138 vehicles trips (29 entering and 109 exiting) during the weekday AM peak hour and 190 vehicle trips (118 entering and 72 exiting) during the weekday PM peak hour.

Analysis

Capacity and queue analyses were conducted at all study area locations under 2013 Existing, 2018 No-Build, and 2018 Build traffic-volume conditions. The impact of site-generated traffic can be measured by comparing 2018 No-Build conditions to 2018 Build conditions. The turning movements into and out of the site driveway shown in the No-Build condition include the existing site trips. Turning movements into and out of the site driveway shown in the Build condition represent the traffic to be generated by the proposed development project, which was

forecast using the trip generation information provided in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*¹.

The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM)² and is described in the Appendix. The concept of level of service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.

Franklin Street at Perkins Street

Under existing and future traffic-volume conditions the Franklin Street movements at the unsignalized intersection of Franklin Street at Perkins Street are expected to operate at optimal levels (LOS A). The minor street movements (Perkins Street) currently operate with long delays (LOS F) and have capacity constraints (volume-to-capacity ratio $[v/c] > 1.00$). The project is expected to increase traffic on this approach by 2.7% or less and increase vehicle queue lengths by 2 vehicles or less during the peak hours.

Franklin Street at Franklin Place (Stoneham High School Access Road)

Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Franklin Place is expected to operate at an overall LOS D or better during the weekday AM peak hour and LOS C or better during the weekday PM peak hour. It should be noted that the analysis results are based on an average over the entire peak hour, and the actual conditions may be better or worst at smaller intervals of time within this hour. The proposed project is expected to impact this location during the weekday PM peak hour. Accordingly, improvement measures are recommended at this location during the weekday PM peak period.

Franklin Street at Dunkin' Donuts Driveway and Residential Complex

Under existing and future traffic-volume conditions the Franklin Street movements at the unsignalized intersection of Franklin Street at the Dunkin' Donuts and residential complex driveways are expected to operate at optimal levels (LOS A). This is true during times when traffic flow along Franklin Street is unrestrained, not necessarily when the Traffic Director is present at Stevens Street and at the High School. The Dunkin' Donuts and residential complex driveways currently operate at LOS F and will continue to operate at LOS F with the addition of the residential development. Queue lengths during the PM peak hour are anticipated to increase by less than one vehicle as a result of the project.

¹*Trip Generation Manual*, 9th Edition; Institute of Transportation Engineers; Washington, DC; 2012.

² *HCM 2010: Highway Capacity Manual*. Washington, D.C.: Transport Research Board, 2010.

Franklin Street at Pleasant Street

Under existing and future traffic-volume conditions, the Franklin Street through movements at the unsignalized intersection of Franklin Street at Pleasant Street are expected to operate at optimal levels (LOS A) with the Franklin Street left-turn movements expected to operate at LOS C or better. The minor street movements (Pleasant Street) at this intersection currently operate with long delays (LOS F) and have capacity constraints ($v/c > 1.00$). The project is expected to increase traffic on this approach by 5.9% or less and increase vehicle queue lengths by 4 vehicles or less during the peak hours.

Franklin Street at Summer Street

Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Summer Street is expected to operate at an overall LOS C or better. The proposed project is expected to impact certain turning movements at this location during the peak hours studied. Accordingly, improvement measures are recommended at this location.

Franklin Street at Pine Street

Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Pine Street is expected to operate with an overall LOS C during the weekday AM peak period and an overall LOS B during the weekday PM peak period. All movements are expected to operate at LOS C or better and LOS is anticipated to remain the same with the addition of the residential development. Increases in queue lengths as a result of the project are expected to be less than 3 vehicles.

Franklin Street at Main Street and Central Street

The signalized intersection of Franklin Street at Main Street and Central Street is expected to drop from an overall LOS C (Existing) to LOS D (No-Build) with the addition of historical traffic growth and background developments and drop from LOS D (No-Build) to LOS E (Build) with the proposed residential development in place during the weekday AM peak hour. Under existing and future traffic-volume conditions the intersection is expected to operate with an overall LOS B during the weekday PM peak hour. As the proposed project is expected to impact this location during the weekday AM peak hour, improvement measures are recommended at this location during the weekday AM peak period.

Main Street at Summer Street and Marble Street

Under existing and future traffic-volume conditions the signalized intersection of Main Street at Summer Street and Marble Street is expected to operate at an overall LOS D or better. During the weekday AM peak hour, the overall LOS drops from LOS C (No-Build) to LOS D (Build) with

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the proposed residential development in place. However, no movements drop a level of service during the weekday AM peak hour. During the weekday PM peak hour, the Main Street southbound approach is expected to drop from LOS B to LOS C as a result of the project, however, this is due to a 0.2 second increase in delay on this movement. Increases in delay for the rest of the intersection are expected to be less than 3 seconds overall and 8.4 seconds or less on any movement. In addition, increases in queue length on any movement are expected to be less than 2 vehicles.

Summer Street at Pond Street

Under existing and future traffic-volume conditions the signalized intersection of Summer Street at Pond Street is expected to drop from an overall LOS B (No-Build) to LOS C (Build) during the weekday AM peak hour and operate an overall LOS B during the weekday PM peak hour. This drop in LOS during the weekday AM peak hour is due to an increase in delay of less than 1 second to the overall intersection. All movements are anticipated to operate at the same LOS with the addition of the residential development. Increases in delay of less than 2 seconds are expected on any movement and increases in queue length on any movement are expected to be less than 1 vehicle.

Franklin Street at Site Driveway

Under future traffic-volume conditions the Franklin Street movements at the site driveway are expected to operate at optimal levels (LOS A). This is true during times when traffic flow along Franklin Street is unrestrained, not necessarily when the Traffic Directors are present at Stevens Street and at the High School. The site driveway southbound left-turn movement is expected to operate at with long delays (LOS F) during the weekday AM and weekday PM peak hours while the right-turn movement is expected to operate at LOS C. The queue length on the site driveway is expected to be approximately 1 vehicle for the left-turn lane and less than 2 vehicles for the right-turn lane. During the peak period prior to the start of school a longer queue could be expected, however, there is ample room on-site to queue the vehicles (up to 75 feet [3 vehicles] in each lane with an additional 50 feet [2 vehicles] prior to blocking the first internal intersection) and delays would be recognized on-site and not along Franklin Street. Improvement measures are recommended at this location.

Improvements

The final phase of the transportation analysis process is to identify improvement measures necessary to minimize the impact of the project and also improve existing operating conditions on the transportation system. Improvements considered necessary to address existing and future roadway system deficiencies are discussed below as they relate to impacts as a result of background growth and to project-generated impacts.

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Due to the impacts that the proposed residential development would have at the intersection of Franklin Street at Franklin Place during the weekday commuter PM peak hour, after the school dismissal peak, improvement measures have been investigated. With the improved signal timings, the intersection is anticipated to operate at an overall LOS C during the weekday PM peak hour with all lane groups operating at LOS D or better and all v/c ratios are expected to be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes.

Due to the impacts that the proposed residential development would have at the intersection of Franklin Street at Summer Street during the weekday AM and weekday PM peak hours, improvement measures have been investigated. With the improved signal timings, the intersection is anticipated to operate at an overall LOS C with all lane groups operating at LOS D or better and all v/c ratios are expected to be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes.

Due to the impacts that the proposed residential development would have at the intersection of Franklin Street at Main Street and Central Street during the weekday AM peak hour, improvement measures have been investigated. With the improved signal timings, the intersection is anticipated to operate at an overall LOS D during the weekday AM peak hour with all lane groups operating at LOS E or better.

INTRODUCTION

GPI has prepared this TIAS for a proposed residential development to be located at 170 Franklin Street in Stoneham, Massachusetts. The subject site is currently a business which sells and distributes landscape products. Based on our understanding of the project, the development consists of razing the existing 2 barns on the site, retaining the residential home and 1 story wood frame barn behind the residential home, and constructing 264 dwelling units with a $\pm 1,000$ square foot leasing office. Access is proposed to be provided via one full access/egress driveway on Franklin Street.

Franklin Street is under local jurisdiction and, therefore, review and approval of the project is expected only through the Town of Stoneham. The site location in relation to the surrounding roadways is shown on the map on Figure 1. This TIAS evaluates the traffic impacts and access/egress requirements for the proposed residential development.

EXISTING CONDITIONS

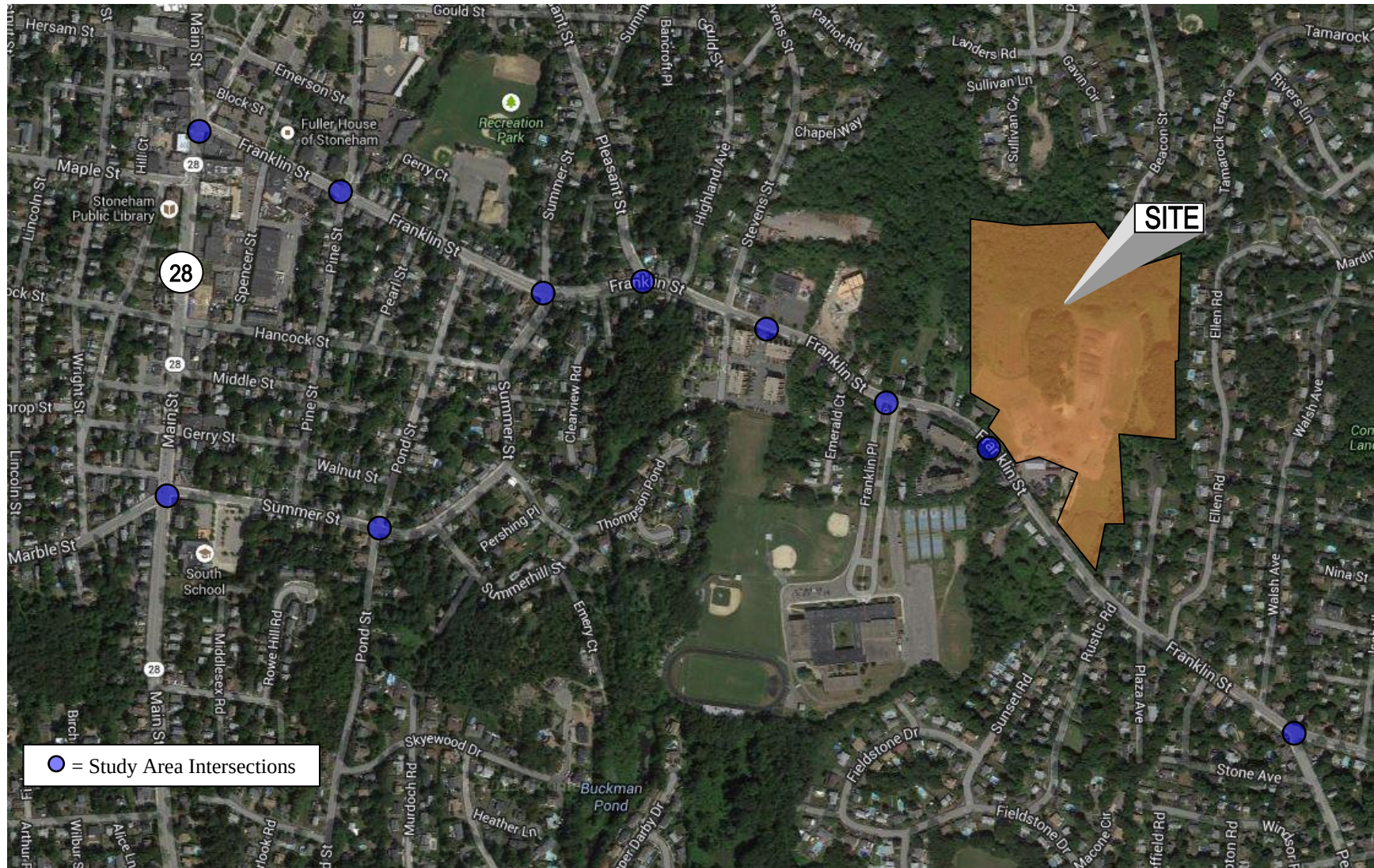
Study Area

Evaluation of the traffic impacts associated with the proposed project requires an evaluation of existing and projected traffic volumes on the adjacent streets, the volume of traffic expected to be generated by the project, and the impact that this traffic will have on the adjacent streets and nearby intersections. In preparing the TIAS for the proposed site, the following intersections have been analyzed and evaluated:

- Franklin Street at Perkins Street (unsignalized)
- Franklin Street at Weiss Farm Driveway - 170 Franklin Street (unsignalized)
- Franklin Street at Franklin Place (Stoneham High School Access Road) (signalized)
- Franklin Street at Dunkin' Donuts Driveway and Residential Complex (unsignalized)
- Franklin Street at Pleasant Street (unsignalized)
- Franklin Street at Summer Street (signalized)
- Franklin Street at Pine Street (signalized)
- Franklin Street at Main Street (Route 28) and Central Street (signalized)
- Main Street (Route 28) at Summer Street and Marble Street (signalized)
- Summer Street at Pond Street (signalized)

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Franklin Street

Within the vicinity of the site, Franklin Street is aligned in an east/west direction. Franklin Street generally provides one through lane and a shoulder in each direction with turn lanes at major intersections. Adjacent to the site, the eastbound lane is 12-feet wide with a ± 3 -foot wide shoulder and the westbound lane is 15-feet wide with a ± 6.5 -foot wide shoulder. Franklin Street has a posted speed limit that fluctuates between 30 and 35 miles per hour (mph) in the eastbound and westbound directions within the study area. Adjacent to the site, the posted speed limit is 30 mph, but changes to 35 mph in the eastbound direction just east of the site. Land uses along Franklin Street consist of residential and institutional uses.

Traffic Volumes

Base traffic conditions within the study area were developed by conducting manual-turning movement counts (TMCs), vehicle classification counts, and automatic traffic recorder (ATR) counts in September 2013. The TMCs and vehicle classification counts were performed during the weekday AM peak period (6:00 to 9:00 AM) and the weekday PM peak period (4:00 to 6:00 PM). Traffic counts at the existing Weiss Farm driveway were collected during the same peak periods on April 10, 2014. In addition, pedestrian and bicycle counts were conducted on April 10, 2014 during the peak hours of each study area intersection, including the dismissal period (2:15 to 3:15 PM) at the Stoneham High School. The ATRs were used to obtain weekday daily traffic volumes along Franklin Street between Franklin Place and Rustic Road. All traffic-count data are provided in the Appendix.

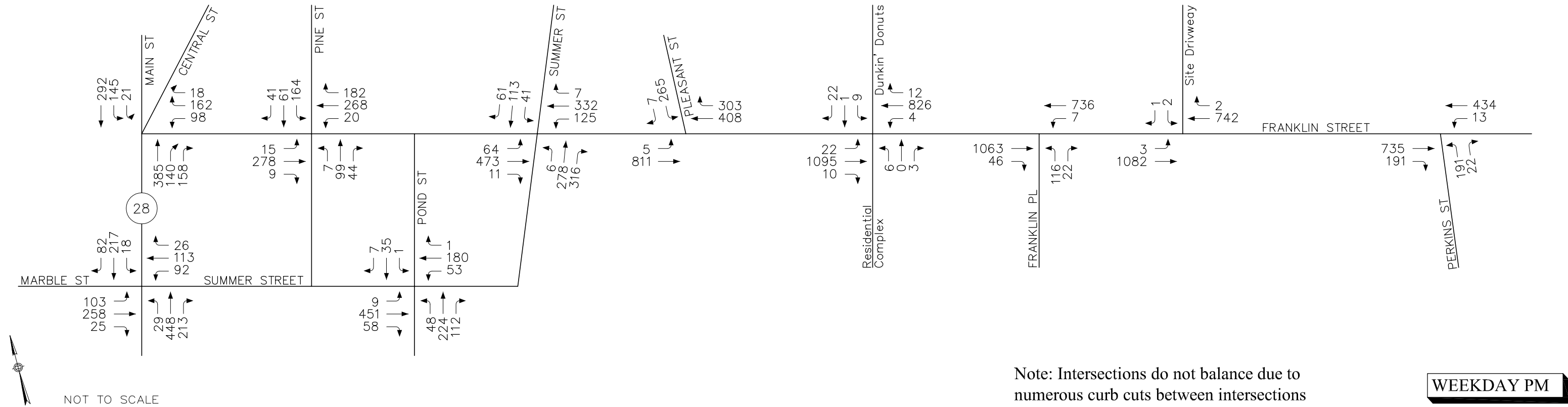
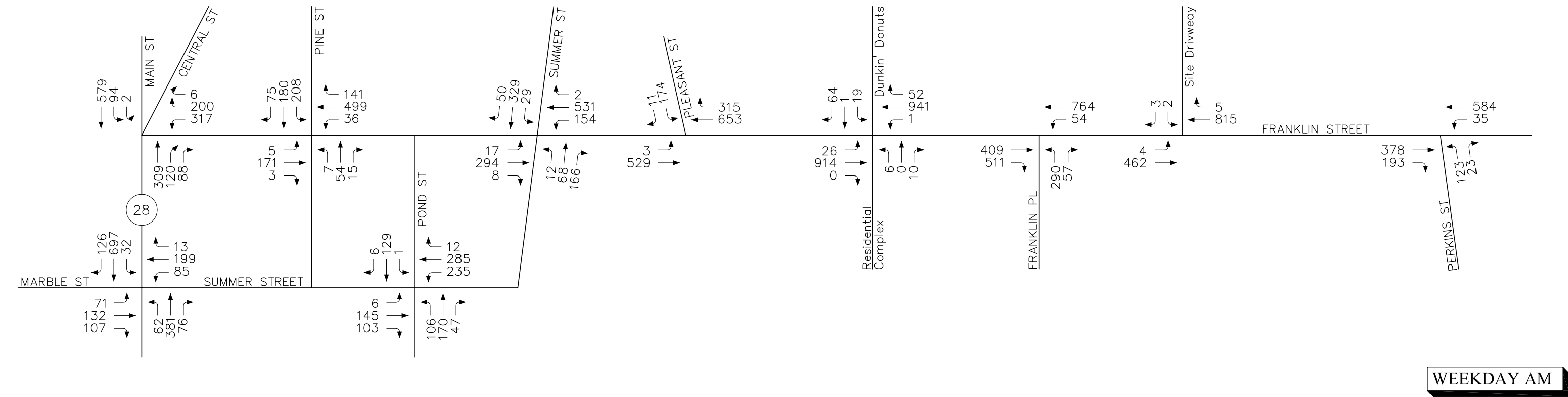
Traffic on a given roadway typically fluctuates throughout the year depending on the area and the type of roadway. To determine if the September traffic-volume data needed to be adjusted to account for this fluctuation, historical traffic-volume data were reviewed from MassDOT records.³ This information revealed that September traffic volumes are 1.6 percent above average-month conditions. Therefore, to provide a conservative analytical framework (higher than average), the collected data were used as counted to reflect an above average-month analysis condition. As only the turns into and out of the Weiss Farm driveway are used in the TIAS, no seasonal adjustment for the April counts was needed. The MassDOT seasonal adjustment data are provided in the Appendix.

Table 1 summarizes the existing daily and peak-hour traffic volumes on Franklin Street between Franklin Place and Rustic Road. The 2013 Existing traffic-flow networks for the weekday AM and weekday PM peak hours are shown graphically on Figure 2.

³MassDOT 2009 Traffic Volumes; Permanent Count Station 407 – Route 28 south of the Reading Town Line (Stoneham).

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NOT TO SCALE

Note: Intersections do not balance due to numerous curb cuts between intersections

Figure 2
2013 Existing
Peak Hour Traffic Volumes

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Table 1
EXISTING TRAFFIC-VOLUME SUMMARY

Location/Time Period	Daily Volume (vpd) ^a	Peak Hour Volume (vph) ^b	K Factor (%) ^c	Directional Distribution ^d
Franklin Street adjacent to site:				
Weekday Daily	17,540			
Weekday AM Peak Hour		1,284	7.3%	64% WB
Weekday PM Peak Hour		1,828	10.4%	59% EB

^a In vehicles per day.

^b In vehicles per hour.

^c Percentage of daily traffic occurring during the peak hour.

^d WB = westbound; EB = eastbound.

Collisions

Collision data for the study area intersections were obtained from the Stoneham Police Department (2011-2013) and MassDOT (2009-2011) for the latest three years available. Summaries of the Stoneham Police Department and MassDOT crash data at the study area intersections are provided in Tables 2 and 3, respectively.

In addition to the collision summary, crash occurrence also should be compared to the volume of traffic through a particular intersection to determine any significance. Accordingly, the crash rates were calculated for each study area intersection and compared with the statewide and district-wide averages. An intersection crash rate is a measure of the frequency of collisions compared to the volume of traffic through an intersection and is presented in crashes per million entering vehicles (c/mev). For signalized intersections, the statewide average is 0.80 c/mev and the district-wide average (District 4) is 0.77 c/mev. For unsignalized intersections, the statewide average is 0.60 c/mev and the district-wide average is 0.58 c/mev. A comparison of the calculated crash rate to these averages can be used to establish the significance of collision occurrence and whether or not potential safety problems exist. It should be noted that the Stoneham Police Department summary table displays a number of police reports and a number of incident reports. Incidents are considered under \$1,000 of damage and are not technically what is reviewed for crash rates, and are therefore not included in the crash rate calculations. The number of incidents has been provided in the table merely for informational purposes. All crash rate worksheets are provided in the Appendix.

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Table 2
COLLISION SUMMARY – Stoneham Police Department Data

Location	Number of Collisions					Severity ^a				Collision Type ^b						Percent During	
	Police Report	Incident Report	Total	Average per Year	Crash Rate ^c	PD	PI	F	U	CM	RE	HO	FO	Ped	U	Commuter Peak ^d	Wet/Icy Conditions ^e
Franklin St. at Perkins St.	4	3	7	1.33	0.24	2	1	--	1	3	1	--	--	--	--	50%	75%
Franklin St. at Weiss Farm Dwy	1	0	1	0.33	0.05	--	1	--	--	--	1	--	--	--	--	0%	100%
Franklin St. at Franklin Pl.	2	3	5	0.67	0.10	2	--	--	--	--	2	--	--	--	--	50%	0%
Franklin St. at Dunkin Donuts Dwy	5	7	12	1.67	0.24	3	2	--	--	1	4	--	--	--	--	60%	40%
Franklin St. at Pleasant St.	0	0	0	0.00	0.00	--	--	--	--	--	--	--	--	--	--	0%	0%
Franklin St. at Summer St.	4	3	7	1.33	0.21	4	--	--	--	3	1	--	--	--	--	50%	0%
Franklin St. at Pine St.	6	2	8	2.00	0.48	5	1	--	--	5	1	--	--	--	--	33%	17%
Franklin St. at Main St./Central St.	4	9	13	1.33	0.23	3	1	--	--	2	1	--	--	1	--	0%	50%
Main St at Summer St./Marble St.	2	5	7	0.67	0.10	1	1	--	--	--	2	--	--	--	--	0%	0%
Summer St. at Pond St.	2	1	3	0.67	0.14	1	1	--	--	1	1	--	--	--	--	50%	0%

Source: Stoneham Police Department Records (2011-2013).

^a PD = property damage only; PI = personal injury; F = fatality.

^b CM = cross movement/angle; RE = rear end; HO = head on; FO = fixed object; Ped = pedestrian; U = unknown.

^c Measured in crashes per million entering vehicles.

^d Percent of vehicle incidents that occurred during the weekday AM and weekday PM commuter peak periods.

^e Represents the percentage of only “known” collisions occurring during inclement weather conditions.

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Table 3
COLLISION SUMMARY – MassDOT Data

Location	Number of Collisions			Severity ^a				Collision Type ^b						Percent During	
	Total	Average per Year	Crash Rate ^c	PD	PI	F	U	CM	RE	HO	FO	Ped	U	Commuter Peak ^d	Wet/Icy Conditions ^e
Franklin Street at Perkins Street	4	1.33	0.24	2	2	--	--	3	1	--	--	--	--	50%	50%
Franklin Street at Weiss Farm Driveway	1	0.33	0.05	--	1	--	--	--	--	--	--	--	1	0%	100%
Franklin Street at Franklin Place	0	0.00	0.00	--	--	--	--	--	--	--	--	--	--	0%	0%
Franklin Street at Dunkin Donuts Driveway	4	1.33	0.19	4	--	--	--	--	3	--	--	--	1	25%	25%
Franklin Street at Pleasant Street	3	1.00	0.16	3	--	--	--	--	1	--	--	--	2	33%	33%
Franklin Street at Summer Street	4	1.33	0.21	3	1	--	--	2	--	--	1	--	1	25%	50%
Franklin Street at Pine Street	6	2.00	0.48	3	1	--	2	3	3	--	--	--	--	33%	17%
Franklin Street at Main St and Central St	19	6.33	1.10	12	6	--	1	4	6	--	6	--	3	21%	42%
Main St at Summer St and Marble St	5	1.67	0.25	4	1	--	--	3	2	--	--	--	--	0%	20%
Summer Street at Pond Street	8	2.67	0.56	5	2	--	1	6	2	--	--	--	--	25%	63%

Source: MassDOT Records (2009-2011).

^a PD = property damage only; PI = personal injury; F = fatality.

^b CM = cross movement/angle; RE = rear end; HO = head on; FO = fixed object; Ped = pedestrian; U = unknown.

^c Measured in crashes per million entering vehicles.

^d Percent of vehicle incidents that occurred during the weekday AM and weekday PM commuter peak periods.

^e Represents the percentage of only “known” collisions occurring during inclement weather conditions.

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The unsignalized intersection of Franklin Street at Perkins Street experienced, on average, approximately 1.3 collisions per year over both three-year study periods. During the most recent three-year period (2011-2013), two of the four collisions resulted in property damage only, one resulted in personal injury, and one is unknown. Three of the crashes were cross movement/angle collisions and one was a rear-end collision. Fifty percent of the collisions occurred during the commuter peak, and 75 percent occurred during wet/icy conditions. Additionally, the crash rate for the intersection (0.24 c/mev) is well below the statewide and district-wide averages for unsignalized intersections, indicating a safety risk does not exist at the intersection.

The unsignalized intersection of Franklin Street at existing Weiss Farm driveway (170 Franklin Street) experienced, on average, approximately 0.3 collisions per year over both three-year study periods. The one collision was a rear-end collision in wet/icy conditions that resulted in personal injury. The crash rate for the intersection (0.05 c/mev) is well below the statewide and district-wide averages for unsignalized intersections, indicating a safety risk does not exist at the intersection.

The signalized intersection of Franklin Street at Franklin Place (Stoneham High School access road) experienced, on average, approximately 0.7 collisions per year during the most recent three-year period (2011-2013). Both collisions were rear-end collisions and resulted in property damage only. One of the crashes occurred during the commuter peak and none occurred during wet/icy conditions. The crash rate for the intersection (0.10 c/mev) is well below the statewide and district-wide averages for signalized intersections, indicating a safety risk does not exist at the intersection.

The unsignalized intersection of Franklin Street at Dunkin' Donuts driveway (128 Franklin Street) and residential complex experienced, on average, 1.7 collisions per year during the most recent three-year period (2011-2013). Three of the five collisions resulted in property damage only, and two resulted in personal injury. One of the crashes was a cross movement/angle collision and four were rear-end collisions. Three crashes occurred during the commuter peak and two crashes occurred in wet/icy conditions. The crash rate (0.24 c/mev) for the intersection is well below the statewide and district-wide averages for unsignalized intersections, indicating a safety risk does not exist at the intersection.

The unsignalized intersection of Franklin Street at Pleasant Street did not experience any collisions during the most recent three-year study period (2011-2013), but experienced on average, 1.0 collision per year over the MassDOT three-year study period (2009-2011). Of the three collisions, all resulted in property damage only and no injuries. One of the crashes was a rear-end collision and the other two were not reported. One crash occurred during the commuter peak and one crash occurred in wet/icy conditions. The crash rate for the intersection (0.16 c/mev) is well below the statewide and district-wide averages for unsignalized intersections, indicating a safety risk does not exist at the intersection.

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The signalized intersection of Franklin Street at Summer Street experienced, on average, 1.3 collisions per year over both three-year study periods. During the most recent three-year period (2011-2013), all four crashes resulted in property damage only and no injuries. Three collisions were cross movement/angle collisions and one was a rear-end collision. Two crashes occurred during the commuter peak and none occurred in wet/icy conditions. The crash rate (0.21 c/mev) for the intersection is well below the statewide and district-wide averages for signalized intersections, indicating a safety risk does not exist at the intersection.

The signalized intersection of Franklin Street at Pine Street experienced, on average, approximately 2.0 collisions per year over both three-year study periods. During the most recent three-year period (2011-2013), five crashes resulted in property damage only and one resulted in personal injury. Five of the six collisions were cross movement/angle collisions and one was a rear-end collision; both of which are typical at signalized intersections. Two crashes occurred during the commuter peak and one occurred during wet/icy conditions. The crash rate for the intersection (0.48 c/mev) is below the statewide and district-wide averages for signalized intersections, indicating a safety risk does not exist at the intersection.

The signalized intersection of Franklin Street at Main Street and Central Street experienced, on average, 6.3 collisions per year over the MassDOT three-year study period (2009-2011). Six of the 19 crashes were rear-end collisions, which are typical at signalized intersections that include permitted movements on this type of roadway with numerous developments. Six were single-vehicle collisions, involving fixed objects and are most likely due to parallel parking. The crash rate for the intersection (1.10 c/mev) is above the statewide and district-wide averages for signalized intersections, indicating a safety risk could exist at the intersection. The fixed-object collisions, mostly likely associated with parallel parking, involve vehicles colliding with objects such as curb, trees, and fences. Although, the crash rate is above statewide and district-wide averages, if the fixed-object collisions were removed from the equation, as parallel parking crashes do not occur “in” the intersection or occur with other vehicles traveling through the intersection, the crash rate reduces to 0.75 c/mev which is below the statewide and district-wide averages. The Stoneham Police Department reports include more detail regarding the crashes and provide a better source of data when locating the collisions. Based on these reports, over the most recent three-year study period (2011-2013), the signalized intersection experienced, on average, approximately 1.3 collisions per year. Three of the four crashes resulted in property damage only and one resulted in personal injury. Two collisions were cross movement/angle collisions, one was a rear-end collision, and one involved a pedestrian. None of the crashes occurred during the commuter peak and two of the crashes occurred during wet/icy conditions. The crash rate for the intersection (0.23 c/mev) based on the local data is well below the statewide and district-wide averages for signalized intersections, indicating a safety risk does not exist at the intersection.

The signalized intersection of Main Street at Summer Street and Marble Street experienced, on average, 0.7 collisions per year during the most recent three-year study period (2011-2013). Both of the crashes were rear-end collisions; one resulted in property damage only and the other resulted in personal injury. Neither collision occurred during the commuter peak, or in wet/icy

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conditions. The crash rate for the intersection (0.10 c/mev) is below the statewide and district-wide averages for signalized intersections, indicating a safety risk does not exist at the intersection.

The signalized intersection of Summer Street at Pond Street experienced, on average, 0.7 collisions per year during the most recent three-year study period (2011-2013). One crash resulted in property damage only and the other resulted in personal injury. One of the two crashes was a cross-movement/angle collision and the other was a rear-end collision; both of which are typical at signalized intersections. Of the two collisions, one occurred during the commuter peak and neither in wet/icy conditions. The crash rate for the intersection (0.14 c/mev) is below the statewide and district-wide averages for signalized intersections.

Vehicle Speeds

Vehicle speed measurements were conducted along Franklin Street between Franklin Place and Rustic Road by measuring the elapsed time for vehicles traveling a short, pre-measured distance between two checkpoints. The travel time was recorded using ATRs and the speed was derived by dividing the elapsed time into the measured distance between checkpoints. The primary use of this information is explained in the *Sight Distance* section where the speeds are correlated to sight distance measurements taken at the location of the site driveway to assure that adequate sight distances exist at the driveway to provide safe operation. The results of the speed measurements are summarized in Table 4.

Table 4
OBSERVED TRAVEL SPEEDS ^a

Location/Direction	Posted Speed Limit	Average Speed ^b	85 th Percentile Speed ^c
Franklin Street between Franklin Place and Rustic Road:			
West of Intersection (eastbound)	30	28	34
East of Intersection (westbound)	30	33	40

^a In miles per hour (mph).

^b Average speed of all observed vehicles.

^c Speed at, or below which 85 percent of all observed vehicles travel.

As shown in Table 4, the average speeds on Franklin Street adjacent to the site were found to be between 28 and 33 mph with 85th percentile speeds between 34 and 40 mph. The average speeds on Franklin Street are consistent with the posted speed limit of 30 mph. Adjacent to the site the

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posted speed limit is 30 mph; however, just east of the site the speed limit changes to 35 mph in the eastbound direction and changes from 35 mph in the westbound direction. The 85th percentile speed on Franklin Street is consistent with the speed limit in the eastbound direction and is considerably higher than the posted speed limit in the westbound direction. The ATR was placed almost exactly at the speed zone change, which would explain the higher speeds recorded in the westbound direction. Therefore, the speeds adjacent to the site might actually be lower than the westbound recorded speeds.

Public Transportation

Stoneham is a member of the Massachusetts Bay Transportation Authority (MBTA), which provides fixed route service to neighboring communities. Public transportation services exist in the vicinity of the project approximately 0.5 to 1.0 mile from the site, with no services that pass by the site. MBTA Bus Route 131 stops at the intersection of Franklin Street and Botolph Street which is 0.5 miles east of the site, MBTA Bus Route 132 stops at the intersection of Franklin and Main Street (Route 28) which is 0.8 miles west of the site, and the Haverhill Commuter Rail Line (Melrose Highlands Station) is located approximately one mile east of the site. MBTA Bus Route 131 provides a connection to the Oak Grove Orange Line Station via East Side Highlands Melrose & Oak Grove Malden Station via Main Street (Malden) from 6:00 AM through 7:34 PM. There is no Saturday or Sunday bus service for Route 131. MBTA Bus Route 132 provides a connection from the Malden Station to the Redstone Shopping Center from 5:30 AM through 7:23 PM. There is no Sunday bus service for Route 132. The public transportation schedules are provided in the Appendix. The MBTA also provides THE RIDE, a paratransit service for the elderly and disabled.

Traffic Observations

Traffic observations were made along the Franklin Street corridor and more specifically in the vicinity of the Stoneham High School (approximately 500 feet west of the proposed site driveway), Stevens Street (adjacent to the Dunkin Donuts at 128 Franklin Street), and at the proposed site driveway during the AM peak period. The queuing along Franklin Street and Franklin Place (Stoneham High School Access Road) during the morning drop-off period at the Stoneham High School is significant from 7:30 AM until 8:00 AM. During this time period, the westbound queue backs up past the location of the proposed site driveway, which will result in long delays for vehicles exiting the site. It is expected that those vehicles entering the site from the west during this peak period will stop in the eastbound travel lane and are expected to get a courtesy gap in traffic to allow them to make a safe left-turn movement into the site.

A Traffic Director was observed at the intersection of Franklin Street at Franklin Place (Stoneham High School Access Road) in order to facilitate pedestrians crossing Franklin Street to access the High School, as well as assist drivers attempting to exit onto Franklin Street from

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the High School. Also, a Traffic Director was observed at the intersection of Franklin Street at Stevens Street (adjacent to Dunkin Donuts) in order to assist drivers attempting to exit onto Franklin Street from Stevens Street. It appeared that, due to the volume of traffic in the westbound direction, when the Traffic Director at Stevens Street stops Franklin Street traffic a westbound queue along Franklin Street develops. Observations were made during the weekday AM peak period while school was in session and again during February school vacation week in order to compare school traffic to ordinary commuter traffic. It was noted that no queuing or delay issues took place during school vacation; therefore, the traffic congestion that occurs along the corridor during the peak half hour prior to the start of school is mainly associated to the High School traffic and not necessarily the ordinary commuter traffic.

In addition, traffic observations were made during the dismissal of Stoneham High School and the weekday PM peak period. It is important to note that school dismissal is at 2:26 PM and the weekday PM peak period occurs from 4:00 to 6:00 PM, with the weekday PM peak hour (commuter peak) in front of the high school occurring from 5:00 to 6:00 PM. The queuing along Franklin Place (Stoneham High School Access Road) during the afternoon pick-up period at the Stoneham High School is significant from 2:30 PM until 2:50 PM. During this time period, the Franklin Street approaches at this signalized intersection did not have significant queuing. The queue exiting the High School to turn left onto Franklin Street extended from the traffic signal to the entrance doors of the High School. It was observed that a vehicle at the end of the queue was able to get through the traffic signal in two cycles. Within five cycles, the majority of the pick-up traffic was cleared out and the queue became less than five vehicles from then on. By the fifth cycle, traffic on Franklin Street in the westbound direction became slow, but never inhibited vehicles from exiting the High School. By 2:50 PM, operations on Franklin Street were entirely back to free flow conditions.

A Traffic Director was observed during dismissal at the intersection of Franklin Street at Franklin Place (Stoneham High School Access Road) in order to facilitate pedestrians crossing Franklin Street to leave the High School, as well as assist drivers attempting to exit onto Franklin Street from the High School. More pedestrians were observed during the dismissal compared to the AM peak period, but the traffic director was able to make operations more efficient by crossing the students during the all red time and the start of the Franklin Street eastbound and westbound green time without negatively affecting flow on Franklin Street. When the pedestrian button was pressed, the traffic director was able to ‘jump start’ the traffic exiting the High School once the students crossed safely, rather than waiting for the pedestrian phase to complete.

Previous studies completed along Franklin Street were reviewed including: the Vanasse Hangen Brustlin, Inc. (VHB) memorandum for the Dunkin’ Donuts & Mac’s Landscaping at 128 Franklin Street dated June 16, 2003 and the Nitsch Engineering report to Tappe Associates on the proposal to relocate the Stoneham Middle School to the Stoneham High School campus at 149 Franklin Street dated April 11, 2011. As noted in the Nitsch Engineering report – *“The addition of the middle school traffic on Franklin Place will pose significant issues during the pick-up/drop-off period, as there are already queuing concerns at this location. Franklin Street*

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can accommodate the additional traffic, but there is a need for a greater storage turning into and out of Franklin Place.” GPI concurs with this statement. Field observations have verified that the traffic congestion along Franklin Place and along Franklin Street is associated with the High School. To increase vehicle trips of the same land use will just intensify the traffic issues and most likely spread the congestion throughout longer weekday AM and PM peak periods since the High School and Middle School start and end at different times. The proposed residential development is not anticipated to add traffic to the turning movements in or out of Franklin Place, but rather add traffic to the through movements along Franklin Street, adjacent to Franklin Place. In order to prevent queuing for the proposed residential site from disrupting flow on Franklin Street, an eastbound left-turn lane is proposed at the site driveway. This improvement is described in the *Recommended Improvements* section of the TIAS.

FUTURE CONDITIONS

To estimate the impact of site-generated traffic within the study area, existing traffic volumes were projected to the year 2018, representing a five-year design horizon in accordance with state guidelines. The proposed development is expected to be completed and fully operational within this time frame. Traffic volumes on the roadway network at that time will include existing traffic, new traffic due to normal traffic growth, and traffic related to any significant developments by others expected to be completed within the area by 2018. Consideration of these factors resulted in the development of 2018 No-Build traffic volumes, which assume that the proposed development is not built. The incremental impacts of the proposed project may then be determined by adding site-generated traffic volumes (Build conditions) and making comparisons to the No-Build conditions.

Traffic Growth

To develop the 2018 No-Build forecast volumes, two components of traffic growth were considered. First, an annual growth percentage was determined. Based on historic traffic-volume counts provided by MassDOT, traffic volumes in the area have been decreasing at a rate of approximately 1.32 percent per year.⁴ Therefore, to provide a conservative (worse than expected) analysis scenario, a 1.0 percent compounded annual growth was assumed for the project area. The MassDOT adjustment data are provided in the Appendix.

Second, any planned or approved specific developments in the area that would generate a significant volume of traffic on study area roadways within the next five years were included.

⁴MassDOT 2009 Traffic Volumes; Count Station 407 located on Route 28 south of the Reading Town Line (Stoneham).

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Based on discussions with Stoneham officials, there is one project in close proximity to the proposed site that has been approved but is not currently completely constructed and occupied. The project is an Assisted Living Facility development located at 140 Franklin Street with 88 units. Trip-generation rates provided in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*⁵ were used to estimate traffic volumes for the approved project and assigned to the roadway networks. All trip-generation data are provided in the Appendix.

Planned Roadway Improvements

Based on discussions with the Town Engineer of Stoneham, there are no roadway improvement projects planned to be constructed within the study area during the design horizon.

No-Build Conditions

The 2018 No-Build peak-hour traffic volumes were accordingly developed by applying a 1.0 percent compounded annual traffic growth rate (5.1 percent over five years) to the 2013 Existing traffic volumes and adding the traffic to be generated by the Assisted Living Facility. The 2018 No-Build traffic volumes are shown graphically on Figure 3 for the weekday AM and weekday PM peak hours.

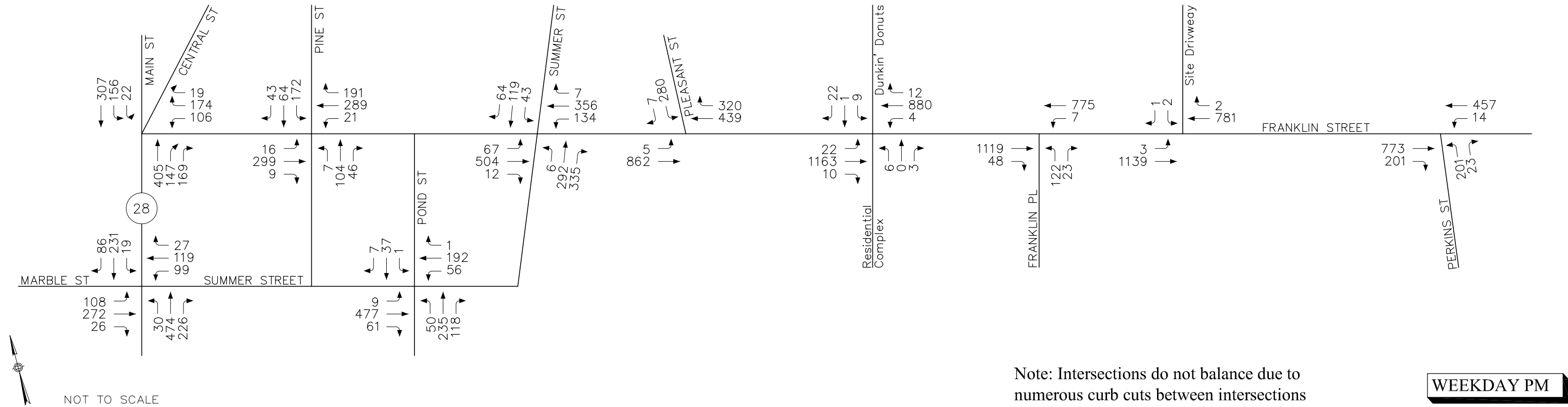
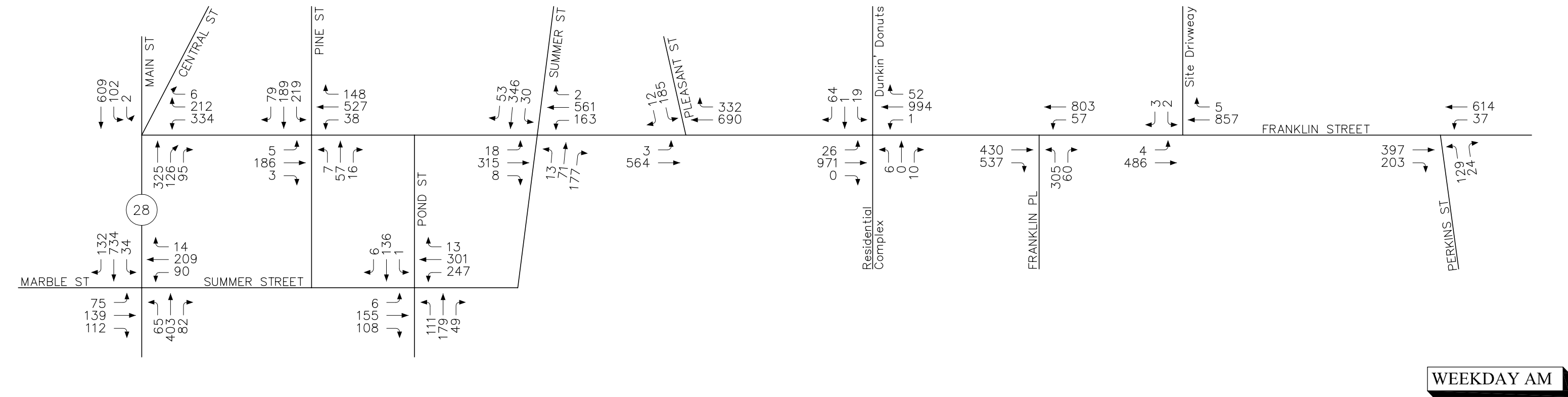
Trip Generation

As proposed, the development consists of razing the existing 2 barns on the site, retaining the residential home and 1 story wood frame barn behind the residential home, and constructing 264 dwelling units with a ±1,000 square foot leasing office which will be open from 10:00 AM to 6:00 PM. It is expected that the leasing office trips will likely occur after the peak hours, particularly after the school arrival and dismissal times, but have been accounted for in the peak hours. Turning movements at the existing site driveway were counted on Thursday, April 10, 2014 and resulted in 14 vehicle trips (9 entering and 5 exiting) during the weekday AM peak hour and 8 vehicle trips (5 entering and 3 exiting) during the weekday PM peak hour. These trips as counted were utilized in the existing and no-build traffic-volume conditions. The build traffic-volume condition, however, does not take credit for the existing trips into and out of the Weiss Farm driveway. This provides a conservative (worse-case) analysis as the existing Weiss Farm trips are included within the Franklin Street adjacent street traffic and were not removed from the roadway network. The residential and office uses have been added in addition to the trips that are already on the roadway. Traffic to be generated by the proposed development project was forecast using the trip-generation information provided in the Institute of Transportation

⁵ *Trip Generation Manual*, 9th Edition. Washington, DC: Institute of Transportation Engineers, 2012.

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NOT TO SCALE

Note: Intersections do not balance due to numerous curb cuts between intersections

Figure 3
2018 No-Build
Peak Hour Traffic Volumes

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Engineers (ITE) *Trip Generation Manual*⁶ for Land Use Code (LUC) 220 (Apartment), LUC 224 (Rental Townhouse), and LUC 826 (Specialty Retail). In order to provide the most conservative trip generation for the dwelling units, apartment, high-rise apartment, and rental townhouse land uses were compared and the most conservative combination was implemented. All trip-generation data are provided in the Appendix.

Table 5
TRIP-GENERATION SUMMARY

Time Period/Direction	Apartments ^a	Townhomes ^b	Rental Office ^c	Total Trips ^d
Weekday Daily	1,730	N/A	44	1,774
Weekday AM Peak Hour:				
<i>Enter</i>	25	4	0	29
<i>Exit</i>	<u>101</u>	<u>7</u>	<u>1</u>	<u>109</u>
<i>Total</i>	126	11	1	138
Weekday PM Peak Hour:				
<i>Enter</i>	101	6	11	118
<i>Exit</i>	<u>54</u>	<u>5</u>	<u>13</u>	<u>72</u>
<i>Total</i>	155	11	24	190

^a ITE LUC 220 (Apartment) for 250 dwelling units (Daily trips are based on 265 apartment units).

^b ITE LUC 224 (Rental Townhouse) for 15 dwelling units.

^c ITE LUC 826 (Specialty Retail Center) for 1,000 square feet.

^d Apartment Trips plus Rental Townhouse Trips plus Specialty Retail Trips.

N/A = Not Available

As shown in Table 5, the proposed development is expected to generate 138 vehicles trips (29 entering and 109 exiting) during the weekday AM peak hour and 190 vehicle trips (118 entering and 72 exiting) during the weekday PM peak hour. It should be noted that while the weekday AM commuter peak hour along Franklin Street coincides with the peak school arrival time period, the weekday PM commuter peak hour occurs 2 hours after the peak school dismissal time period.

⁶*Trip Generation Manual*, 9th Edition; Institute of Transportation Engineers; Washington, DC; 2012.

Trip Distribution

Having estimated project-generated vehicle trips, the next step is to determine the distribution of project traffic and assign these trips to the local roadway network. The distribution of proposed site traffic on the area roadways is based on United States Census Bureau Journey-to-Work information and expected travel routes to the site. Accordingly, approximately 90 percent of the *residential* site-generated traffic is expected to and from the west along Franklin Street and 10 percent is expected to and from the east along Franklin Street. Based on existing travel patterns and expected site access routes, approximately 70 percent of the *leasing office* site-generated traffic is expected to and from the west along Franklin Street and 30 percent is expected to and from the east along Franklin Street.

Of the 90 percent *residential* traffic to and from the west; 30 percent is expected to and from the north on Main Street, 40 percent is expected to and from the south on Main Street, 5 percent is expected to and from the west on Marble Street, and 15 percent is expected to and from the north on Pleasant Street. Of the 10 percent to and from the east; 5 percent is expected to and from further points east on Franklin Street and 5 percent is expected to and from the south on Perkins Street.

Of the 70 percent *leasing office* traffic to and from the west; 20 percent is expected to and from the north on Main Street, 25 percent is expected to and from the south on Main Street, 15 percent is expected to and from the west on Marble Street, and 10 percent is expected to and from the north on Pleasant Street. Of the 30 percent to and from the east; 20 percent is expected to and from further points east on Franklin Street and 10 percent is expected to and from the south on Perkins Street.

Site Access

Access is proposed to be provided via one full access/egress driveway on Franklin Street. Egress will consist of a left-turn lane and a right-turn lane. In order to accommodate left-turns into the site without disrupting the flow on Franklin Street, an exclusive eastbound left-turn lane providing 75 feet of queue storage is proposed. This improvement is described in the *Recommended Improvements* section of the TIAS. The on-site sidewalks are designed to tie into the Franklin Street sidewalk system. With the close proximity to Stoneham High School, the internal on-site sidewalks and the existing sidewalks are expected to be utilized and provide students with a safe path to and from the school.

During the construction of the project site, it is expected that construction vehicles will use the existing driveway to access and egress the site until the proposed driveway location can be properly graded for use. A Traffic Management Plan will be provided within the construction documents for the new driveway and the closure of the existing driveway on Franklin Street.

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Based on discussion with the Stoneham Town Engineer and Director of the Department of Public Works, Bob Grover, the street opening permit is the only permit required by Public Works to accomplish this work, and it will cover any work done in the public right of way.

Parking

As proposed, a total of 438 parking spaces are to be provided. This consists of 395 surface spaces (includes 10 handicap spaces), 7 standard garage spaces, 15 townhouse garage spaces, and 21 structured parking spaces (includes 1 handicap space).

The Town of Stoneham Zoning Bylaws contains a requirement of 2 spaces per dwelling unit for Single or two Family dwellings for the number of parking spaces to be provided by this type of land use. Based on the ITE *Parking Generation* report⁷, the 85th percentile parking rate for LUC 222 (High-Rise Apartments) is 1.52 spaces per dwelling unit and LUC 224 (Rental Townhouse) is 1.76 spaces per dwelling unit.

Based on the ITE data, the proposed site will require 406 parking spaces, exceeding the ITE 85th percentile *Parking Generation* rates. Therefore, the proposed 438 parking spaces are anticipated to be sufficient to accommodate the parking demand generated by the proposed residential development.

Sight Distance

Access to the site will be provided via one full access/egress driveway on the northern side of Franklin Street between Franklin Place and Rustic Road. To identify potential safety concerns associated with site access and egress, sight distances have been evaluated at the proposed site driveway location to determine if the available sight distances for vehicles exiting the site meet or exceed the minimum distances required for approaching vehicles to safely stop. The available sight distances were compared with minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO)⁸. AASHTO is the national standard by which vehicle sight distance is calculated, measured, and reported. The Massachusetts Executive Office of Transportation (EOT) and the Executive Office of Energy and Environmental Affairs (EEA) require the use of AASHTO sight distance standards when preparing traffic impact assessments and studies, as stated in their guidelines for traffic impact assessments.

⁷ *Parking Generation*, 4th Edition; Institute of Transportation Engineers; Washington, DC; 2010.

⁸ *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2004.

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Sight distance is the length of roadway ahead that is visible to the driver. Stopping Sight Distance (SSD) is the minimum distance required for a vehicle traveling at a certain speed to safely stop before reaching a stationary object in its path. The values are based on a driver perception and reaction time of 2.5 seconds and a braking distance calculated for wet, level pavements. When the roadway is either on an upgrade or downgrade, grade correction factors are applied. Stopping sight distance is measured from an eye height of 3.5 feet to an object height of 2 feet above street level, equivalent to the taillight height of a passenger car. The SSD is measured along the centerline of the traveled way of the major road.

Intersection sight distance (ISD) is provided on minor street approaches to allow the drivers of stopped vehicles a sufficient view of the major roadway to decide when to enter the major roadway. By definition, ISD is the minimum distance required for a motorist exiting a minor street to turn onto the major street, without being overtaken by an approaching vehicle reducing its speed from the design speed to 70 percent of the design speed. ISD is measured from an eye height of 3.5 feet to an object height of 3.5 feet above street level. The use of an object height equal to the driver eye height makes intersection sight distances reciprocal (i.e., if one driver can see another vehicle, then the driver of that vehicle can also see the first vehicle). When the minor street is on an upgrade that exceeds 3 percent, grade correction factors are applied.

SSD is generally more important as it represents the minimum distance required for safe stopping while ISD is based only upon acceptable speed reductions to the approaching traffic stream. However, the ISD must be equal to or greater than the minimum required SSD in order to provide safe operations at the intersection. In accordance with the AASHTO manual, *“If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”* Accordingly, ISD should be at least equal to the distance required to allow a driver approaching the minor road to safely stop.

The available SSD and ISD at the proposed full access/egress site driveway location was measured and compared to minimum requirements as established by AASHTO. Based on the posted and observed speeds on Franklin Street, the SSD and ISD requirements at this intersection were calculated. The required minimum sight distances for the driveway are compared to the available distances, as shown in Table 6.

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Table 6
SIGHT DISTANCE SUMMARY

Location/Direction	Stopping Sight Distance (feet)		Intersection Sight Distance (feet)		
	Measured	Minimum Required ^a	Measured	Minimum Required ^b	Desirable ^c
Franklin Street at Site Driveway:					
West of intersection (EB)	380	240	400	240	335
East of intersection (WB)	360	305	320	305	335

^a Values based on AASHTO requirements for 85th percentile speeds of 34 mph for Franklin Street eastbound travel (west of intersection) and 40 mph for Franklin Street westbound travel (east of intersection).

^b Values based on AASHTO requirements for SSD.

^c Values based on AASHTO requirements for posted speed limit of 30 mph on Franklin Street.

West of the intersection (eastbound travel), a horizontal curve is present. Because the driveway is located on the northern side of Franklin Street, the horizontal curve allows increased visibility between Franklin Street and the site driveway west of the intersection. East of the intersection (westbound), a vertical curve and slight s-curve is present. However, a stopped vehicle exiting the site driveway is able to see a vehicle at a distance of 320 feet on the major roadway. During sight distance measurements, there were significant snow piles present along Franklin Street; without the snow piles, the line of sight would be even greater than the measurements provided in Table 6.

As indicated in Table 6, available sight distances at the proposed site driveway exceed the minimum SSD and ISD requirements for safe operation in both directions. The desirable ISD is also met west of the intersection (eastbound travel direction). Although the desirable ISD is not available east of the site driveway, the measured ISD is adequate for speeds up to 38 mph, which is well above the posted speed limit of 30 mph. It is recommended that any proposed landscaping in the vicinity of the driveways and roadway intersections be located sufficiently back from Franklin Street or kept low to the ground so as not to impede the available sight distances.

Build Traffic Volumes

Based on the traffic generation and distribution estimates for this project, the traffic volumes associated with the proposed residential development were assigned to the roadway network. The site-generated traffic networks are shown on Figure 4 for the weekday AM and weekday PM peak hours. The site-generated traffic volumes were then combined with the 2018 No-Build traffic volumes to develop the 2018 Build peak-hour traffic-volume networks. The turning

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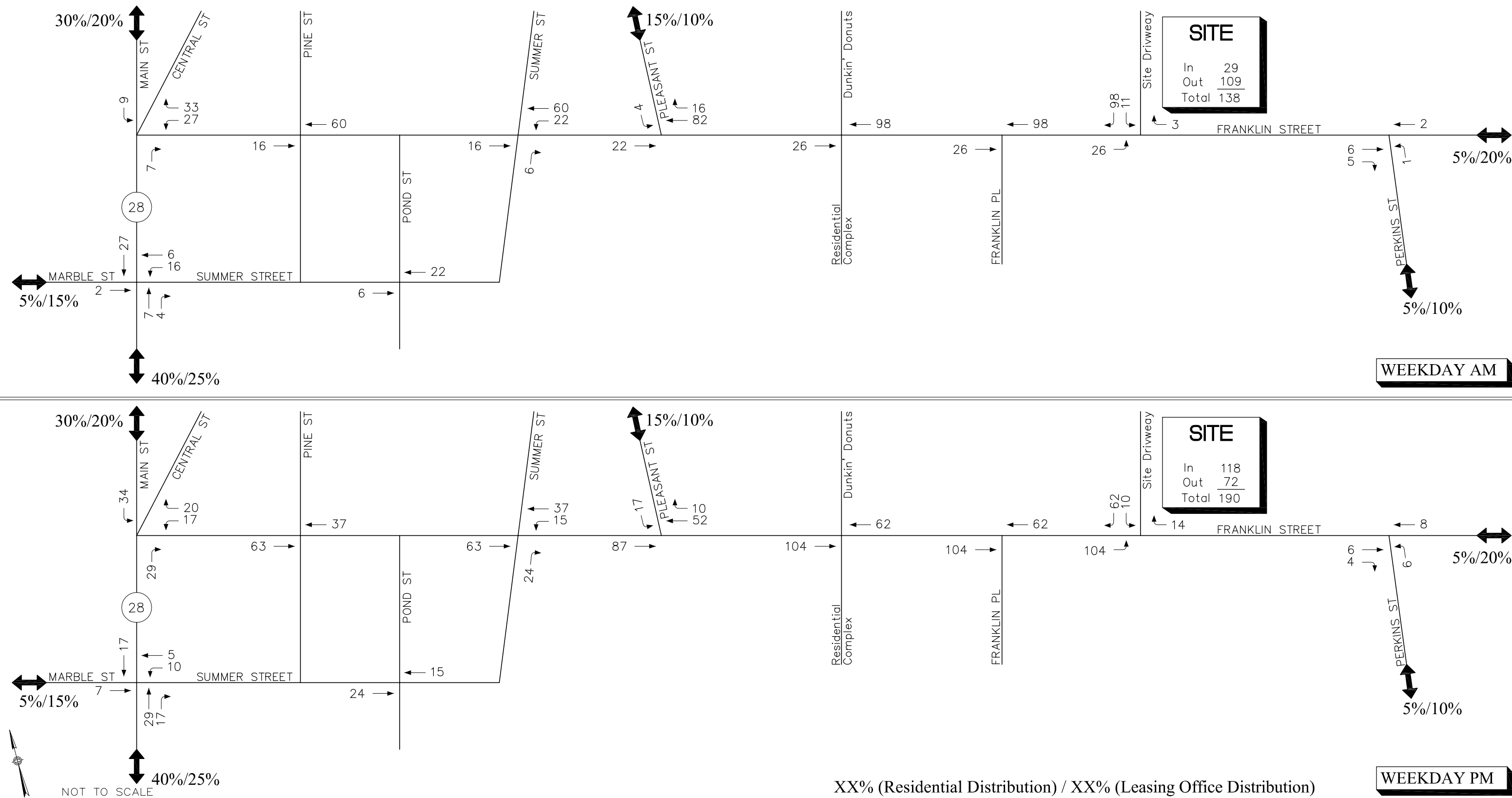


Figure 4
Site-Generated
Peak Hour Traffic Volumes

movements into and out of the site driveway shown on the No-Build network include the existing site trips. Turning movements into and out of the site driveway shown on the Site-Generated and Build networks include the traffic to be generated by proposed development project, which was forecast using the trip generation information provided in the ITE *Trip Generation Manual*. The 2018 Build weekday AM and weekday PM peak hour traffic volumes are illustrated on Figure 5.

Traffic Increases

The proposed development will result in increases in traffic on the study area roadways. As shown on Figure 4, traffic-volume increases beyond the study area during the peak hours are expected to be in the range of 6 to 73 vehicles. These increases represent, on average, approximately one additional vehicle every fifty seconds to ten minutes during the peak hours.

CAPACITY AND QUEUE ANALYSIS

Capacity and queue analyses were conducted at all study area locations under 2013 Existing, 2018 No-Build, and 2018 Build traffic-volume conditions. The impact of site-generated traffic can be measured by comparing 2018 No-Build conditions to 2018 Build conditions. The turning movements into and out of the site driveway shown in the No-Build condition include the existing site trips. Turning movements into and out of the site driveway shown in the Build condition include the traffic to be generated by proposed development project, which was forecast using the trip generation information provided in the ITE *Trip Generation Manual*.

Methodology

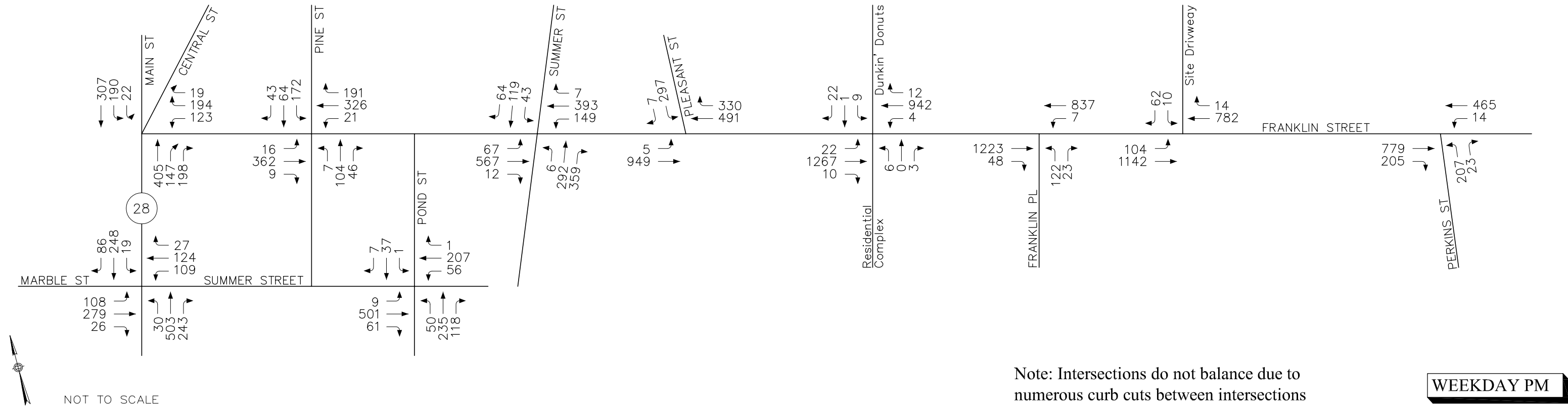
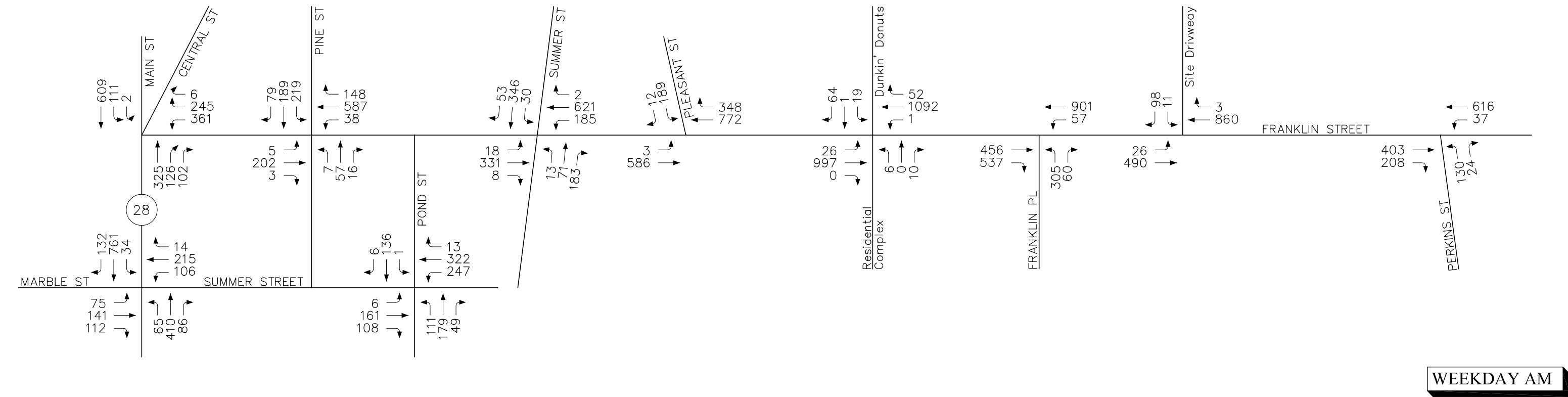
The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM)⁹ and is described in the Appendix. The level-of-service results are presented and discussed below and the analysis worksheets for all conditions are provided in the Appendix.

For signalized intersections, the maximum back of queue during a typical (average) signal cycle and a 95th percentile signal cycle were calculated for each lane group during the peak periods studied. The back of queue is the length of a backup of vehicles from the stop line of a signalized intersection to the last vehicle in the queue that is required to stop, regardless of the signal indication. The length of this queue depends on a number of factors including signal timing,

⁹ HCM 2010: *Highway Capacity Manual*. Washington, D.C.: Transport Research Board, 2010.

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Note: Intersections do not balance due to numerous curb cuts between intersections

Figure 5
2018 Build
Peak Hour Traffic Volumes

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vehicle arrival patterns, and the saturation flow rate. For unsignalized intersections, the 95th percentile queue represents the length of queue of the critical minor-street movement that is not expected to be exceeded 95 percent of the time during the analysis period (typically one hour). In this case, the queue length is a function of the capacity of the movement and the movement's degree of saturation.

Analysis Results

The results of the level-of-service (LOS) and queue analyses are shown in Table 7 and are discussed below. Capacity and queue analyses were conducted at the study area intersections utilizing *Synchro* software.¹⁰

Capacity and queue analyses were conducted at the study area intersections utilizing *Synchro* software and the default values in the program. It is expected that motorists typically accept smaller gaps in traffic at unsignalized intersections during peak periods of traffic than reflected in the analysis model and, therefore, do not wait as long to exit into the main line of traffic as shown in the analysis results. Therefore, unsignalized intersection operating results are anticipated to be better than as presented in this memorandum.

Franklin Street at Perkins Street

As shown in Table 7, under existing and future traffic-volume conditions the Franklin Street movements at the unsignalized intersection of Franklin Street at Perkins Street are expected to operate at optimal levels (LOS A). The minor street movements (Perkins Street) currently operate with long delays (LOS F) and have capacity constraints (volume-to-capacity ratio $[v/c] > 1.00$). The project is expected to add 1 additional vehicle to the Perkins Street northbound approach during the weekday AM peak hour and 6 additional vehicles during the weekday PM peak hour. These vehicles represent a 0.7% and 2.7% increase in traffic on the northbound approach for the weekday AM and weekday PM peak hours, respectively. The proposed project is expected to add 1 additional vehicle to the queue length during the weekday AM peak hour and 2 additional vehicles during weekday PM peak hour.

Franklin Street at Franklin Place (Stoneham High School Access Road)

Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Franklin Place is expected to operate at an overall LOS D or better during the weekday AM peak hour and LOS C or better during the weekday PM peak hour. During the weekday PM peak hour, the overall LOS is expected to drop from LOS B (No-Build) to LOS C (Build) with an increase in delay of 12.2 seconds, the Franklin Street eastbound through movement is expected to drop from LOS C to LOS D with an increase in delay of 23 seconds, and the Franklin Street

¹⁰*Synchro plus SimTraffic 8*; Trafficware Ltd.; Sugar Land, TX; 2011.

westbound left-turn movement is expected to drop from LOS B to LOS C with an increase in delay of 3.1 seconds. All other movements are anticipated to remain the same LOS with the addition of the residential development. It should be noted that the analysis results are based on an average over the entire peak hour analyzed, and the actual conditions may be better or worst at smaller intervals of time within this hour. Improvement measures are recommended at this location and are described in the *Recommended Improvements* section of this study. As a result of the proposed signal timing modifications, the Franklin Street eastbound through movement is expected to improve from LOS D back to LOS C during the weekday PM peak hour.

Franklin Street at Dunkin' Donuts Driveway and Residential Complex

As shown in Table 7, under existing and future traffic-volume conditions the Franklin Street movements at the unsignalized intersection of Franklin Street at the Dunkin' Donuts and residential complex driveways are expected to operate at optimal levels (LOS A). This is true during times when traffic flow along Franklin Street is unrestrained, not necessarily when the Traffic Director is present at Stevens Street and at the High School. As described in the *Traffic Observations* section of this study, during this peak period prior to the start of school the westbound traffic along Franklin Street is stopped. The Dunkin' Donuts and residential complex driveways currently operate at LOS F and will continue to operate at LOS F with the addition of the residential development. Queue lengths during the PM peak hour are anticipated to increase by less than one vehicle as a result of the project.

Franklin Street at Pleasant Street

Under existing and future traffic-volume conditions, the Franklin Street through movements at the unsignalized intersection of Franklin Street at Pleasant Street are expected to operate at optimal levels (LOS A) with the Franklin Street left-turn movements expected to operate at LOS C or better. The minor street movements (Pleasant Street) at this intersection currently operate with long delays (LOS F) and have capacity constraints ($v/c > 1.00$). The project is expected to add 4 additional vehicles to the Pleasant Street southbound approach during the weekday AM peak hour and 17 additional vehicles during the weekday PM peak hour. These vehicles represent a 2.0% and 5.9% increase in traffic on the southbound approach for the weekday AM and weekday PM peak hours, respectively. The proposed project is expected to add approximately 4 additional vehicles to the queue length during the weekday AM peak hour and 3 vehicles during the weekday PM peak hour.

Franklin Street at Summer Street

As shown in Table 7, under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Summer Street is expected to operate at an overall LOS C or better. During the weekday AM peak hour, the Franklin Street westbound shared through/right-turn movement is expected to drop from LOS B to LOS C. During the weekday PM peak hour, the Franklin Street eastbound shared through/right-turn movements is expected to drop from

LOS C to LOS D and the westbound left-turn movement is expected to drop from LOS B to LOS C. Improvement measures are recommended at this location and are described in the *Recommended Improvements* section of this study. As a result of the proposed signal timing modifications, the Franklin Street eastbound through/right-turn is expected to improve from LOS C back to LOS B during the weekday AM peak hour, and during the weekday PM peak hour the Franklin Street eastbound through/right-turn is expected to improve from LOS D back to LOS C and the Franklin Street westbound through/right-turn is expected to improve from LOS C back to LOS B.

Franklin Street at Pine Street

Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Pine Street is expected to operate with an overall LOS C during the weekday AM peak period and an overall LOS B during the weekday PM peak period. All movements are expected to operate at LOS C or better and LOS is anticipated to remain the same with the addition of the residential development. Increases in queue lengths as a result of the project are expected to be less than 3 vehicles.

Franklin Street at Main Street and Central Street

As shown in Table 7, the signalized intersection of Franklin Street at Main Street and Central Street is expected to drop from an overall LOS C (Existing) to LOS D (No-Build) with the addition of historical traffic growth and background developments and drop from LOS D (No-Build) to LOS E (Build) with the proposed residential development in place during the weekday AM peak hour. Under existing and future traffic-volume conditions the intersection is expected to operate with an overall LOS B during the weekday PM peak hour. During the weekday AM peak hour, the Main Street southbound approach is expected to drop from LOS E to LOS F with an increase in queue length of less than four vehicles. All other movements are anticipated to remain the same with the addition of the residential development. Improvement measures are recommended at this location and are described in the *Recommended Improvements* section of this study. As a result of the proposed signal timing modifications, the Main Street southbound approach is expected to improve from LOS F to LOS E during the weekday AM peak hour.

Main Street at Summer Street and Marble Street

Under existing and future traffic-volume conditions the signalized intersection of Main Street at Summer Street and Marble Street is expected to operate at an overall LOS D or better. During the weekday AM peak hour, the overall LOS drops from LOS C (No-Build) to LOS D (Build) with the proposed residential development in place. However, no movements drop a level of service during the weekday AM peak hour. During the weekday PM peak hour, the Main Street southbound approach is expected to drop from LOS B to LOS C as a result of the project, however, this is due to a 0.2 second increase in delay on this movement. Increases in delay for the rest of the intersection are expected to be less than 3 seconds overall and 8.4 seconds or less

on any movement. In addition, increases in queue length on any movement are expected to be less than 2 vehicles.

Summer Street at Pond Street

As shown in Table 7, under existing and future traffic-volume conditions the signalized intersection of Summer Street at Pond Street is expected to drop from an overall LOS B (No-Build) to LOS C (Build) during the weekday AM peak hour and operate an overall LOS B during the weekday PM peak hour. This drop in LOS during the weekday AM peak hour is due to an increase in delay of less than 1 second to the overall intersection. All movements are anticipated to operate at the same LOS with the addition of the residential development. Increases in delay of less than 2 seconds are expected on any movement and increases in queue length on any movement are expected to be less than 1 vehicle.

Franklin Street at Site Driveway

As shown in Table 7, under future traffic-volume conditions the Franklin Street movements at the site driveway are expected to operate at optimal levels (LOS A). This is true during times when traffic flow along Franklin Street is unrestrained, not necessarily when the Traffic Directors are present at Stevens Street and at the High School. As described in the *Traffic Observations* section of this study, during this peak period prior to the start of school the westbound traffic along Franklin Street queues past the site driveway. The site driveway southbound left-turn movement is expected to operate at LOS F with 50.1 seconds of delay during the weekday AM peak hour and LOS F with more than 100.0 seconds of delay during the weekday PM peak hour while the right-turn movement is expected to operate at LOS C. Even though fewer vehicles are exiting the site during the weekday PM peak hour, the delay for the vehicles exiting is longer due to the increased traffic making a left-turn into the site as well as the increased traffic on the eastbound through movement. The queue length on the site driveway is expected to be approximately 1 vehicle for the left-turn lane and less than 2 vehicles for the right-turn lane. During the peak period prior to the start of school a longer queue could be expected, however, there is ample room on-site to queue the vehicles (up to 75 feet [3 vehicles] in each lane with an additional 50 feet [2 vehicles] prior to blocking the first internal intersection) and delays would be recognized on-site and not along Franklin Street. Improvement measures are recommended at this location and are described in the *Recommended Improvements* section of this study. As a result of the Franklin Street exclusive eastbound left-turn lane, sufficient storage is provided to accommodate a three-vehicle queue so as to not interfere with the through traffic on Franklin Street.

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Perkins Street												
<i>Weekday AM:</i>												
Franklin Street EB through/right-turn	0.37	0.0	A	--/0	0.38	0.0	A	--/0	0.39	0.0	A	--/0
Franklin Street WB left-turn/through	0.04	1.2	A	--/4	0.05	1.3	A	--/4	0.05	1.3	A	--/4
Perkins Street NB approach	>1.0	>100.0	F	--/214	>1.0	>100.0	F	--/264	>1.0	>100.0	F	--/273
<i>Weekday PM:</i>												
Franklin Street EB through/right-turn	0.58	0.0	A	--/0	0.61	0.0	A	--/0	0.62	0.0	A	--/0
Franklin Street WB left-turn/through	0.02	0.6	A	--/1	0.02	0.6	A	--/2	0.02	0.6	A	--/2
Perkins Street NB approach	>1.0	>100.0	F	--/400	>1.0	>100.0	F	--/474	>1.0	>100.0	F	--/503

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Franklin Place												
<i>Weekday AM:</i>												
Franklin Street EB through	0.69	19.9	B	225/246	0.68	19.4	B	243/263	0.65	17.4	B	266/284
Franklin Street EB right-turn	0.45	2.1	A	0/0	0.47	2.2	A	0/0	0.47	2.0	A	0/0
Franklin Street WB left-turn	0.21	10.8	B	14/26	0.22	10.7	B	15/27	0.20	10.1	B	15/27
Franklin Street WB through	0.90	25.8	C	401/436	0.91	26.9	C	446/481	0.95	32.3	C	585/616
Franklin Place NB left-turn	>1.0	87.3	F	353/353	>1.0	>100.0	F	445/445	>1.0	>100.0	F	555/555
Franklin Place NB right-turn	0.08	20.3	C	0/0	0.08	22.4	C	0/0	0.08	27.0	C	0/0
Overall Intersection	>1.0	31.2	C	--/--	>1.0	40.8	D	--/--	>1.0	54.7	D	--/--
<i>Weekday PM:</i>												
Franklin Street EB through	0.90	19.8	B	285/897	0.95	27.9	C	332/981	>1.0	50.9	D	432/1,125
Franklin Street EB right-turn	0.03	0.7	A	0/4	0.03	0.7	A	0/4	0.03	0.7	A	0/4
Franklin Street WB left-turn	0.06	14.5	B	1/5	0.07	18.8	B	1/5	0.07	21.9	C	1/5
Franklin Street WB through	0.60	5.4	A	154/314	0.64	6.1	A	172/361	0.69	7.0	A	199/431
Franklin Place NB left-turn	0.66	38.2	D	71/106	0.66	38.3	D	74/111	0.65	37.8	D	74/111
Franklin Place NB right-turn	0.02	30.7	C	0/0	0.02	30.4	C	0/0	0.02	30.4	C	0/0
Overall Intersection	0.87	15.5	B	--/--	0.92	19.8	B	--/--	0.99	32.0	C	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Dunkin Donuts and Residential Complex												
<i>Weekday AM:</i>												
Franklin Street EB approach	0.07	3.7	A	--/6	0.08	5.4	A	--/6	0.10	9.3	A	--/9
Franklin Street WB approach	0.00	0.1	A	--/0	0.00	0.1	A	--/0	0.00	0.1	A	--/0
Residential Complex NB approach	>1.0	>100.0	F	--/77	>1.0	>100.0	F	--/90	>1.0	>100.0	F	--/--
Dunkin' Donuts SB approach	>1.0	>100.0	F	--/274	>1.0	>100.0	F	--/309	>1.0	>100.0	F	--/--
<i>Weekday PM:</i>												
Franklin Street EB approach	0.04	1.4	A	--/3	0.04	1.8	A	--/3	0.04	2.8	A	--/3
Franklin Street WB approach	0.01	0.3	A	--/1	0.01	0.4	A	--/1	0.01	0.5	A	--/1
Residential Complex NB approach	0.17	66.4	F	--/14	0.20	80.7	F	--/17	0.27	112.2	F	--/22
Dunkin' Donuts SB approach	0.39	45.0	E	--/42	0.45	55.2	F	--/50	0.56	78.6	F	--/65

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Pleasant Street												
<i>Weekday AM:</i>												
Franklin Street EB left-turn	0.01	14.4	B	--/1	0.01	15.6	C	--/1	0.01	19.1	C	--/1
Franklin Street EB through	0.35	0.0	A	--/0	0.38	0.0	A	--/0	0.39	0.0	A	--/0
Franklin Street WB through/right-turn	0.63	0.0	A	--/0	0.67	0.0	A	--/0	0.73	0.0	A	--/0
Pleasant Street SB approach	0.96	98.1	F	--/208	>1.0	>100.0	F	--/281	>1.0	>100.0	F	--/386
<i>Weekday PM:</i>												
Franklin Street EB left-turn	0.01	9.7	A	--/1	0.01	10.0	A	--/1	0.01	10.6	B	--/1
Franklin Street EB through	0.51	0.0	A	--/0	0.54	0.0	A	--/0	0.59	0.0	A	--/0
Franklin Street WB through/right-turn	0.48	0.0	A	--/0	0.51	0.0	A	--/0	0.55	0.0	A	--/0
Pleasant Street SB approach	>1.0	>100.0	F	--/547	>1.0	>100.0	F	--/591	>1.0	>100.0	F	--/653

^a Volume-to-capacity ratio.^b Average control delay in seconds per vehicle.^c Level of service.^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Summer Street												
<i>Weekday AM:</i>												
Franklin Street EB left-turn	0.10	13.9	B	4/15	0.10	14.1	B	4/16	0.13	14.9	B	4/16
Franklin Street EB through/right-turn	0.65	20.5	C	129/229	0.65	20.6	C	150/252	0.68	21.6	C	164/266
Franklin Street WB left-turn	0.40	9.9	A	32/90	0.43	10.3	B	36/97	0.51	10.9	B	43/109
Franklin Street WB through/right-turn	0.75	19.2	B	152/499	0.76	19.9	B	177/552	0.83	24.2	C	211/639
Summer Street NB approach	0.32	16.6	B	36/102	0.35	18.3	B	43/111	0.36	18.6	B	46/112
Summer Street SB approach	0.78	26.2	C	146/298	0.83	31.2	C	166/318	0.83	31.6	C	175/318
Overall Intersection	0.76	19.9	B	--/--	0.79	21.6	C	--/--	0.83	23.2	C	--/--
<i>Weekday PM:</i>												
Franklin Street EB left-turn	0.20	14.2	B	16/40	0.21	15.2	B	19/42	0.22	15.9	B	20/42
Franklin Street EB through/right-turn	0.79	28.4	C	213/358	0.82	31.3	C	257/400	0.88	38.4	D	309/506
Franklin Street WB left-turn	0.57	17.0	B	38/75	0.58	17.6	B	46/80	0.75	29.0	C	53/140
Franklin Street WB through/right-turn	0.62	21.4	C	156/260	0.61	21.5	C	189/280	0.65	23.1	C	218/317
Summer Street NB approach	0.83	26.5	C	253/504	0.90	35.8	D	301/550	0.93	43.1	D	351/585
Summer Street SB approach	0.40	15.6	B	73/147	0.47	18.1	B	86/159	0.48	19.6	B	95/161
Overall Intersection	0.79	23.5	C	--/--	0.83	27.8	C	--/--	0.89	33.3	C	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Pine Street												
<i>Weekday AM:</i>												
Franklin Street EB approach	0.31	11.5	B	55/76	0.32	11.2	B	60/81	0.33	10.9	B	66/87
Franklin Street WB approach	0.84	22.8	C	234/358	0.85	22.9	C	257/388	0.87	24.5	C	296/446
Pine Street NB approach	0.13	12.3	B	22/51	0.15	13.4	B	25/57	0.15	14.9	B	28/58
Pine Street SB approach	0.79	22.7	C	162/445	0.86	29.6	C	192/508	0.89	35.3	D	211/517
Overall Intersection	0.82	20.4	C	--/--	0.85	22.6	C	--/--	0.88	25.0	C	--/--
<i>Weekday PM:</i>												
Franklin Street EB approach	0.45	8.5	A	48/128	0.47	9.1	A	58/149	0.54	9.6	A	76/181
Franklin Street WB approach	0.64	10.4	B	73/191	0.67	11.6	B	90/225	0.69	12.1	B	106/249
Pine Street NB approach	0.23	9.7	A	20/68	0.24	10.2	B	25/74	0.24	11.0	B	27/81
Pine Street SB approach	0.60	12.5	B	49/142	0.59	12.9	B	60/155	0.60	13.9	B	64/169
Overall Intersection	0.62	10.3	B	--/--	0.63	11.1	B	--/--	0.65	11.6	B	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Main St and Central St												
<i>Weekday AM:</i>												
Main Street NB through	0.42	12.9	B	123/187	0.45	13.9	B	142/198	0.47	15.7	B	152/198
Main Street NB right-turn	0.31	12.1	B	60/106	0.34	13.0	B	71/114	0.36	14.7	B	78/117
Main Street SB approach	0.92	34.5	C	351/662	>1.0	71.7	E	493/743	>1.0	>100.0	F	565/785
Franklin Street WB approach	0.90	38.8	D	276/409	0.92	41.1	D	300/484	0.95	47.3	D	354/570
Overall Intersection	0.91	28.6	C	--/--	0.99	43.7	D	--/--	>1.0	67.6	E	--/--
<i>Weekday PM:</i>												
Main Street NB through	0.39	7.9	A	76/164	0.38	7.7	A	85/184	0.37	8.1	A	93/201
Main Street NB right-turn	0.35	7.6	A	39/105	0.35	7.5	A	45/121	0.37	8.1	A	53/143
Main Street SB approach	0.68	11.8	B	113/268	0.70	12.3	B	135/325	0.78	16.9	B	175/465
Franklin Street WB approach	0.65	20.4	C	88/199	0.75	28.3	C	128/215	0.82	37.1	D	151/242
Overall Intersection	0.67	11.6	B	--/--	0.71	12.1	B	--/--	0.79	17.0	B	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Main St at Summer St and Marble St												
<i>Weekday AM:</i>												
Main Street NB approach	0.68	22.5	C	141/194	0.73	25.1	C	158/214	0.75	26.3	C	164/222
Main Street SB approach	0.80	26.0	C	249/317	0.83	28.3	C	274/342	0.85	29.6	C	286/356
Marble Street EB approach	0.79	40.9	D	162/333	0.83	46.4	D	180/361	0.85	50.2	D	185/364
Summer Street WB approach	0.81	41.2	D	169/358	0.85	47.4	D	190/386	0.89	54.1	D	210/423
Overall Intersection	0.80	29.5	C	--/--	0.84	32.9	C	--/--	0.86	35.5	D	--/--
<i>Weekday PM:</i>												
Main Street NB approach	0.76	26.0	C	164/240	0.77	26.6	C	182/256	0.79	27.6	C	208/276
Main Street SB approach	0.38	19.8	B	68/105	0.39	19.9	B	75/111	0.40	20.1	C	84/116
Marble Street EB approach	0.76	30.8	C	184/405	0.84	37.7	D	207/448	0.89	46.1	D	228/481
Summer Street WB approach	0.73	34.4	C	116/212	0.76	37.0	D	128/248	0.79	39.5	D	142/288
Overall Intersection	0.75	27.1	C	--/--	0.79	29.3	C	--/--	0.82	32.0	C	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Summer Street at Pond Street												
<i>Weekday AM:</i>												
Summer Street EB approach	0.36	9.7	A	63/132	0.37	9.7	A	70/140	0.37	9.8	A	72/143
Summer Street WB approach	0.80	18.7	B	151/398	0.83	20.7	C	174/434	0.85	22.2	C	183/454
Pond Street NB approach	0.77	22.1	C	136/179	0.82	27.8	C	145/190	0.83	28.7	C	145/190
Pond Street SB approach	0.24	13.0	B	40/73	0.25	14.4	B	42/76	0.26	14.6	B	42/76
Overall Intersection	0.78	17.1	B	--/--	0.82	19.7	B	--/--	0.84	20.6	C	--/--
<i>Weekday PM:</i>												
Summer Street EB approach	0.72	13.9	B	107/282	0.75	15.4	B	125/318	0.77	15.9	B	136/339
Summer Street WB approach	0.38	9.4	A	42/121	0.40	9.9	A	49/135	0.42	9.9	A	53/144
Pond Street NB approach	0.66	13.6	B	82/216	0.68	14.6	B	98/229	0.69	15.3	B	103/229
Pond Street SB approach	0.09	9.2	A	9/28	0.09	9.6	A	11/28	0.09	9.9	A	11/28
Overall Intersection	0.69	12.7	B	--/--	0.72	13.8	B	--/--	0.73	14.2	B	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 7 (continued)
INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/Peak Hour/Lane Group	2013 Existing				2018 No-Build				2018 Build			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Site Driveway												
<i>Weekday AM:</i>												
Franklin Street EB left-turn/through	0.01	0.2	A	--/0	0.01	0.2	A	--/0	0.04	1.1	A	--/3
Franklin Street WB through/right-turn	0.54	0.0	A	--/0	0.56	0.0	A	--/0	0.56	0.0	A	--/0
Site Driveway SB left-turn	0.02	35.2	E	--/1	0.02	40.0	E	--/2	0.13	50.1	F	--/11
Site Driveway SB right-turn	0.01	16.0	C	--/1	0.01	16.7	C	--/1	0.35	22.7	C	--/38
<i>Weekday PM:</i>												
Franklin Street EB left-turn/through	0.00	0.2	A	--/0	0.00	0.2	A	--/0	0.15	6.8	A	--/13
Franklin Street WB through/right-turn	0.49	0.0	A	--/0	0.51	0.0	A	--/0	0.52	0.0	A	--/0
Site Driveway SB left-turn	0.40	>100.0	F	--/18	0.64	>100.0	F	--/21	>1.0	>100.0	F	--/--
Site Driveway SB right-turn	0.00	15.0	C	--/0	0.00	15.6	C	--/0	0.21	18.5	C	--/19

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

RECOMMENDED IMPROVEMENTS

The final phase of the transportation analysis process is to identify improvement measures necessary to minimize the impact of the project and also improve existing operating conditions on the transportation system. Improvements considered necessary to address existing and future roadway system deficiencies are discussed below as they relate to impacts as a result of background growth and to project-generated impacts.

Franklin Street at Franklin Place (Stoneham High School Access Road)

Due to the impacts that the proposed residential development would have at the intersection of Franklin Street at Franklin Place during the weekday commuter PM peak hour, after the school dismissal traffic is over, improvement measures have been investigated. Accordingly, traffic signal timing modifications are recommended at this location. These modifications include lowering the cycle length from 100 seconds to 90 seconds in order to reduce delay, and increasing the green time on the Franklin Street eastbound approach from 55 seconds to 65 seconds and westbound approach from 70 seconds to 72 seconds. These modifications can be accomplished by taking time from the other approaches without impacting level-of-service. Specifically, lowering the green time for the Franklin Place northbound approach from 30 seconds to 18 seconds and lowering the green time for the leading left-turn on the Franklin Street westbound approach from 15 seconds to 7 seconds. With the improved timings, the intersection is anticipated to operate at an overall LOS C during the weekday PM peak hour with all lane groups operating at LOS D or better and all v/c ratios are expected to be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes. The capacity analysis results are shown in Table 8.

Franklin Street at Summer Street

Due to the impacts that the proposed residential development would have at the intersection of Franklin Street at Summer Street during the weekday AM and weekday PM peak hours, improvement measures have been investigated. Accordingly, traffic signal timing modifications are recommended at this location. The weekday AM modification includes increasing the green time for through movement on Franklin Street from 35 seconds to 46 seconds. This modification can be accomplished by taking time from the other approaches without impacting level-of-service. Specifically, lowering the minimum green time for the Franklin Street left-turn movements from 13 seconds to 9 seconds and lowering the minimum green time for the Summer Street approaches from 42 seconds to 35 seconds. The weekday PM peak hour modification includes lowering the cycle length from 91 seconds to 70 seconds in order to reduce delay. With the improved timings, the intersection is anticipated to operate at an overall LOS C with all lane groups operating at LOS D or better and all v/c ratios are expected to be below 1.00, indicating

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

there will be adequate capacity to accommodate the anticipated traffic volumes. The capacity analysis results are shown in Table 8.

Franklin Street at Main Street and Central Street

Due to the impacts that the proposed residential development would have at the intersection of Franklin Street at Main Street and Central Street during the weekday AM peak hour, improvement measures have been investigated. Accordingly, traffic signal timing modifications are recommended at this location. These modifications include increasing the green time on Main Street from 46 seconds to 50 seconds. These modifications can be accomplished by lowering the green time for the Franklin Street approach from 43 seconds to 39 seconds. With the improved timings, the intersection is anticipated to operate at an overall LOS D during the weekday AM peak hour with all lane groups operating at LOS E or better. The capacity analysis results are shown in Table 8.

Franklin Street at Site Driveway

In order to eliminate additional delays for through movements along Franklin Street in the eastbound direction at the site driveway, an exclusive left-turn lane was investigated. Based on the available information, the existing pavement width allows for a 10.5-foot wide exclusive eastbound left-turn lane, with 11-foot wide through lanes in each direction, and ± 2 foot shoulders. In addition, a storage length of 75 feet can be provided, which is sufficient length to accommodate a three-vehicle queue. The proposed traffic volumes at the site driveway intersection meets the requirements for a major-road left-turn bay and the warrant worksheet is provided in the Appendix. A *Conceptual Improvement Plan* of the proposed left-turn lane is provided in the Appendix. The capacity analysis results are shown in Table 8.

In addition to the left-turn lane warrant, it was also investigated if the traffic volumes at the site driveway location warrant the installation of a traffic signal. Based on the Build traffic volumes, none of the traffic volume warrants were met. Accordingly, traffic signal control is not proposed at this location. The Traffic Control Signal Warrant Analyses worksheet is provided in the Appendix.

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Table 8

INTERSECTION CAPACITY ANALYSIS SUMMARY – 2018 CONDITIONS WITH IMPROVEMENTS

Intersection/Peak Hour/Lane Group	2018 No-Build				2018 Build				2018 Build with Improvements			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Franklin Place												
<i>Weekday AM:</i>												
Franklin Street EB through	0.68	19.4	B	243/263	0.65	17.4	B	266/284	--	--	--	--/--
Franklin Street EB right-turn	0.47	2.2	A	0/0	0.47	2.0	A	0/0	--	--	--	--/--
Franklin Street WB left-turn	0.22	10.7	B	15/27	0.20	10.1	B	15/27	--	--	--	--/--
Franklin Street WB through	0.91	26.9	C	446/481	0.95	32.3	C	585/616	--	--	--	--/--
Franklin Place NB left-turn	>1.0	>100.0	F	445/445	>1.0	>100.0	F	555/555	--	--	--	--/--
Franklin Place NB right-turn	0.08	22.4	C	0/0	0.08	27.0	C	0/0	--	--	--	--/--
Overall Intersection	>1.0	40.8	D	--/--	>1.0	54.7	D	--/--	--	--	--	--/--
<i>Weekday PM:</i>												
Franklin Street EB through	0.95	27.9	C	332/981	>1.0	50.9	D	432/1,125	0.97	29.6	C	467/1035
Franklin Street EB right-turn	0.03	0.7	A	0/4	0.03	0.7	A	0/4	0.03	0.5	A	0/3
Franklin Street WB left-turn	0.07	18.8	B	1/5	0.07	21.9	C	1/5	0.08	24.0	C	¼
Franklin Street WB through	0.64	6.1	A	172/361	0.69	7.0	A	199/431	0.66	6.0	A	216/334
Franklin Place NB left-turn	0.66	38.3	D	74/111	0.65	37.8	D	74/111	0.75	49.6	D	87/122
Franklin Place NB right-turn	0.02	30.4	C	0/0	0.02	30.4	C	0/0	0.02	34.7	C	0/0
Overall Intersection	0.92	19.8	B	--/--	0.99	32.0	C	--/--	0.95	21.5	C	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

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Proposed Residential Development – Stoneham, Massachusetts

Table 8 (continued)

INTERSECTION CAPACITY ANALYSIS SUMMARY – 2018 CONDITIONS WITH IMPROVEMENTS

Intersection/Peak Hour/Lane Group	2018 No-Build				2018 Build				2018 Build with Improvements			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Summer Street												
<i>Weekday AM:</i>												
Franklin Street EB left-turn	0.10	14.1	B	4/16	0.13	14.9	B	4/16	0.14	13.9	B	4/13
Franklin Street EB through/right-turn	0.65	20.6	C	150/252	0.68	21.6	C	164/266	0.63	18.3	B	151/212
Franklin Street WB left-turn	0.43	10.3	B	36/97	0.51	10.9	B	43/109	0.54	11.0	B	44/90
Franklin Street WB through/right-turn	0.76	19.9	B	177/552	0.83	24.2	C	211/639	0.83	23.7	C	218/539
Summer Street NB approach	0.35	18.3	B	43/111	0.36	18.6	B	46/112	0.38	18.4	B	48/140
Summer Street SB approach	0.83	31.2	C	166/318	0.83	31.6	C	175/318	0.83	31.2	C	162/401
Overall Intersection	0.79	21.6	C	--/--	0.83	23.2	C	--/--	0.84	22.2	C	--/--
<i>Weekday PM:</i>												
Franklin Street EB left-turn	0.21	15.2	B	19/42	0.22	15.9	B	20/42	0.23	13.5	B	14/33
Franklin Street EB through/right-turn	0.82	31.3	C	257/400	0.88	38.4	D	309/506	0.88	32.7	C	231/418
Franklin Street WB left-turn	0.58	17.6	B	46/80	0.75	29.0	C	53/140	0.76	27.2	C	38/113
Franklin Street WB through/right-turn	0.61	21.5	C	189/280	0.65	23.1	C	218/317	0.64	18.7	B	166/254
Summer Street NB approach	0.90	35.8	D	301/550	0.93	43.1	D	351/585	0.98	50.8	D	267/495
Summer Street SB approach	0.47	18.1	B	86/159	0.48	19.6	B	95/161	0.52	17.7	B	73/137
Overall Intersection	0.83	27.8	C	--/--	0.89	33.3	C	--/--	0.91	33.0	C	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

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Table 8 (continued)

INTERSECTION CAPACITY ANALYSIS SUMMARY – 2018 CONDITIONS WITH IMPROVEMENTS

Intersection/Peak Hour/Lane Group	2018 No-Build				2018 Build				2018 Build with Improvements			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Main St and Central St												
<i>Weekday AM:</i>												
Main Street NB through	0.45	13.9	B	142/198	0.47	15.7	B	152/198	0.44	14.1	B	138/179
Main Street NB right-turn	0.34	13.0	B	71/114	0.36	14.7	B	78/117	0.34	13.2	B	69/103
Main Street SB approach	>1.0	71.7	E	493/743	>1.0	>100.0	F	565/785	>1.0	79.6	E	509/729
Franklin Street WB approach	0.92	41.1	D	300/484	0.95	47.3	D	354/570	>1.0	70.7	E	418/618
Overall Intersection	0.99	43.7	D	--/--	>1.0	67.6	E	--/--	>1.0	55.9	D	--/--
<i>Weekday PM:</i>												
Main Street NB through	0.38	7.7	A	85/184	0.37	8.1	A	93/201	--	--	--	--/--
Main Street NB right-turn	0.35	7.5	A	45/121	0.37	8.1	A	53/143	--	--	--	--/--
Main Street SB approach	0.70	12.3	B	135/325	0.78	16.9	B	175/465	--	--	--	--/--
Franklin Street WB approach	0.75	28.3	C	128/215	0.82	37.1	D	151/242	--	--	--	--/--
Overall Intersection	0.71	12.1	B	--/--	0.79	17.0	B	--/--	--	--	--	--/--

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

Table 8 (continued)

INTERSECTION CAPACITY ANALYSIS SUMMARY – 2018 CONDITIONS WITH IMPROVEMENTS

Intersection/Peak Hour/Lane Group	2018 No-Build				2018 Build				2018 Build with Improvements			
	V/C ^a	Del. ^b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Franklin Street at Site Driveway												
<i>Weekday AM:</i>												
Franklin Street EB left-turn	--	--	--	--/--	--	--	--	--/--	0.04	10.2	B	--/3
Franklin Street EB through	--	--	--	--/--	--	--	--	--/--	0.32	0.0	A	--/0
Franklin Street EB left-turn/through	0.01	0.2	A	--/0	0.04	1.1	A	--/3	--	--	--	--/--
Franklin Street WB through/right-turn	0.56	0.0	A	--/0	0.56	0.0	A	--/0	0.56	0.0	A	--/0
Site Driveway SB left-turn	0.02	40.0	E	--/2	0.13	50.1	F	--/11	0.13	49.1	E	--/11
Site Driveway SB right-turn	0.01	16.7	C	--/1	0.35	22.7	C	--/38	0.35	22.7	C	--/38
<i>Weekday PM:</i>												
Franklin Street EB left-turn	--	--	--	--/--	--	--	--	--/--	0.15	10.6	B	--/13
Franklin Street EB through	--	--	--	--/--	--	--	--	--/--	0.75	0.0	A	--/0
Franklin Street EB left-turn/through	0.00	0.2	A	--/0	0.15	6.8	A	--/13	--	--	--	--/--
Franklin Street WB through/right-turn	0.51	0.0	A	--/0	0.52	0.0	A	--/0	0.52	0.0	A	--/0
Site Driveway SB left-turn	0.64	>100.0	F	--/21	>1.0	>100.0	F	--/--	>1.0	>100.0	F	--/--
Site Driveway SB right-turn	0.00	15.6	C	--/0	0.21	18.5	C	--/19	0.20	18.4	C	--/19

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

CONCLUSIONS AND RECOMMENDATIONS

Existing and future conditions in the study area have been described, analyzed, and evaluated with respect to traffic operations and the impact of the proposed residential development. Conclusions of this effort and recommendations are presented below.

- As proposed, the development consists of razing the existing 2 barns, retaining the residential home and 1 story wood frame barn behind the residential home, and constructing 264 dwelling units with a $\pm 1,000$ square foot leasing office. Access is proposed to be provided via one full access/egress driveway on Franklin Street.
- The proposed development is expected to generate 138 vehicles trips (29 entering and 109 exiting) during the weekday AM peak hour and 190 vehicle trips (118 entering and 72 exiting) during the weekday PM peak hour. Traffic-volume increases beyond the study area during the peak hours are expected to be in the range of 6 to 73 vehicles. These increases represent, on average, approximately one additional vehicle every fifty seconds to ten minutes during the peak hours.
- Available sight distances at the proposed site driveway exceed the minimum and desirable SSD and ISD requirements for safe operation in both directions. It is recommended that any proposed landscaping in the vicinity of the driveways and roadway intersections be located sufficiently back from Franklin Street or kept low to the ground so as not to impede the available sight distances.
- Under existing and future traffic-volume conditions the Franklin Street movements at the unsignalized intersection of Franklin Street at Perkins Street are expected to operate at optimal levels (LOS A). The minor street movements (Perkins Street) currently operate with long delays (LOS F) and have capacity constraints ($v/c > 1.00$). The project is expected to add 1 additional vehicle to the Perkins Street northbound approach during the weekday AM peak hour and 6 additional vehicles during the weekday PM peak hour. These vehicles represent a 0.7% and 2.7% increase in traffic on the northbound approach for the weekday AM and weekday PM peak hours, respectively. The proposed project is expected to add 1 additional vehicle to the queue length during the weekday AM peak hour and 2 additional vehicles during weekday PM peak hour.
- Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Franklin Place is expected to operate at an overall LOS D or better during the weekday AM peak hour and LOS C or better during the weekday PM peak hour. During the weekday PM peak hour, the overall LOS is expected to drop from LOS B (No-Build) to LOS C (Build) with an increase in delay of 12.2 seconds. Traffic

signal timing modifications are recommended during the weekday PM peak period at this location. With the improved timings, the intersection is anticipated to operate at an overall LOS C during the weekday PM peak hour with all lane groups operating at LOS D or better and all v/c ratios are expected to be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes.

- Under existing and future traffic-volume conditions the Franklin Street movements at the unsignalized intersection of Franklin Street at the Dunkin' Donuts and residential complex driveways are expected to operate at optimal levels (LOS A). This is true during times when traffic flow along Franklin Street is unrestrained, not necessarily when the Traffic Director is present at Stevens Street and at the High School. As described in the *Traffic Observations* section of this study, during this peak period prior to the start of school the westbound traffic along Franklin Street is stopped. The Dunkin' Donuts and residential complex driveways currently operate at LOS F and will continue to operate at LOS F with the addition of the residential development. Queue lengths during the PM peak hour are anticipated to increase by less than one vehicle as a result of the project.
- Under existing and future traffic-volume conditions, the Franklin Street through movements at the unsignalized intersection of Franklin Street at Pleasant Street are expected to operate at optimal levels (LOS A) with the Franklin Street left-turn movements expected to operate at LOS C or better. The minor street movements (Pleasant Street) at this intersection currently operate with long delays (LOS F) and have capacity constraints ($v/c > 1.00$). The project is expected to add 4 additional vehicles to the Pleasant Street southbound approach during the weekday AM peak hour and 17 additional vehicles during the weekday PM peak hour. These vehicles represent a 2.0% and 5.9% increase in traffic on the southbound approach for the weekday AM and weekday PM peak hours, respectively. The proposed project is expected to add approximately 4 additional vehicles to the queue length during the weekday AM peak hour and 3 vehicles during the weekday PM peak hour.
- Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Summer Street is expected to operate at an overall LOS C or better. As a result of the project, some movements will drop LOS; therefore, traffic signal timing modifications are recommended during the weekday AM and weekday PM peak periods at this location. With the improved timings, the intersection is anticipated to operate at an overall LOS C with all lane groups operating at LOS D or better and all v/c ratios are expected to be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes.
- Under existing and future traffic-volume conditions the signalized intersection of Franklin Street at Pine Street is expected to operate with an overall LOS C during the

weekday AM peak period and an overall LOS B during the weekday PM peak period. All movements are expected to operate at LOS C or better and LOS is anticipated to remain the same with the addition of the residential development. Increases in queue lengths as a result of the project are expected to be less than 3 vehicles.

- The signalized intersection of Franklin Street at Main Street and Central Street is expected to drop from an overall LOS C (Existing) to LOS D (No-Build) with the addition of historical traffic growth and background developments and drop from LOS D (No-Build) to LOS E (Build) with the proposed residential development in place during the weekday AM peak hour. Under existing and future traffic-volume conditions the intersection is expected to operate with an overall LOS B during the weekday PM peak hour. Traffic signal timing modifications are recommended during the weekday AM peak period at this location. With the improved timings, the intersection is anticipated to operate at an overall LOS D during the weekday AM peak hour with all lane groups operating at LOS E or better.
- Under existing and future traffic-volume conditions the signalized intersection of Main Street at Summer Street and Marble Street is expected to operate at an overall LOS D or better. During the weekday AM peak hour, the overall LOS drops from LOS C (No-Build) to LOS D (Build) with the proposed residential development in place. During the weekday PM peak hour, the Main Street southbound approach is expected to drop from LOS B to LOS C as a result of the project, however, this is due to a 0.2 second increase in delay on this movement. Increases in delay for the rest of the intersection are expected to be less than 3 seconds overall and approximately 8.4 seconds or less on any movement. In addition, increases in queue length on any movement are expected to be less than 2 vehicles.
- Under existing and future traffic-volume conditions the signalized intersection of Summer Street at Pond Street is expected to drop from an overall LOS B (No-Build) to LOS C (Build) during the weekday AM peak hour and operate an overall LOS B during the weekday PM peak hour. This drop in LOS during the weekday AM peak hour is due to an increase in delay of less than 1 second to the overall intersection. All movements are anticipated to operate at the same LOS with the addition of the residential development. Increases in delay of less than 2 seconds are expected on any movement and increases in queue length on any movement are expected to be less than 1 vehicle.
- Under future traffic-volume conditions the Franklin Street movements at the site driveway are expected to operate at optimal levels (LOS A). This is true during times when traffic flow along Franklin Street is unrestrained, not necessarily when the Traffic Directors are present at Stevens Street and at the High School. As described in the *Traffic Observations* section of this study, during this peak period prior to the start of school the

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westbound traffic along Franklin Street queues past the site driveway. The site driveway southbound left-turn movement is expected to operate at LOS F with 50.1 seconds of delay during the weekday AM peak hour and LOS F with more than 100.0 seconds of delay during the weekday PM peak hour while the right-turn movement is expected to operate at LOS C. The queue length on the site driveway is expected to be approximately 1-2 vehicles for the left-turn lane and the right-turn lane. During the peak period prior to the start of school a longer queue could be expected, however, there is ample room on-site to queue the vehicles (up to 115 feet [4 vehicles] prior to blocking the first internal intersections) and delays would be recognized on-site and not along Franklin Street. As part of the proposed residential development, an exclusive eastbound left-turn lane will be provided on Franklin Street at the site driveway. As a result of the eastbound left-turn lane, sufficient storage is provided to accommodate a three-vehicle queue thereby removing these turning vehicles from the through traffic on Franklin Street.

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APPENDIX

TRAFFIC-COUNT DATA

TRAFFIC-VOLUME ADJUSTMENT DATA

MASSDOT CRASH RATE WORKSHEETS

PUBLIC TRANSPORTATION SCHEDULES

OTHER DEVELOPMENT DATA

TRIP-GENERATION CALCULATIONS

CAPACITY ANALYSIS METHODOLOGY

CAPACITY AND QUEUE ANALYSIS WORKSHEETS

LEFT-TURN LANE WARRANT ANALYSIS

CONCEPTUAL IMPROVEMENT PLAN

TRAFFIC CONTROL SIGNAL WARRANT ANALYSES WORKSHEET

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Proposed Residential Development – Stoneham, Massachusetts

TRAFFIC-COUNT DATA

GPI Project #:
 Stoneham, MA
 Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-801-8800
www.tsetraffic.com

Site Code: Stoneham
 Station ID: Franklin Street
 Between Franklin Place and Rustic Road

Eastbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
09/18/13	0	0	4	13	28	4	0	0	0	0	0	0	0	0	49
01:00	0	0	1	7	14	2	0	0	0	0	0	0	0	0	24
02:00	0	0	0	4	4	1	0	0	0	0	0	0	0	0	9
03:00	0	0	0	3	3	4	0	0	0	0	0	0	0	0	10
04:00	0	1	0	6	11	1	1	0	0	0	0	0	0	0	20
05:00	1	0	2	11	35	11	1	0	0	0	0	0	0	0	61
06:00	13	1	4	58	137	21	3	0	0	0	0	0	0	0	237
07:00	80	9	41	185	117	8	0	1	0	0	0	0	0	0	441
08:00	68	5	19	192	238	13	1	1	1	0	0	0	0	0	538
09:00	38	3	8	104	187	28	1	1	0	0	0	0	0	0	370
10:00	25	6	24	179	197	11	1	0	0	0	0	0	0	0	443
11:00	49	17	32	227	140	7	0	0	0	0	0	0	0	0	472
12 PM	30	0	17	143	238	21	2	0	0	0	0	0	0	0	451
13:00	26	4	12	184	244	13	3	0	1	0	0	0	0	0	487
14:00	42	0	35	254	214	9	3	0	2	0	0	0	0	0	559
15:00	42	7	36	300	254	15	0	1	0	0	1	0	0	0	656
16:00	62	4	33	364	311	17	1	1	0	0	0	0	0	0	793
17:00	95	8	62	481	252	9	0	1	0	0	0	0	0	0	908
18:00	53	7	49	417	294	10	1	0	1	0	0	0	0	0	832
19:00	33	2	17	278	206	11	1	0	0	0	0	0	0	0	548
20:00	17	4	4	145	202	15	0	1	0	0	0	0	0	0	388
21:00	5	0	2	95	155	13	1	0	0	0	0	0	0	0	271
22:00	2	0	1	49	99	11	1	1	0	0	0	0	0	0	164
23:00	0	0	0	30	64	10	2	0	0	0	0	0	0	0	106
Total	681	78	403	3729	3644	265	23	8	5	0	1	0	0	0	8837



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-801-3800
www.tsetraffic.com

GPI Project #:
 Stoneham, MA
 Client: John DeBarros

Site Code: Stoneham
 Station ID: Franklin Street
 Between Franklin Place and Rustic Road

Eastbound

Start Time	15	20	25	30	35	40	45	50	55	60	65	70	75	999	Total
09/19/13	0	0	2	10	27	7	0	0	0	0	0	0	0	0	46
01:00	0	0	0	4	11	2	1	0	0	0	0	0	0	0	18
02:00	0	0	0	2	3	3	0	0	0	0	0	0	0	0	8
03:00	1	1	0	2	5	1	0	0	0	0	0	0	0	0	10
04:00	0	0	0	6	11	6	2	0	0	0	0	0	0	0	25
05:00	0	0	1	6	39	11	1	0	0	0	0	0	0	0	58
06:00	20	1	5	57	126	20	1	0	0	0	0	0	0	0	230
07:00	78	3	19	184	122	3	0	1	0	0	0	0	0	0	410
08:00	55	4	5	191	236	16	1	0	0	0	0	0	0	0	508
09:00	29	4	14	100	244	34	0	0	0	0	0	0	0	0	425
10:00	33	5	13	150	194	16	3	0	0	0	0	0	0	0	414
11:00	22	4	17	263	163	10	1	0	0	0	0	0	0	0	480
12 PM	36	5	14	166	252	19	1	0	1	0	0	0	0	0	494
13:00	39	3	29	217	199	17	1	1	0	0	0	0	0	0	506
14:00	54	3	41	243	165	11	0	1	1	0	0	0	0	0	519
15:00	68	3	28	319	232	16	0	0	0	0	0	0	0	0	666
16:00	70	10	39	372	295	20	0	2	1	0	0	0	0	0	809
17:00	102	25	96	482	200	11	0	0	0	0	0	0	0	0	916
18:00	51	5	61	389	264	16	0	0	0	1	0	0	0	0	787
19:00	36	5	38	333	184	10	0	1	0	0	0	0	0	0	607
20:00	15	3	7	184	174	10	0	0	0	1	0	0	0	0	394
21:00	3	0	2	123	144	12	2	1	0	0	0	0	0	0	287
22:00	2	0	1	56	89	12	1	0	0	0	0	0	0	0	161
23:00	0	0	1	31	55	13	0	0	0	0	0	0	0	0	100
Total	714	84	433	3890	3434	296	15	7	3	2	0	0	0	0	8878
Grand Total	1395	162	836	7619	7078	561	38	15	8	2	1	0	0	0	17715

15th Percentile : 26 MPH
 50th Percentile : 30 MPH
 85th Percentile : 34 MPH
 95th Percentile : 35 MPH

Statistics Mean Speed(Average) : 28 MPH
 10 MPH Pace Speed : 26-35 MPH
 Number in Pace : 14697
 Percent in Pace : 83.0%
 Number of Vehicles > 55 MPH : 3
 Percent of Vehicles > 55 MPH : 0.0%

GPI Project #:
 Stoneham, MA
 Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

Site Code: Stoneham
 Station ID: Franklin Street
 Between Franklin Place and Rustic Road

Westbound

Start	1	16	21	26	31	36	41	46	51	56	61	66	71	76	
Time	15	20	25	30	35	40	45	50	55	60	65	70	75	999	Total
09/18/13	1	0	0	2	7	10	6	2	0	0	0	0	0	0	28
01:00	0	0	0	2	2	1	4	1	0	0	0	0	0	0	10
02:00	0	0	0	1	3	6	2	1	1	0	0	0	0	0	14
03:00	0	0	1	0	1	3	3	2	0	1	0	0	0	0	11
04:00	0	0	0	0	6	11	5	8	2	0	0	0	0	0	32
05:00	3	0	1	5	35	46	32	13	2	0	0	0	0	0	137
06:00	13	0	8	31	132	223	74	7	0	0	0	0	0	0	488
07:00	185	43	22	60	181	135	27	5	0	0	0	0	0	0	658
08:00	90	7	7	84	312	225	43	5	2	1	0	0	0	0	776
09:00	31	13	24	54	201	207	48	3	2	0	0	0	0	0	583
10:00	22	7	2	38	153	182	58	10	1	0	0	0	0	0	473
11:00	20	0	3	47	156	162	52	2	1	0	0	0	0	0	443
12 PM	20	0	0	32	190	157	53	3	0	0	0	0	0	0	455
13:00	18	1	1	36	168	217	47	8	0	0	1	0	0	0	497
14:00	34	3	6	49	186	190	45	5	0	0	0	0	0	0	518
15:00	52	1	5	27	187	220	62	9	1	0	0	0	0	0	564
16:00	52	0	2	45	183	238	61	5	1	1	0	0	0	0	588
17:00	55	0	0	41	186	219	46	5	1	0	0	0	0	0	553
18:00	58	0	0	15	166	206	63	8	0	0	0	0	0	0	516
19:00	19	0	3	33	137	173	34	3	0	0	1	0	0	0	403
20:00	9	0	1	21	104	114	38	4	0	0	0	0	0	0	291
21:00	4	0	1	15	46	100	36	4	1	0	0	0	0	0	207
22:00	3	1	0	7	37	57	19	2	2	0	0	0	0	0	128
23:00	0	0	1	5	16	27	17	6	1	0	0	0	0	0	73
Total	689	76	88	650	2795	3129	875	121	18	3	2	0	0	0	8446

GPI Project #:
 Stoneham, MA
 Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-301-8800
www.tsetraffic.com

Site Code: Stoneham
 Station ID: Franklin Street
 Between Franklin Place and Rustic Road

Westbound

Start Time	15	20	25	30	35	40	45	50	55	60	65	70	75	999	Total
09/19/13	1	0	0	0	6	18	15	3	0	0	0	0	0	0	43
01:00	0	0	1	2	3	5	7	1	0	0	0	0	0	0	19
02:00	0	0	0	0	4	7	3	2	0	0	0	0	0	0	16
03:00	0	1	1	0	3	5	5	2	0	0	0	0	0	0	17
04:00	0	0	0	0	5	6	10	7	1	0	0	0	0	0	29
05:00	0	0	0	6	26	46	41	14	5	0	0	0	0	0	138
06:00	12	1	9	23	168	221	69	7	2	0	0	0	0	0	512
07:00	256	35	12	58	168	96	21	2	3	0	0	0	0	0	651
08:00	107	13	5	76	318	268	31	6	1	1	0	0	0	0	826
09:00	16	2	0	30	238	251	69	10	1	0	0	0	0	0	617
10:00	26	2	8	29	162	186	57	3	2	0	0	0	0	0	475
11:00	34	1	3	26	148	202	59	2	2	0	0	0	0	0	477
12 PM	32	3	7	25	149	175	55	4	0	0	0	0	0	1	451
13:00	20	0	12	49	164	208	45	4	2	0	0	0	1	0	505
14:00	62	15	29	53	206	182	32	5	1	0	1	0	0	0	586
15:00	44	3	7	44	182	213	59	5	0	0	0	0	0	0	557
16:00	62	0	2	27	155	221	64	10	0	0	0	0	0	0	541
17:00	61	1	0	41	225	181	49	4	2	0	0	0	0	0	564
18:00	40	2	3	19	159	222	64	4	0	0	0	0	0	0	513
19:00	22	1	1	25	155	152	48	4	1	0	0	0	0	0	409
20:00	9	1	4	21	86	125	34	5	1	0	0	0	0	1	287
21:00	5	0	0	10	52	93	31	4	3	0	1	0	0	0	199
22:00	5	0	1	8	39	36	36	7	1	1	0	0	0	0	134
23:00	0	0	0	7	25	34	23	3	1	0	0	0	0	0	93
Total	814	81	105	579	2846	3153	927	118	29	2	2	0	1	2	8659
Grand Total	1503	157	193	1229	5641	6282	1802	239	47	5	4	0	1	2	17105

15th Percentile : 28 MPH
 50th Percentile : 35 MPH
 85th Percentile : 40 MPH
 95th Percentile : 44 MPH

Statistics Mean Speed(Average) : 33 MPH
 10 MPH Pace Speed : 31-40 MPH
 Number in Pace : 11923
 Percent in Pace : 69.7%
 Number of Vehicles > 55 MPH : 12
 Percent of Vehicles > 55 MPH : 0.1%

GPI Project #:
 Stoneham, MA
 Client: John DeBarros



Traffic Survey Expedition
 106 Sharon Road
 N. Quincy, MA 02171
 P: 617-443-5636
 F: 617-301-8800
 www.tsetraffic.com

Site Code: Stoneham
 Station ID: Franklin Street
 Between Franklin Place and Rustic Road

Start Time	18-Sep-13 Wed	Eastbound	Westbound	Combined Total	
12:00 AM		49	28	77	
01:00		24	10	34	
02:00		9	14	23	
03:00		10	11	21	
04:00		20	32	52	
05:00		61	137	198	
06:00		237	489	726	
07:00		441	657	1098	
08:00		539	776	1315	
09:00		370	583	953	
10:00		442	473	915	
11:00		473	443	916	
12:00 PM		450	455	905	
01:00		487	497	984	
02:00		559	518	1077	
03:00		656	564	1220	
04:00		793	588	1381	
05:00		908	553	1461	
06:00		832	516	1348	
07:00		548	403	951	
08:00		389	291	680	
09:00		270	207	477	
10:00		164	128	292	
11:00		106	73	179	
Total		8837	8446	17283	
Percent		51.1%	48.9%		



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-301-3300
www.tsetraffic.com

GPI Project #:
Stoneham, MA
Client: John DeBarros

Site Code: Stoneham
Station ID: Franklin Street
Between Franklin Place and Rustic Road

Start Time	19-Sep-13 Thu	Eastbound	Westbound	Combined Total	
12:00 AM		46	43	89	■
01:00		18	19	37	■
02:00		8	16	24	■
03:00		10	17	27	■
04:00		25	29	54	■
05:00		59	138	197	■
06:00		229	512	741	■
07:00		410	651	1061	■
08:00		509	826	1335	■
09:00		424	617	1041	■
10:00		414	475	889	■
11:00		480	477	957	■
12:00 PM		494	451	945	■
01:00		506	506	1012	■
02:00		519	585	1104	■
03:00		666	557	1223	■
04:00		809	541	1350	■
05:00		916	564	1480	■
06:00		787	513	1300	■
07:00		607	409	1016	■
08:00		394	287	681	■
09:00		287	199	486	■
10:00		161	134	295	■
11:00		100	93	193	■
Total		8878	8659	17537	
Percent		50.6%	49.4%		
Grand Total		17715	17105		
Percentage		50.9%	49.1%		

ADT

Not Calculated



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.traffic.com

GPI Project #:
Stoneham, MA
Client: John DeBarros

Site Code: Stoneham
Station ID: Franklin Street
Between Franklin Place and Rustic Road

Start Time	18-Sep Wed	Eastbound		Westbound		Combined		19-Sep Thu	Eastbound		Westbound		Combined	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		19	104	4	103	23	207		13	121	13	117	26	238
12:15		12	110	9	133	21	243		10	129	11	120	21	249
12:30		7	95	6	105	13	200		13	135	9	111	22	246
12:45		11	141	9	114	20	255		10	109	10	103	20	212
01:00		8	140	3	104	11	244		5	130	5	111	10	241
01:15		7	100	3	129	10	229		6	113	8	121	14	234
01:30		8	114	3	130	11	244		3	126	5	132	8	258
01:45		1	133	1	134	2	267		4	137	1	142	5	279
02:00		2	129	5	113	7	242		1	109	8	137	9	246
02:15		3	145	1	124	4	269		0	130	2	147	2	277
02:30		3	156	4	130	7	286		4	133	4	148	8	281
02:45		1	129	4	151	5	280		3	147	2	153	5	300
03:00		2	165	2	140	4	305		2	166	1	131	3	297
03:15		2	139	3	154	5	293		1	168	7	145	8	313
03:30		2	175	4	119	6	294		3	148	4	134	7	282
03:45		4	177	2	151	6	328		4	184	5	147	9	331
04:00		5	174	7	148	12	322		4	183	4	138	8	321
04:15		3	197	6	146	9	343		7	207	9	137	16	344
04:30		6	208	6	152	12	360		7	208	7	137	14	345
04:45		6	214	13	142	19	356		7	217	9	129	16	340
05:00		10	221	12	125	22	346		7	227	17	143	24	370
05:15		9	218	26	152	35	370		10	234	21	146	31	380
05:30		16	223	45	150	61	373		18	244	52	139	70	383
05:45		26	246	54	126	80	372		24	211	48	136	72	347
06:00		20	256	71	115	91	371		28	227	73	144	101	371
06:15		38	219	93	132	131	351		34	192	99	114	133	306
06:30		80	181	136	125	216	306		77	174	139	127	216	301
06:45		99	176	189	144	288	320		90	194	201	128	291	322
07:00		128	166	221	108	349	274		95	190	232	116	327	306
07:15		96	134	227	100	323	234		109	162	185	105	294	267
07:30		85	126	104	87	189	213		84	140	122	94	206	234
07:45		132	122	105	108	237	230		122	115	112	94	234	209
08:00		139	106	160	77	299	183		117	102	198	83	315	185
08:15		142	104	205	78	347	182		130	114	212	70	342	184
08:30		137	87	216	82	353	169		134	88	220	68	354	156
08:45		121	92	195	54	316	146		128	90	196	66	324	156
09:00		121	76	168	54	289	130		96	83	176	61	272	144
09:15		91	74	156	62	247	136		119	80	152	49	271	129
09:30		70	63	125	51	195	114		99	71	138	45	237	116
09:45		88	57	134	40	222	97		110	53	151	44	261	97
10:00		116	42	109	42	225	84		100	42	126	38	226	80
10:15		98	47	109	37	207	84		102	43	117	42	219	85
10:30		119	30	125	27	244	57		102	43	120	24	222	67
10:45		109	45	130	22	239	67		110	33	112	30	222	63
11:00		127	30	105	19	232	49		119	33	107	34	226	67
11:15		103	30	108	19	211	49		103	30	110	30	213	60
11:30		116	25	122	18	238	43		118	17	143	17	261	34
11:45		127	21	108	17	235	38		140	20	117	12	257	32
Total		2675	6162	3653	4793	6328	10955		2632	6246	3820	4839	6452	11085
Day		8837		8446		17283			8878		8659		17537	
% Total		15.5%	35.7%	21.1%	27.7%				15.0%	35.6%	21.8%	27.6%		
Peak Vol.		07:45 550	05:30 944	08:15 784	03:45 597	08:00 1315	05:15 1486		08:00 509	04:45 916	08:00 826	02:00 585	08:00 1335	05:15 1481
P.H.F.		0.968	0.922	0.907	0.969	0.931	0.996		0.950	0.939	0.890	0.956	0.943	0.967
ADT		Not Calculated												

GPI Project #:
Stoneham, MA
Client: John DeBarros

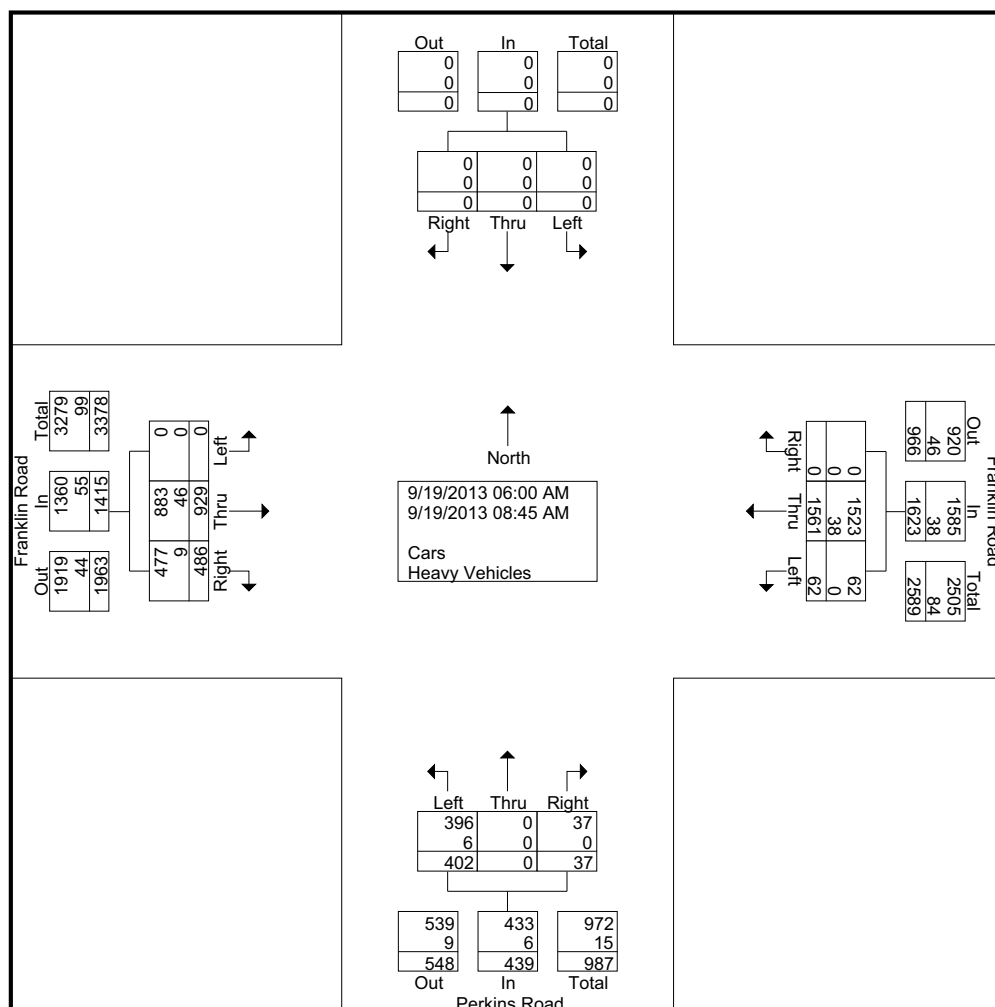


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5636
F: 617-301-8800
www.tsetraffic.com

File Name : Perkins AM
Site Code : 1
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

Start Time	Perkins Road Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
06:00 AM	26	0	1	27	0	0	0	0	0	53	20	73	3	94	0	97	197
06:15 AM	31	0	2	33	0	0	0	0	0	56	23	79	1	105	0	106	218
06:30 AM	26	0	1	27	0	0	0	0	0	56	51	107	4	145	0	149	283
06:45 AM	37	0	1	38	0	0	0	0	0	59	48	107	5	174	0	179	324
Total	120	0	5	125	0	0	0	0	0	224	142	366	13	518	0	531	1022
07:00 AM	32	0	3	35	0	0	0	0	0	80	63	143	6	184	0	190	368
07:15 AM	36	0	6	42	0	0	0	0	0	93	48	141	5	105	0	110	293
07:30 AM	17	0	5	22	0	0	0	0	0	107	48	155	11	147	0	158	335
07:45 AM	38	0	9	47	0	0	0	0	0	98	34	132	13	148	0	161	340
Total	123	0	23	146	0	0	0	0	0	378	193	571	35	584	0	619	1336
08:00 AM	49	0	1	50	0	0	0	0	0	95	47	142	9	149	0	158	350
08:15 AM	39	0	4	43	0	0	0	0	0	94	41	135	3	127	0	130	308
08:30 AM	45	0	2	47	0	0	0	0	0	82	41	123	2	109	0	111	281
08:45 AM	26	0	2	28	0	0	0	0	0	56	22	78	0	74	0	74	180
Total	159	0	9	168	0	0	0	0	0	327	151	478	14	459	0	473	1119
Grand Total	402	0	37	439	0	0	0	0	0	929	486	1415	62	1561	0	1623	3477
Apprch %	91.6	0	8.4		0	0	0		0	65.7	34.3		3.8	96.2	0		
Total %	11.6	0	1.1	12.6	0	0	0	0	0	26.7	14	40.7	1.8	44.9	0	46.7	
Cars	396	0	37	433	0	0	0	0	0	883	477	1360	62	1523	0	1585	6756
% Cars	98.5	0	100	98.6	0	0	0	0	0	95	98.1	96.1	100	97.6	0	97.7	97.2
Heavy Vehicles	6	0	0	6	0	0	0	0	0	46	9	55	0	38	0	38	198
% Heavy Vehicles	1.5	0	0	1.4	0	0	0	0	0	5	1.9	3.9	0	2.4	0	2.3	2.8



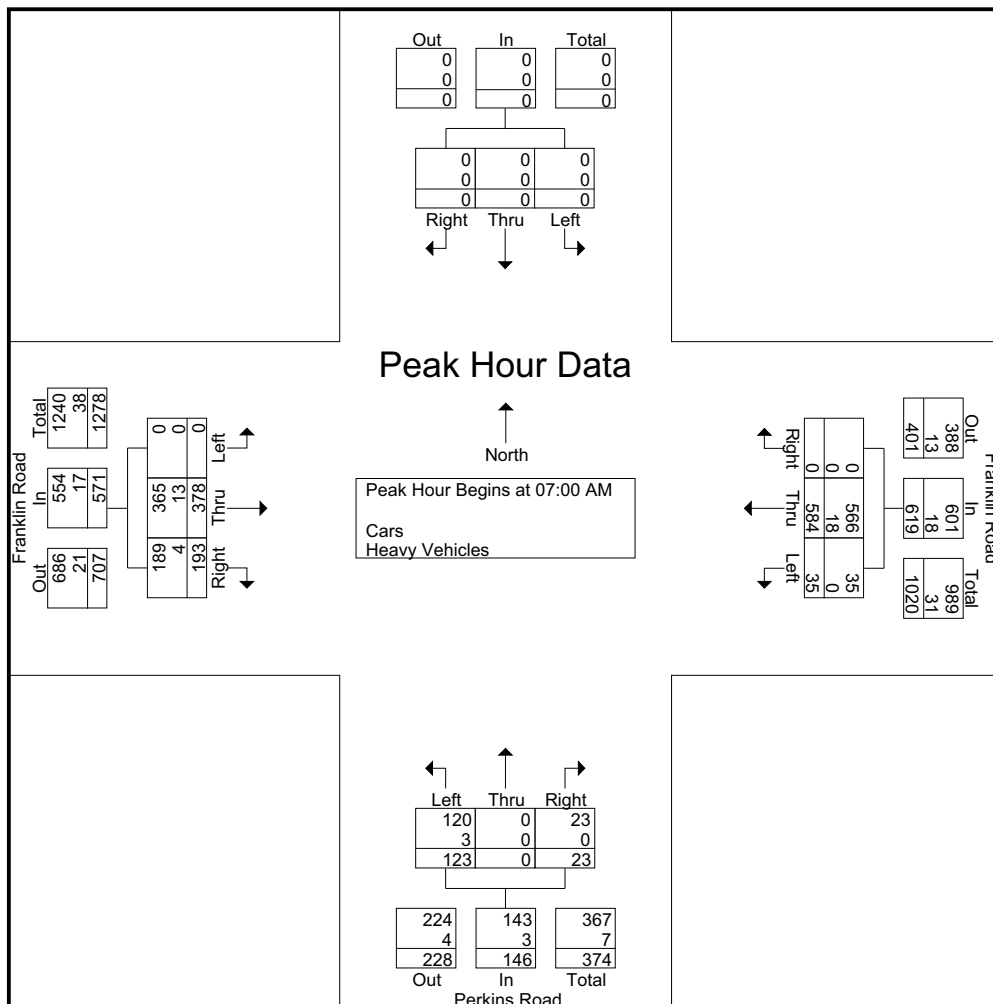
GPI Project #:
Stoneham, MA
Client: John DeBarros



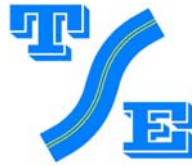
Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Perkins AM
Site Code : 2
Start Date : 9/19/2013
Page No : 2 of 4

	Perkins Road Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	32	0	3	35	0	0	0	0	0	80	63	143	6	184	0	190	368
07:15 AM	36	0	6	42	0	0	0	0	0	93	48	141	5	105	0	110	293
07:30 AM	17	0	5	22	0	0	0	0	0	107	48	155	11	147	0	158	335
07:45 AM	38	0	9	47	0	0	0	0	0	98	34	132	13	148	0	161	340
Total Volume	123	0	23	146	0	0	0	0	0	378	193	571	35	584	0	619	1336
% App. Total	84.2	0	15.8		0	0	0		0	66.2	33.8		5.7	94.3	0		
PHF	.809	.000	.639	.777	.000	.000	.000	.000	.000	.883	.766	.921	.673	.793	.000	.814	.908
Cars	120	0	23	143	0	0	0	0	0	365	189	554	35	566	0	601	1298
% Cars	97.6	0	100	97.9	0	0	0	0	0	96.6	97.9	97.0	100	96.9	0	97.1	97.2
Heavy Vehicles	3	0	0	3	0	0	0	0	0	13	4	17	0	18	0	18	38
% Heavy Vehicles	2.4	0	0	2.1	0	0	0	0	0	3.4	2.1	3.0	0	3.1	0	2.9	2.8



GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8300
www.tsetraffic.com

File Name : Perkins AM
Site Code : 3
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Perkins Road Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	25	0	1	26	0	0	0	0	0	50	20	70	3	91	0	94	190
06:15 AM	31	0	2	33	0	0	0	0	0	51	23	74	1	100	0	101	208
06:30 AM	26	0	1	27	0	0	0	0	0	51	49	100	4	144	0	148	275
06:45 AM	36	0	1	37	0	0	0	0	0	55	46	101	5	173	0	178	316
Total	118	0	5	123	0	0	0	0	0	207	138	345	13	508	0	521	989
07:00 AM	30	0	3	33	0	0	0	0	0	78	60	138	6	183	0	189	360
07:15 AM	35	0	6	41	0	0	0	0	0	90	48	138	5	100	0	105	284
07:30 AM	17	0	5	22	0	0	0	0	0	102	48	150	11	141	0	152	324
07:45 AM	38	0	9	47	0	0	0	0	0	95	33	128	13	142	0	155	330
Total	120	0	23	143	0	0	0	0	0	365	189	554	35	566	0	601	1298
08:00 AM	49	0	1	50	0	0	0	0	0	92	47	139	9	146	0	155	344
08:15 AM	38	0	4	42	0	0	0	0	0	85	40	125	3	125	0	128	295
08:30 AM	45	0	2	47	0	0	0	0	0	78	41	119	2	105	0	107	273
08:45 AM	26	0	2	28	0	0	0	0	0	56	22	78	0	73	0	73	179
Total	158	0	9	167	0	0	0	0	0	311	150	461	14	449	0	463	1091
Grand Total	396	0	37	433	0	0	0	0	0	883	477	1360	62	1523	0	1585	3378
Apprch %	91.5	0	8.5		0	0	0		0	64.9	35.1		3.9	96.1	0		
Total %	11.7	0	1.1	12.8	0	0	0	0	0	26.1	14.1	40.3	1.8	45.1	0	46.9	

	Perkins Road Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	30	0	3	33	0	0	0	0	0	78	60	138	6	183	0	189	360
07:15 AM	35	0	6	41	0	0	0	0	0	90	48	138	5	100	0	105	284
07:30 AM	17	0	5	22	0	0	0	0	0	102	48	150	11	141	0	152	324
07:45 AM	38	0	9	47	0	0	0	0	0	95	33	128	13	142	0	155	330
Total Volume	120	0	23	143	0	0	0	0	0	365	189	554	35	566	0	601	1298
% App. Total	83.9	0	16.1		0	0	0		0	65.9	34.1		5.8	94.2	0		
PHF	.789	.000	.639	.761	.000	.000	.000	.000	.000	.895	.788	.923	.673	.773	.000	.795	.901

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				06:00 AM				07:15 AM				06:45 AM			
+0 mins.	38	0	9	47	0	0	0	0	0	90	48	138	5	173	0	178
+15 mins.	49	0	1	50	0	0	0	0	0	102	48	150	6	183	0	189
+30 mins.	38	0	4	42	0	0	0	0	0	95	33	128	5	100	0	105
+45 mins.	45	0	2	47	0	0	0	0	0	92	47	139	11	141	0	152
Total Volume	170	0	16	186	0	0	0	0	0	379	176	555	27	597	0	624
% App. Total	91.4	0	8.6		0	0	0		0	68.3	31.7		4.3	95.7	0	
PHF	.867	.000	.444	.930	.000	.000	.000	.000	.000	.929	.917	.925	.614	.816	.000	.825

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Perkins AM
Site Code : 4
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

Start Time	Perkins Road Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
06:00 AM	1	0	0	1	0	0	0	0	0	3	0	3	0	3	0	3	7
06:15 AM	0	0	0	0	0	0	0	0	0	5	0	5	0	5	0	5	10
06:30 AM	0	0	0	0	0	0	0	0	0	5	2	7	0	1	0	1	8
06:45 AM	1	0	0	1	0	0	0	0	0	4	2	6	0	1	0	1	8
Total	2	0	0	2	0	0	0	0	0	17	4	21	0	10	0	10	33
07:00 AM	2	0	0	2	0	0	0	0	0	2	3	5	0	1	0	1	8
07:15 AM	1	0	0	1	0	0	0	0	0	3	0	3	0	5	0	5	9
07:30 AM	0	0	0	0	0	0	0	0	0	5	0	5	0	6	0	6	11
07:45 AM	0	0	0	0	0	0	0	0	0	3	1	4	0	6	0	6	10
Total	3	0	0	3	0	0	0	0	0	13	4	17	0	18	0	18	38
08:00 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6
08:15 AM	1	0	0	1	0	0	0	0	0	9	1	10	0	2	0	2	13
08:30 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	8
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	1	0	0	1	0	0	0	0	0	16	1	17	0	10	0	10	28
Grand Total	6	0	0	6	0	0	0	0	0	46	9	55	0	38	0	38	99
Apprch %	100	0	0		0	0	0		0	83.6	16.4		0	100	0		
Total %	6.1	0	0	6.1	0	0	0	0	0	46.5	9.1	55.6	0	38.4	0	38.4	

	Perkins Road Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	0	0	0	0	5	0	5	0	6	0	6	11
07:45 AM	0	0	0	0	0	0	0	0	0	3	1	4	0	6	0	6	10
08:00 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6
08:15 AM	1	0	0	1	0	0	0	0	0	9	1	10	0	2	0	2	13
Total Volume	1	0	0	1	0	0	0	0	0	20	2	22	0	17	0	17	40
% App. Total	100	0	0		0	0	0		0	90.9	9.1		0	100	0		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.556	.500	.550	.000	.708	.000	.708	.769

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	06:30 AM				06:00 AM				06:15 AM				07:15 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	5	0	5	0	5	0	5
+15 mins.	1	0	0	1	0	0	0	0	0	5	2	7	0	6	0	6
+30 mins.	2	0	0	2	0	0	0	0	0	4	2	6	0	6	0	6
+45 mins.	1	0	0	1	0	0	0	0	0	2	3	5	0	3	0	3
Total Volume	4	0	0	4	0	0	0	0	0	16	7	23	0	20	0	20
% App. Total	100	0	0		0	0	0		0	69.6	30.4		0	100	0	
PHF	.500	.000	.000	.500	.000	.000	.000	.000	.000	.800	.583	.821	.000	.833	.000	.833

Accurate Counts

978-664-2565

N/S Street : Perkins Street
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470001
 Site Code : 16470001
 Start Date : 4/10/2014
 Page No : 10

Groups Printed- Bikes Peds

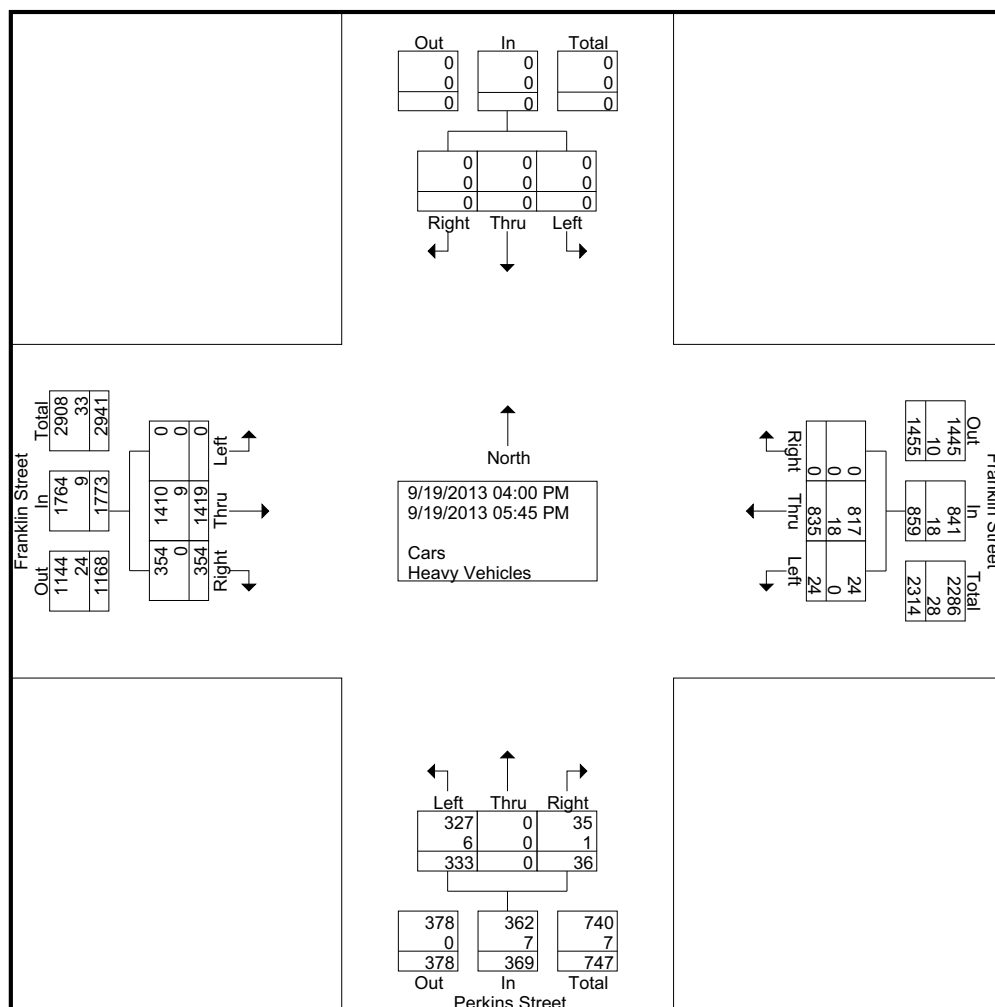
	Franklin St From East			Perkins St From South			Franklin St From West			
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Int. Total
07:00 AM	0	1	0	0	0	0	0	0	1	2
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	2	0	0	0	0	0	0	0	2
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	3	0	0	0	0	0	0	1	4
08:00 AM	0	0	0	0	0	0	0	0	0	0
Grand Total	0	3	0	0	0	0	0	0	1	4
Apprch %	0	100	0	0	0	0	0	0	100	
Total %	0	75	0	0	0	0	0	0	25	

	Franklin St From East				Perkins St From South				Franklin St From West				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	0	1	0	1	0	0	0	0	0	0	1	1	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	2	0	2	0	0	0	0	0	0	0	0	2
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	3	0	3	0	0	0	0	0	0	1	1	4
% App. Total	0	100	0		0	0	0		0	0	100		
PHF	.000	.375	.000	.375	.000	.000	.000	.000	.000	.000	.250	.250	.500



File Name : Perkins PM
Site Code : 1
Start Date : 9/19/2013
Page No : 1 of 4

	Perkins Street Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	33	0	4	37	0	0	0	0	0	165	40	205	4	96	0	100	342
04:15 PM	38	0	4	42	0	0	0	0	0	169	42	211	4	109	0	113	366
04:30 PM	35	0	3	38	0	0	0	0	0	178	38	216	0	103	0	103	357
04:45 PM	36	0	3	39	0	0	0	0	0	172	43	215	3	93	0	96	350
Total	142	0	14	156	0	0	0	0	0	684	163	847	11	401	0	412	1415
05:00 PM	48	0	2	50	0	0	0	0	0	173	43	216	4	103	0	107	373
05:15 PM	41	0	3	44	0	0	0	0	0	196	40	236	1	115	0	116	396
05:30 PM	48	0	9	57	0	0	0	0	0	190	57	247	5	106	0	111	415
05:45 PM	54	0	8	62	0	0	0	0	0	176	51	227	3	110	0	113	402
Total	191	0	22	213	0	0	0	0	0	735	191	926	13	434	0	447	1586
Grand Total	333	0	36	369	0	0	0	0	0	1419	354	1773	24	835	0	859	3001
Apprch %	90.2	0	9.8		0	0	0		0	80	20		2.8	97.2	0		
Total %	11.1	0	1.2	12.3	0	0	0	0	0	47.3	11.8	59.1	0.8	27.8	0	28.6	
Cars	327	0	35	362	0	0	0	0	0	1410	354	1764	24	817	0	841	5934
% Cars	98.2	0	97.2	98.1	0	0	0	0	0	99.4	100	99.5	100	97.8	0	97.9	98.9
Heavy Vehicles	6	0	1	7	0	0	0	0	0	9	0	9	0	18	0	18	68
% Heavy Vehicles	1.8	0	2.8	1.9	0	0	0	0	0	0.6	0	0.5	0	2.2	0	2.1	1.1



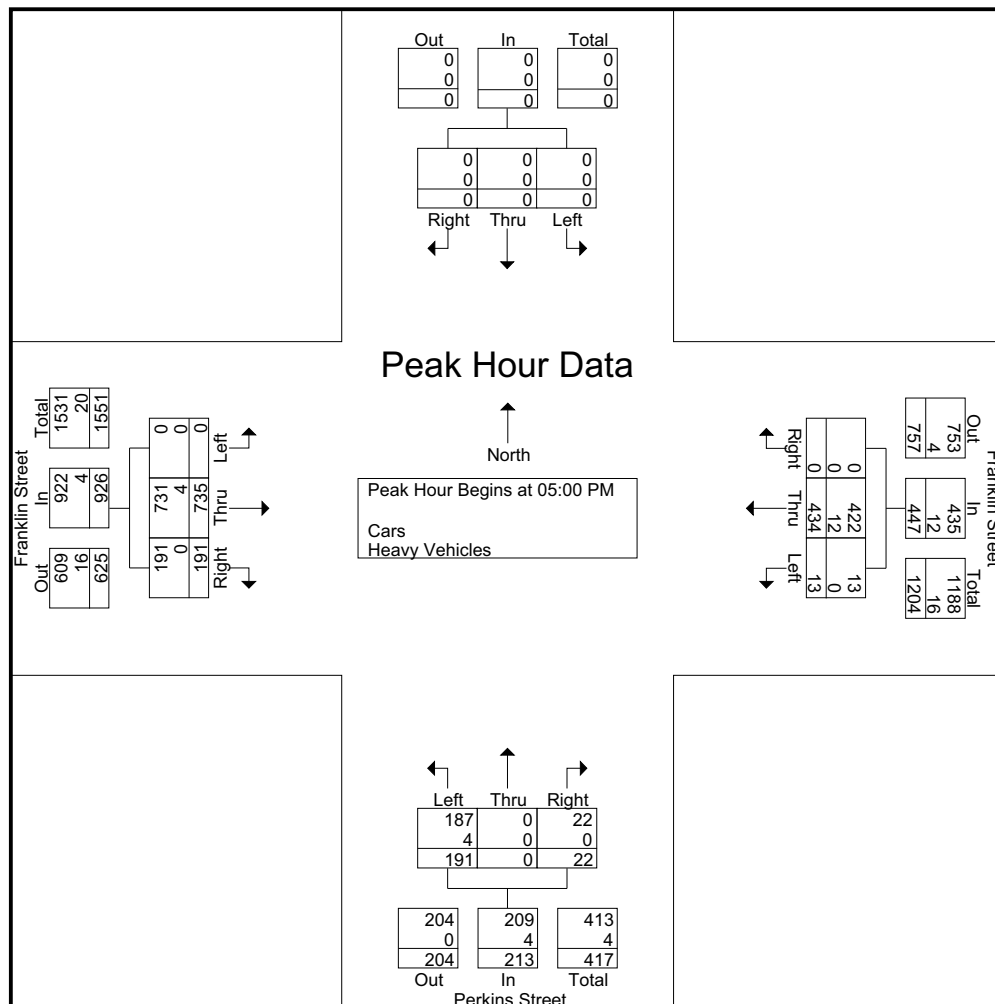
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Perkins PM
Site Code : 1
Start Date : 9/19/2013
Page No : 2 of 4

	Perkins Street Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	48	0	2	50	0	0	0	0	0	173	43	216	4	103	0	107	373
05:15 PM	41	0	3	44	0	0	0	0	0	196	40	236	1	115	0	116	396
05:30 PM	48	0	9	57	0	0	0	0	0	190	57	247	5	106	0	111	415
05:45 PM	54	0	8	62	0	0	0	0	0	176	51	227	3	110	0	113	402
Total Volume	191	0	22	213	0	0	0	0	0	735	191	926	13	434	0	447	1586
% App. Total	89.7	0	10.3		0	0	0		0	79.4	20.6		2.9	97.1	0		
PHF	.884	.000	.611	.859	.000	.000	.000	.000	.000	.938	.838	.937	.650	.943	.000	.963	.955
Cars	187	0	22	209	0	0	0	0	0	731	191	922	13	422	0	435	1566
% Cars	97.9	0	100	98.1	0	0	0	0	0	99.5	100	99.6	100	97.2	0	97.3	98.7
Heavy Vehicles	4	0	0	4	0	0	0	0	0	4	0	4	0	12	0	12	20
% Heavy Vehicles	2.1	0	0	1.9	0	0	0	0	0	0.5	0	0.4	0	2.8	0	2.7	1.3



GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-3800
www.tsetraffic.com

File Name : Perkins PM
Site Code : 1
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

Start Time	Perkins Street Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	33	0	4	37	0	0	0	0	0	164	40	204	4	95	0	99	340
04:15 PM	37	0	4	41	0	0	0	0	0	167	42	209	4	107	0	111	361
04:30 PM	35	0	2	37	0	0	0	0	0	177	38	215	0	101	0	101	353
04:45 PM	35	0	3	38	0	0	0	0	0	171	43	214	3	92	0	95	347
Total	140	0	13	153	0	0	0	0	0	679	163	842	11	395	0	406	1401
05:00 PM	48	0	2	50	0	0	0	0	0	172	43	215	4	103	0	107	372
05:15 PM	40	0	3	43	0	0	0	0	0	195	40	235	1	109	0	110	388
05:30 PM	46	0	9	55	0	0	0	0	0	189	57	246	5	103	0	108	409
05:45 PM	53	0	8	61	0	0	0	0	0	175	51	226	3	107	0	110	397
Total	187	0	22	209	0	0	0	0	0	731	191	922	13	422	0	435	1566
Grand Total	327	0	35	362	0	0	0	0	0	1410	354	1764	24	817	0	841	2967
Apprch %	90.3	0	9.7		0	0	0		0	79.9	20.1		2.9	97.1	0		
Total %	11	0	1.2	12.2	0	0	0	0	0	47.5	11.9	59.5	0.8	27.5	0	28.3	

	Perkins Street Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	48	0	2	50	0	0	0	0	0	172	43	215	4	103	0	107	372
05:15 PM	40	0	3	43	0	0	0	0	0	195	40	235	1	109	0	110	388
05:30 PM	46	0	9	55	0	0	0	0	0	189	57	246	5	103	0	108	409
05:45 PM	53	0	8	61	0	0	0	0	0	175	51	226	3	107	0	110	397
Total Volume	187	0	22	209	0	0	0	0	0	731	191	922	13	422	0	435	1566
% App. Total	89.5	0	10.5		0	0	0		0	79.3	20.7		3	97	0		
PHF	.882	.000	.611	.857	.000	.000	.000	.000	.000	.937	.838	.937	.650	.968	.000	.989	.957

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM				04:00 PM				05:00 PM				05:00 PM			
+0 mins.	48	0	2	50	0	0	0	0	0	172	43	215	4	103	0	107
+15 mins.	40	0	3	43	0	0	0	0	0	195	40	235	1	109	0	110
+30 mins.	46	0	9	55	0	0	0	0	0	189	57	246	5	103	0	108
+45 mins.	53	0	8	61	0	0	0	0	0	175	51	226	3	107	0	110
Total Volume	187	0	22	209	0	0	0	0	0	731	191	922	13	422	0	435
% App. Total	89.5	0	10.5		0	0	0		0	79.3	20.7		3	97	0	
PHF	.882	.000	.611	.857	.000	.000	.000	.000	.000	.937	.838	.937	.650	.968	.000	.989

GPI Project #:
Stoneham, MA
Client: John DeBarros



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File Name : Perkins PM
Site Code : 1
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Perkins Street Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:15 PM	1	0	0	1	0	0	0	0	0	2	0	2	0	2	0	2	5
04:30 PM	0	0	1	1	0	0	0	0	0	1	0	1	0	2	0	2	4
04:45 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	1	0	1	3
Total	2	0	1	3	0	0	0	0	0	5	0	5	0	6	0	6	14
05:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
05:15 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	6	0	6	8
05:30 PM	2	0	0	2	0	0	0	0	0	1	0	1	0	3	0	3	6
05:45 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	3	0	3	5
Total	4	0	0	4	0	0	0	0	0	4	0	4	0	12	0	12	20
Grand Total	6	0	1	7	0	0	0	0	0	9	0	9	0	18	0	18	34
Apprch %	85.7	0	14.3		0	0	0		0	100	0		0	100	0		
Total %	17.6	0	2.9	20.6	0	0	0	0	0	26.5	0	26.5	0	52.9	0	52.9	

	Perkins Street Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
05:15 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	6	0	6	8
05:30 PM	2	0	0	2	0	0	0	0	0	1	0	1	0	3	0	3	6
05:45 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	3	0	3	5
Total Volume	4	0	0	4	0	0	0	0	0	4	0	4	0	12	0	12	20
% App. Total	100	0	0		0	0	0		0	100	0		0	100	0		
PHF	.500	.000	.000	.500	.000	.000	.000	.000	.000	1.000	.000	1.000	.000	.500	.000	.500	.625

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM				04:00 PM				04:00 PM				05:00 PM			
+0 mins.	1	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	2	0	2	0	6	0	6
+30 mins.	1	0	0	1	0	0	0	0	0	1	0	1	0	3	0	3
+45 mins.	2	0	0	2	0	0	0	0	0	1	0	1	0	3	0	3
Total Volume	4	0	0	4	0	0	0	0	0	5	0	5	0	12	0	12
% App. Total	100	0	0		0	0	0		0	100	0		0	100	0	
PHF	.500	.000	.000	.500	.000	.000	.000	.000	.000	.625	.000	.625	.000	.500	.000	.500

Accurate Counts

978-664-2565

N/S Street : Perkins Street
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470001
Site Code : 16470001
Start Date : 4/10/2014
Page No : 8

Groups Printed- Bikes Peds

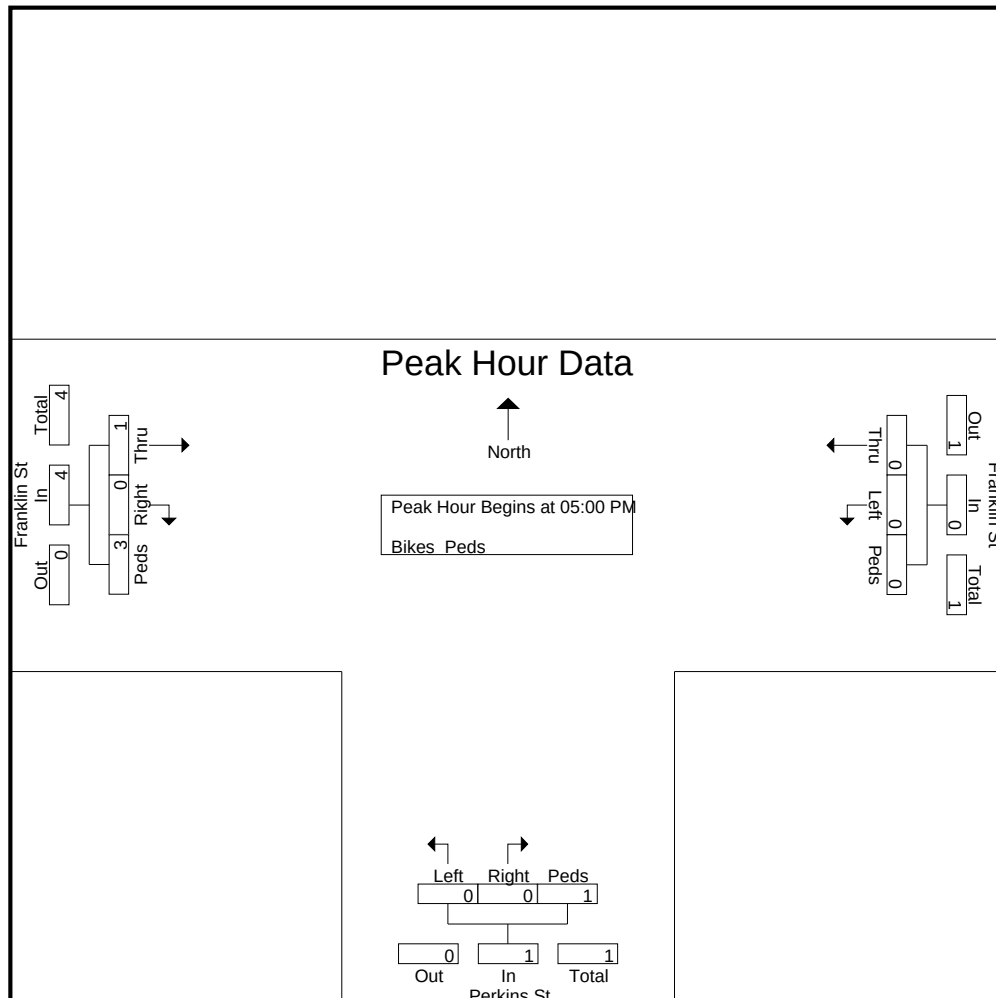
	Franklin St From East			Perkins St From South			Franklin St From West			
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Int. Total
05:00 PM	0	0	0	0	0	0	0	0	1	1
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	1	0	0	1	2
05:45 PM	0	0	0	0	0	0	1	0	1	2
Total	0	0	0	0	0	1	1	0	3	5
Grand Total	0	0	0	0	0	1	1	0	3	5
Apprch %	0	0	0	0	0	100	25	0	75	
Total %	0	0	0	0	0	20	20	0	60	

	Franklin St From East				Perkins St From South				Franklin St From West				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total

Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

05:00 PM	0	0	0	0	0	0	0	0	0	0	1	1	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	1	1	0	0	1	1	2
05:45 PM	0	0	0	0	0	0	0	0	1	0	1	2	2
Total Volume	0	0	0	0	0	0	1	1	1	0	3	4	5
% App. Total	0	0	0		0	0	100		25	0	75		
PHF	.000	.000	.000	.000	.000	.000	.250	.250	.250	.000	.750	.500	.625



GPI Project #:
Stoneham, MA
Client: John DeBarros

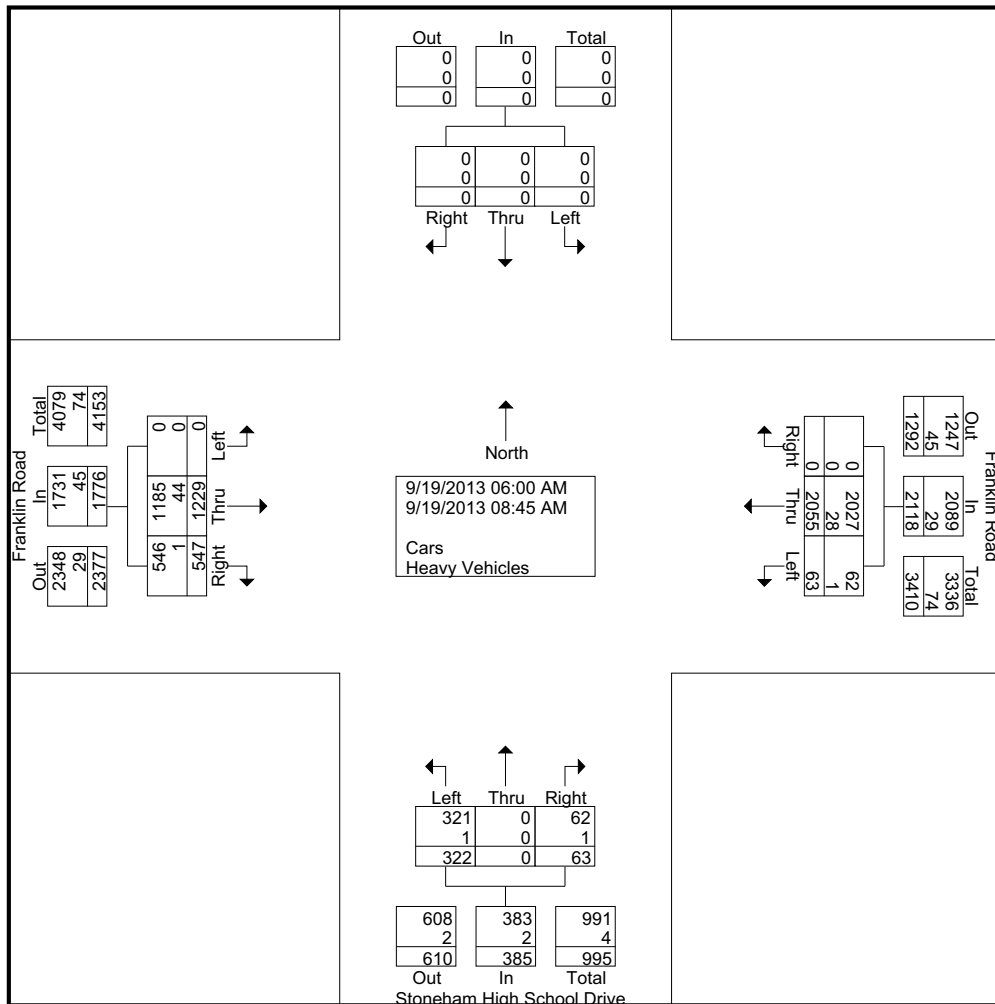


Traffic Survey Expedition
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F: 617-801-8300
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File Name : School AM
Site Code : 2
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Stoneham High School Drive Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	1	0	0	1	0	0	0	0	0	28	2	30	0	69	0	69	100
06:15 AM	0	0	1	1	0	0	0	0	0	33	1	34	0	87	0	87	122
06:30 AM	3	0	0	3	0	0	0	0	0	86	8	94	1	146	0	147	244
06:45 AM	3	0	4	7	0	0	0	0	0	109	19	128	6	217	0	223	358
Total	7	0	5	12	0	0	0	0	0	256	30	286	7	519	0	526	824
07:00 AM	32	0	4	36	0	0	0	0	0	102	66	168	16	243	0	259	463
07:15 AM	101	0	17	118	0	0	0	0	0	86	221	307	11	177	0	188	613
07:30 AM	154	0	32	186	0	0	0	0	0	112	205	317	21	127	0	148	651
07:45 AM	21	0	3	24	0	0	0	0	0	131	14	145	5	132	0	137	306
Total	308	0	56	364	0	0	0	0	0	431	506	937	53	679	0	732	2033
08:00 AM	5	0	1	6	0	0	0	0	0	132	7	139	2	205	0	207	352
08:15 AM	1	0	0	1	0	0	0	0	0	129	3	132	0	223	0	223	356
08:30 AM	1	0	0	1	0	0	0	0	0	148	1	149	1	227	0	228	378
08:45 AM	0	0	1	1	0	0	0	0	0	133	0	133	0	202	0	202	336
Total	7	0	2	9	0	0	0	0	0	542	11	553	3	857	0	860	1422
Grand Total	322	0	63	385	0	0	0	0	0	1229	547	1776	63	2055	0	2118	4279
Apprch %	83.6	0	16.4		0	0	0		0	69.2	30.8		3	97	0		
Total %	7.5	0	1.5	9	0	0	0	0	0	28.7	12.8	41.5	1.5	48	0	49.5	
Cars	321	0	62	383	0	0	0	0	0	1185	546	1731	62	2027	0	2089	8406
% Cars	99.7	0	98.4	99.5	0	0	0	0	0	96.4	99.8	97.5	98.4	98.6	0	98.6	98.2
Heavy Vehicles	1	0	1	2	0	0	0	0	0	44	1	45	1	28	0	29	152
% Heavy Vehicles	0.3	0	1.6	0.5	0	0	0	0	0	3.6	0.2	2.5	1.6	1.4	0	1.4	1.8



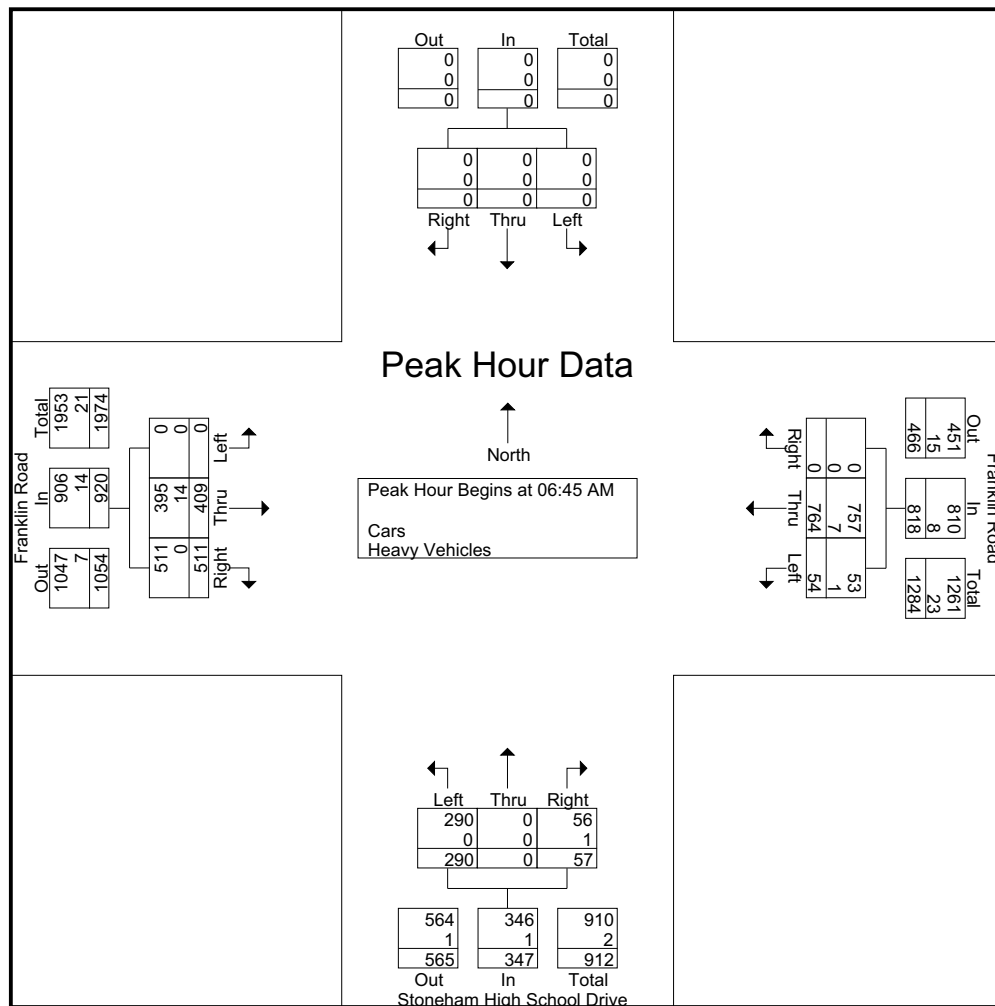
GPI Project #:
Stoneham, MA
Client: John DeBarros



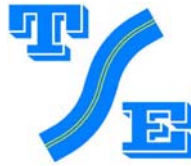
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File Name : School AM
Site Code : 2
Start Date : 9/19/2013
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	Stoneham High School Drive Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:45 AM																	
06:45 AM	3	0	4	7	0	0	0	0	0	109	19	128	6	217	0	223	358
07:00 AM	32	0	4	36	0	0	0	0	0	102	66	168	16	243	0	259	463
07:15 AM	101	0	17	118	0	0	0	0	0	86	221	307	11	177	0	188	613
07:30 AM	154	0	32	186	0	0	0	0	0	112	205	317	21	127	0	148	651
Total Volume	290	0	57	347	0	0	0	0	0	409	511	920	54	764	0	818	2085
% App. Total	83.6	0	16.4		0	0	0		0	44.5	55.5		6.6	93.4	0		
PHF	.471	.000	.445	.466	.000	.000	.000	.000	.000	.913	.578	.726	.643	.786	.000	.790	.801
Cars	290	0	56	346	0	0	0	0	0	395	511	906	53	757	0	810	2062
% Cars	100	0	98.2	99.7	0	0	0	0	0	96.6	100	98.5	98.1	99.1	0	99.0	98.9
Heavy Vehicles	0	0	1	1	0	0	0	0	0	14	0	14	1	7	0	8	23
% Heavy Vehicles	0	0	1.8	0.3	0	0	0	0	0	3.4	0	1.5	1.9	0.9	0	1.0	1.1



GPI Project #:
Stoneham, MA
Client: John DeBarros



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Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Stoneham High School Drive Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	1	0	0	1	0	0	0	0	0	25	2	27	0	66	0	66	94
06:15 AM	0	0	1	1	0	0	0	0	0	30	1	31	0	85	0	85	117
06:30 AM	2	0	0	2	0	0	0	0	0	80	7	87	1	144	0	145	234
06:45 AM	3	0	4	7	0	0	0	0	0	103	19	122	5	215	0	220	349
Total	6	0	5	11	0	0	0	0	0	238	29	267	6	510	0	516	794
07:00 AM	32	0	3	35	0	0	0	0	0	100	66	166	16	240	0	256	457
07:15 AM	101	0	17	118	0	0	0	0	0	84	221	305	11	177	0	188	611
07:30 AM	154	0	32	186	0	0	0	0	0	108	205	313	21	125	0	146	645
07:45 AM	21	0	3	24	0	0	0	0	0	127	14	141	5	127	0	132	297
Total	308	0	55	363	0	0	0	0	0	419	506	925	53	669	0	722	2010
08:00 AM	5	0	1	6	0	0	0	0	0	128	7	135	2	203	0	205	346
08:15 AM	1	0	0	1	0	0	0	0	0	125	3	128	0	219	0	219	348
08:30 AM	1	0	0	1	0	0	0	0	0	145	1	146	1	226	0	227	374
08:45 AM	0	0	1	1	0	0	0	0	0	130	0	130	0	200	0	200	331
Total	7	0	2	9	0	0	0	0	0	528	11	539	3	848	0	851	1399
Grand Total	321	0	62	383	0	0	0	0	0	1185	546	1731	62	2027	0	2089	4203
Apprch %	83.8	0	16.2		0	0	0		0	68.5	31.5		3	97	0		
Total %	7.6	0	1.5	9.1	0	0	0	0	0	28.2	13	41.2	1.5	48.2	0	49.7	

	Stoneham High School Drive Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:45 AM																	
06:45 AM	3	0	4	7	0	0	0	0	0	103	19	122	5	215	0	220	349
07:00 AM	32	0	3	35	0	0	0	0	0	100	66	166	16	240	0	256	457
07:15 AM	101	0	17	118	0	0	0	0	0	84	221	305	11	177	0	188	611
07:30 AM	154	0	32	186	0	0	0	0	0	108	205	313	21	125	0	146	645
Total Volume	290	0	56	346	0	0	0	0	0	395	511	906	53	757	0	810	2062
% App. Total	83.8	0	16.2		0	0	0		0	43.6	56.4		6.5	93.5	0		
PHF	.471	.000	.438	.465	.000	.000	.000	.000	.000	.914	.578	.724	.631	.789	.000	.791	.799

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				06:00 AM				07:00 AM				08:00 AM			
+0 mins.	32	0	3	35	0	0	0	0	0	100	66	166	2	203	0	205
+15 mins.	101	0	17	118	0	0	0	0	0	84	221	305	0	219	0	219
+30 mins.	154	0	32	186	0	0	0	0	0	108	205	313	1	226	0	227
+45 mins.	21	0	3	24	0	0	0	0	0	127	14	141	0	200	0	200
Total Volume	308	0	55	363	0	0	0	0	0	419	506	925	3	848	0	851
% App. Total	84.8	0	15.2		0	0	0		0	45.3	54.7		0.4	99.6	0	
PHF	.500	.000	.430	.488	.000	.000	.000	.000	.000	.825	.572	.739	.375	.938	.000	.937

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
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File Name : School AM
Site Code : 2
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Stoneham High School Drive Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6
06:15 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
06:30 AM	1	0	0	1	0	0	0	0	0	6	1	7	0	2	0	2	10
06:45 AM	0	0	0	0	0	0	0	0	0	6	0	6	1	2	0	3	9
Total	1	0	0	1	0	0	0	0	0	18	1	19	1	9	0	10	30
07:00 AM	0	0	1	1	0	0	0	0	0	2	0	2	0	3	0	3	6
07:15 AM	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6
07:45 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	5	0	5	9
Total	0	0	1	1	0	0	0	0	0	12	0	12	0	10	0	10	23
08:00 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6
08:15 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	8
08:30 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	1	4
08:45 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
Total	0	0	0	0	0	0	0	0	0	14	0	14	0	9	0	9	23
Grand Total	1	0	1	2	0	0	0	0	0	44	1	45	1	28	0	29	76
Apprch %	50	0	50		0	0	0		0	97.8	2.2		3.4	96.6	0		
Total %	1.3	0	1.3	2.6	0	0	0	0	0	57.9	1.3	59.2	1.3	36.8	0	38.2	

	Stoneham High School Drive Northbound				Southbound				Franklin Road Eastbound				Franklin Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:00 AM																	
06:00 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6
06:15 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
06:30 AM	1	0	0	1	0	0	0	0	0	6	1	7	0	2	0	2	10
06:45 AM	0	0	0	0	0	0	0	0	0	6	0	6	1	2	0	3	9
Total Volume	1	0	0	1	0	0	0	0	0	18	1	19	1	9	0	10	30
% App. Total	100	0	0		0	0	0		0	94.7	5.3		10	90	0		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.750	.250	.679	.250	.750	.000	.833	.750

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	06:15 AM				06:00 AM				06:00 AM				07:30 AM				
+0 mins.	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	
+15 mins.	1	0	0	1	0	0	0	0	0	3	0	3	0	5	0	5	
+30 mins.	0	0	0	0	0	0	0	0	0	6	1	7	0	2	0	2	
+45 mins.	0	0	1	1	0	0	0	0	0	6	0	6	0	4	0	4	
Total Volume	1	0	1	2	0	0	0	0	0	18	1	19	0	13	0	13	
% App. Total	50	0	50		0	0	0		0	94.7	5.3		0	100	0		
PHF	.250	.000	.250	.500	.000	.000	.000	.000	.000	.750	.250	.679	.000	.650	.000	.650	

Accurate Counts

978-664-2565

N/S Street : Franklion Place
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470003
 Site Code : 16470003
 Start Date : 4/10/2014
 Page No : 10

Groups Printed- Bikes Peds

	Franklin St From East			High School Dwy From South			Franklin St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
07:00 AM	0	1	0	0	0	2	0	0	1	3	1	4
07:15 AM	0	0	0	0	0	2	0	0	7	9	0	9
07:30 AM	0	1	0	0	0	0	0	1	4	4	2	6
07:45 AM	0	1	0	0	0	0	0	0	3	3	1	4
Total	0	3	0	0	0	4	0	1	15	19	4	23
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	3	0	0	0	4	0	1	15	19	4	23
Apprch %	0	100		0	0		0	100				
Total %	0	75		0	0		0	25		82.6	17.4	

	Franklin St From East			High School Dwy From South			Franklin St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 08:30 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	1	1	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	1	1	0	0	0	0	1	1	2
07:45 AM	0	1	1	0	0	0	0	0	0	1
Total Volume	0	3	3	0	0	0	0	1	1	4
% App. Total	0	100		0	0		0	100		
PHF	.000	.750	.750	.000	.000	.000	.000	.250	.250	.500

GPI Project #:
Stoneham, MA
Client: John DeBarros

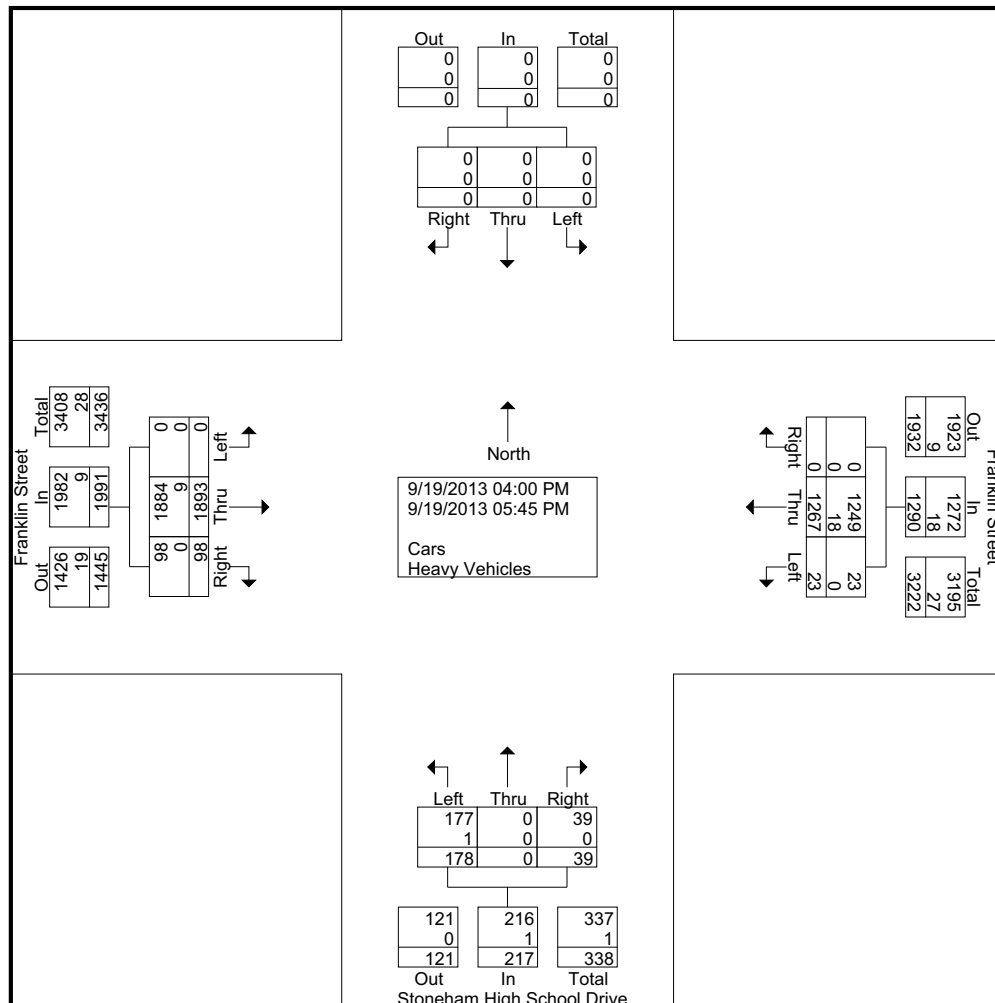


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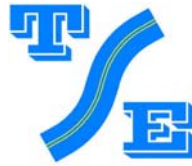
File Name : School PM
Site Code : 2
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Stoneham High School Drive Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	10	0	4	14	0	0	0	0	0	191	12	203	3	136	0	139	356
04:15 PM	18	0	5	23	0	0	0	0	0	211	10	221	3	137	0	140	384
04:30 PM	8	0	3	11	0	0	0	0	0	212	9	221	4	127	0	131	363
04:45 PM	26	0	5	31	0	0	0	0	0	216	21	237	6	131	0	137	405
Total	62	0	17	79	0	0	0	0	0	830	52	882	16	531	0	547	1508
05:00 PM	40	0	9	49	0	0	0	0	0	259	10	269	0	143	0	143	461
05:15 PM	26	0	7	33	0	0	0	0	0	251	21	272	3	207	0	210	515
05:30 PM	33	0	4	37	0	0	0	0	0	272	8	280	2	184	0	186	503
05:45 PM	17	0	2	19	0	0	0	0	0	281	7	288	2	202	0	204	511
Total	116	0	22	138	0	0	0	0	0	1063	46	1109	7	736	0	743	1990
Grand Total	178	0	39	217	0	0	0	0	0	1893	98	1991	23	1267	0	1290	3498
Apprch %	82	0	18		0	0	0		0	95.1	4.9		1.8	98.2	0		
Total %	5.1	0	1.1	6.2	0	0	0	0	0	54.1	2.8	56.9	0.7	36.2	0	36.9	
Cars	177	0	39	216	0	0	0	0	0	1884	98	1982	23	1249	0	1272	6940
% Cars	99.4	0	100	99.5	0	0	0	0	0	99.5	100	99.5	100	98.6	0	98.6	99.2
Heavy Vehicles	1	0	0	1	0	0	0	0	0	9	0	9	0	18	0	18	56
% Heavy Vehicles	0.6	0	0	0.5	0	0	0	0	0	0.5	0	0.5	0	1.4	0	1.4	0.8



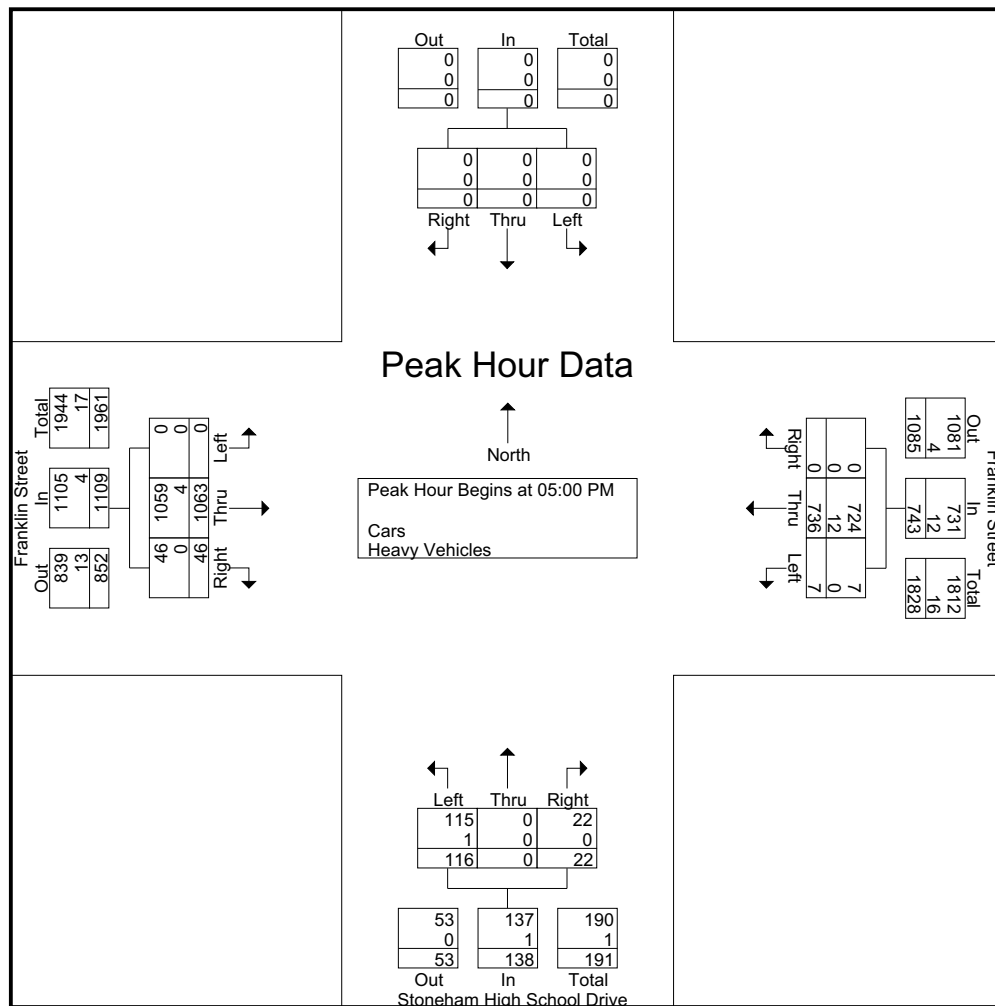
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
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File Name : School PM
Site Code : 2
Start Date : 9/19/2013
Page No : 2 of 4

	Stoneham High School Drive Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	40	0	9	49	0	0	0	0	0	259	10	269	0	143	0	143	461
05:15 PM	26	0	7	33	0	0	0	0	0	251	21	272	3	207	0	210	515
05:30 PM	33	0	4	37	0	0	0	0	0	272	8	280	2	184	0	186	503
05:45 PM	17	0	2	19	0	0	0	0	0	281	7	288	2	202	0	204	511
Total Volume	116	0	22	138	0	0	0	0	0	1063	46	1109	7	736	0	743	1990
% App. Total	84.1	0	15.9		0	0	0		0	95.9	4.1		0.9	99.1	0		
PHF	.725	.000	.611	.704	.000	.000	.000	.000	.000	.946	.548	.963	.583	.889	.000	.885	.966
Cars	115	0	22	137	0	0	0	0	0	1059	46	1105	7	724	0	731	1973
% Cars	99.1	0	100	99.3	0	0	0	0	0	99.6	100	99.6	100	98.4	0	98.4	99.1
Heavy Vehicles	1	0	0	1	0	0	0	0	0	4	0	4	0	12	0	12	17
% Heavy Vehicles	0.9	0	0	0.7	0	0	0	0	0	0.4	0	0.4	0	1.6	0	1.6	0.9



GPI Project #:
Stoneham, MA
Client: John DeBarros



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106 Sharon Road
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File Name : School PM
Site Code : 2
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Stoneham High School Drive Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	10	0	4	14	0	0	0	0	0	190	12	202	3	134	0	137	353
04:15 PM	18	0	5	23	0	0	0	0	0	209	10	219	3	135	0	138	380
04:30 PM	8	0	3	11	0	0	0	0	0	211	9	220	4	126	0	130	361
04:45 PM	26	0	5	31	0	0	0	0	0	215	21	236	6	130	0	136	403
Total	62	0	17	79	0	0	0	0	0	825	52	877	16	525	0	541	1497
05:00 PM	39	0	9	48	0	0	0	0	0	258	10	268	0	142	0	142	458
05:15 PM	26	0	7	33	0	0	0	0	0	250	21	271	3	202	0	205	509
05:30 PM	33	0	4	37	0	0	0	0	0	271	8	279	2	180	0	182	498
05:45 PM	17	0	2	19	0	0	0	0	0	280	7	287	2	200	0	202	508
Total	115	0	22	137	0	0	0	0	0	1059	46	1105	7	724	0	731	1973
Grand Total	177	0	39	216	0	0	0	0	0	1884	98	1982	23	1249	0	1272	3470
Apprch %	81.9	0	18.1		0	0	0		0	95.1	4.9		1.8	98.2	0		
Total %	5.1	0	1.1	6.2	0	0	0	0	0	54.3	2.8	57.1	0.7	36	0	36.7	

	Stoneham High School Drive Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	39	0	9	48	0	0	0	0	0	258	10	268	0	142	0	142	458
05:15 PM	26	0	7	33	0	0	0	0	0	250	21	271	3	202	0	205	509
05:30 PM	33	0	4	37	0	0	0	0	0	271	8	279	2	180	0	182	498
05:45 PM	17	0	2	19	0	0	0	0	0	280	7	287	2	200	0	202	508
Total Volume	115	0	22	137	0	0	0	0	0	1059	46	1105	7	724	0	731	1973
% App. Total	83.9	0	16.1		0	0	0		0	95.8	4.2		1	99	0		
PHF	.737	.000	.611	.714	.000	.000	.000	.000	.000	.946	.548	.963	.583	.896	.000	.891	.969

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM				04:00 PM				05:00 PM				05:00 PM			
+0 mins.	26	0	5	31	0	0	0	0	0	258	10	268	0	142	0	142
+15 mins.	39	0	9	48	0	0	0	0	0	250	21	271	3	202	0	205
+30 mins.	26	0	7	33	0	0	0	0	0	271	8	279	2	180	0	182
+45 mins.	33	0	4	37	0	0	0	0	0	280	7	287	2	200	0	202
Total Volume	124	0	25	149	0	0	0	0	0	1059	46	1105	7	724	0	731
% App. Total	83.2	0	16.8		0	0	0		0	95.8	4.2		1	99	0	
PHF	.795	.000	.694	.776	.000	.000	.000	.000	.000	.946	.548	.963	.583	.896	.000	.891

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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File Name : School PM
Site Code : 2
Start Date : 9/19/2013
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Groups Printed- Heavy Vehicles

	Stoneham High School Drive Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
04:15 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2	4
04:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
Total	0	0	0	0	0	0	0	0	0	5	0	5	0	6	0	6	11
05:00 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	1	0	1	3
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	5	0	5	6
05:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	4	0	4	5
05:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
Total	1	0	0	1	0	0	0	0	0	4	0	4	0	12	0	12	17
Grand Total	1	0	0	1	0	0	0	0	0	9	0	9	0	18	0	18	28
Apprch %	100	0	0		0	0	0		0	100	0		0	100	0		
Total %	3.6	0	0	3.6	0	0	0	0	0	32.1	0	32.1	0	64.3	0	64.3	

	Stoneham High School Drive Northbound				Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	1	0	1	3
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	5	0	5	6
05:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	4	0	4	5
05:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
Total Volume	1	0	0	1	0	0	0	0	0	4	0	4	0	12	0	12	17
% App. Total	100	0	0		0	0	0		0	100	0		0	100	0		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	1.000	.000	1.000	.000	.600	.000	.600	.708

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:15 PM				04:00 PM				04:00 PM				05:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
+15 mins.	0	0	0	0	0	0	0	0	0	2	0	2	0	5	0	5
+30 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	4	0	4
+45 mins.	1	0	0	1	0	0	0	0	0	1	0	1	0	2	0	2
Total Volume	1	0	0	1	0	0	0	0	0	5	0	5	0	12	0	12
% App. Total	100	0	0		0	0	0		0	100	0		0	100	0	
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.625	.000	.625	.000	.600	.000	.600

Accurate Counts

978-664-2565

N/S Street : Franklion Place
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470003
Site Code : 16470003
Start Date : 4/10/2014
Page No : 8

Groups Printed- Bikes Peds

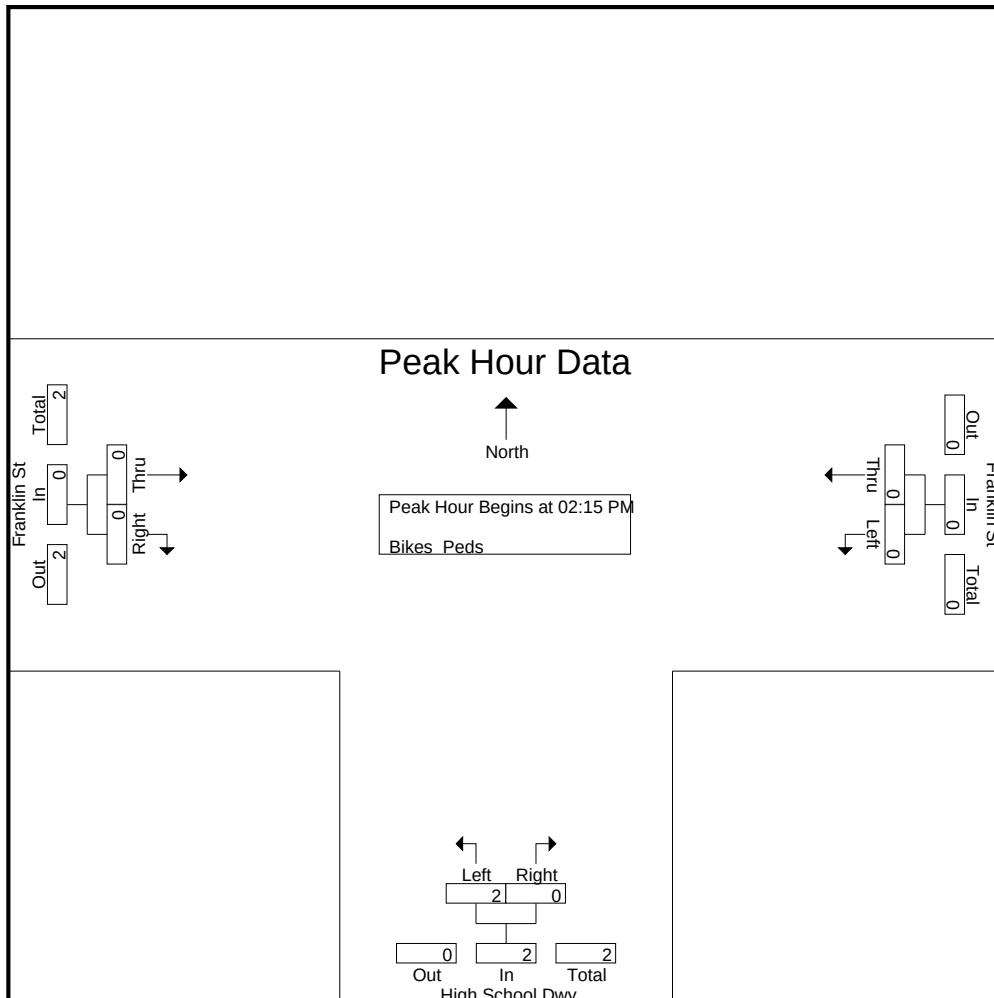
	Franklin St From East			High School Dwy From South			Franklin St From West			Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds			
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	2	0	12	0	0	84	96	2	98
02:45 PM	0	0	0	0	0	3	0	0	2	5	0	5
Total	0	0	0	2	0	15	0	0	86	101	2	103
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	2	0	15	0	0	86	101	2	103
Apprch %	0	0		100	0		0	0				
Total %	0	0		100	0		0	0		98.1	1.9	

	Franklin St From East			High School Dwy From South			Franklin St From West			Int. Total
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	

Peak Hour Analysis From 02:15 PM to 03:00 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 02:15 PM

02:15 PM	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	2	0	2	0	0	0	2
02:45 PM	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	2	0	2	0	0	0	2
% App. Total	0	0		100	0		0	0		
PHF	.000	.000	.000	.250	.000	.250	.000	.000	.000	.250



Accurate Counts

978-664-2565

N/S Street : Franklion Place
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470003
Site Code : 16470003
Start Date : 4/10/2014
Page No : 8

Groups Printed- Bikes Peds

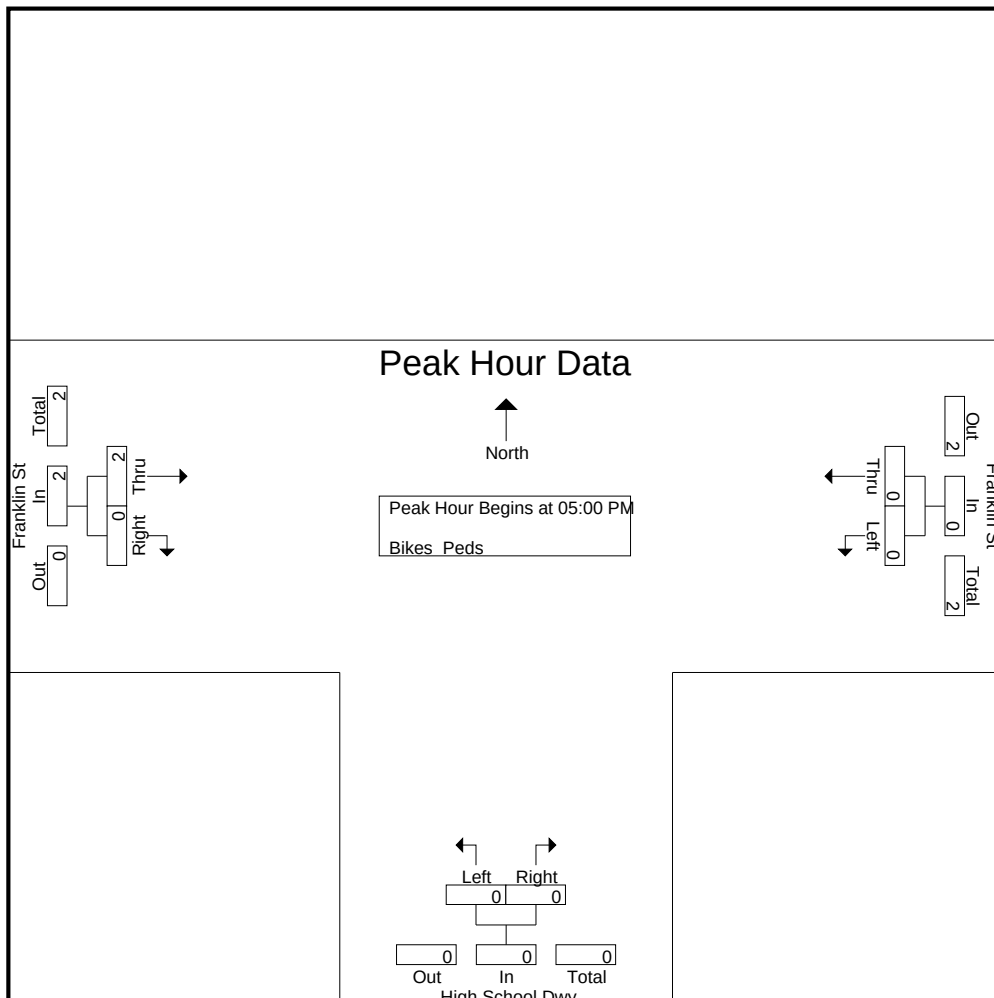
	Franklin St From East			High School Dwy From South			Franklin St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
05:00 PM	0	0	0	0	0	0	1	0	5	5	1	6
05:15 PM	0	0	0	0	0	0	0	0	4	4	0	4
05:30 PM	0	0	0	0	0	1	0	0	1	2	0	2
05:45 PM	0	0	0	0	0	0	1	0	6	6	1	7
Total	0	0	0	0	0	1	2	0	16	17	2	19
Grand Total	0	0	0	0	0	1	2	0	16	17	2	19
Apprch %	0	0		0	0		100	0				
Total %	0	0		0	0		100	0		89.5	10.5	

	Franklin St From East			High School Dwy From South			Franklin St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total

Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

05:00 PM	0	0	0	0	0	0	1	0	1	1
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	0	2	0	2	2
% App. Total	0	0		0	0		100	0		
PHF	.000	.000	.000	.000	.000	.000	.500	.000	.500	.500



GPI Project #:
Stoneham, MA
Client: John DeBarros

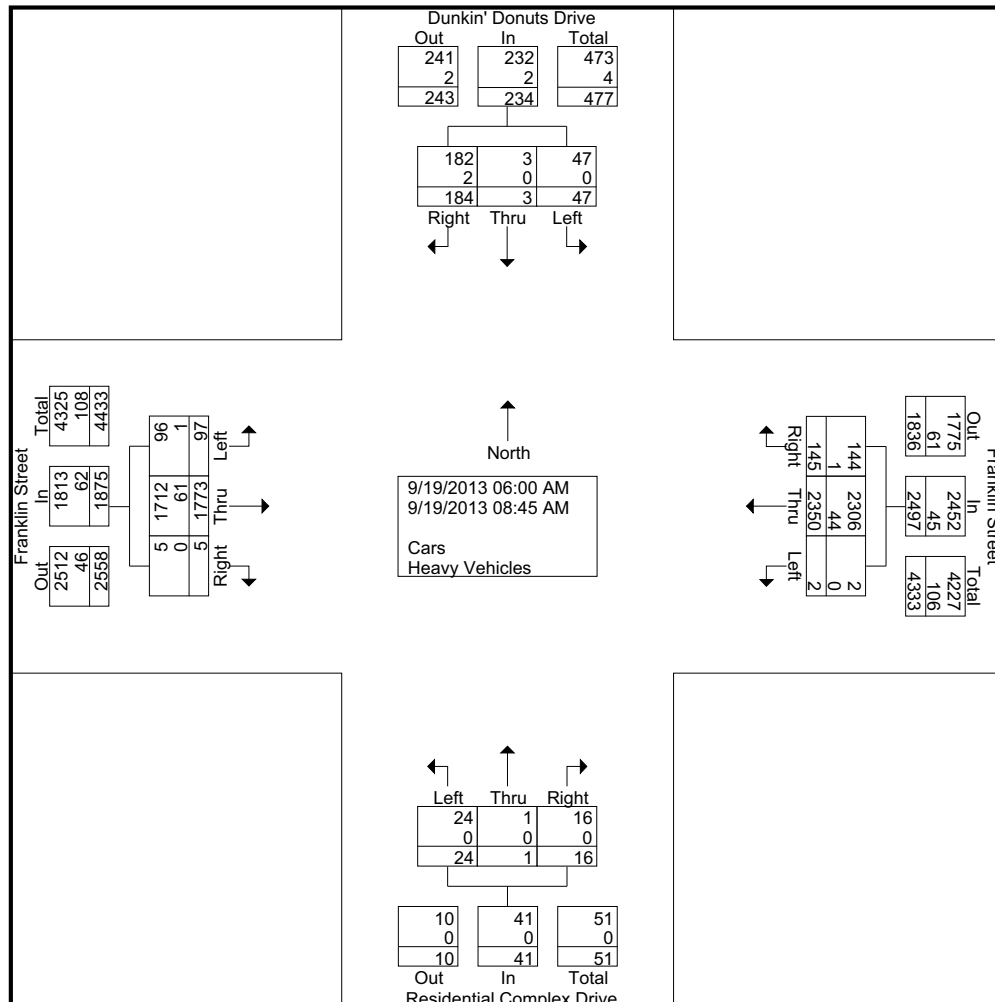


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
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File Name : Dunkins AM
Site Code : 9
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Residential Complex Drive Northbound				Dunkin' Donuts Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	1	0	0	1	0	0	5	5	4	21	0	25	0	42	3	45	76
06:15 AM	1	1	0	2	0	0	8	8	7	52	0	59	0	118	5	123	192
06:30 AM	3	0	3	6	4	0	19	23	11	96	0	107	0	165	19	184	320
06:45 AM	3	0	1	4	4	0	17	21	11	128	1	140	0	209	10	219	384
Total	8	1	4	13	8	0	49	57	33	297	1	331	0	534	37	571	972
07:00 AM	2	0	0	2	6	0	12	18	14	165	0	179	0	245	12	257	456
07:15 AM	1	0	1	2	10	1	17	28	7	236	0	243	0	231	13	244	517
07:30 AM	0	0	2	2	6	0	14	20	3	323	0	326	0	217	11	228	576
07:45 AM	3	0	3	6	1	0	8	9	6	174	0	180	1	255	7	263	458
Total	6	0	6	12	23	1	51	75	30	898	0	928	1	948	43	992	2007
08:00 AM	2	0	4	6	2	0	25	27	10	181	0	191	0	238	21	259	483
08:15 AM	2	0	0	2	4	0	21	25	11	154	0	165	0	220	19	239	431
08:30 AM	2	0	1	3	6	2	20	28	8	120	3	131	1	215	7	223	385
08:45 AM	4	0	1	5	4	0	18	22	5	123	1	129	0	195	18	213	369
Total	10	0	6	16	16	2	84	102	34	578	4	616	1	868	65	934	1668
Grand Total	24	1	16	41	47	3	184	234	97	1773	5	1875	2	2350	145	2497	4647
Apprch %	58.5	2.4	39		20.1	1.3	78.6		5.2	94.6	0.3		0.1	94.1	5.8		
Total %	0.5	0	0.3	0.9	1	0.1	4	5	2.1	38.2	0.1	40.3	0	50.6	3.1	53.7	
Cars	24	1	16	41	47	3	182	232	96	1712	5	1813	2	2306	144	2452	9076
% Cars	100	100	100	100	100	100	98.9	99.1	99	96.6	100	96.7	100	98.1	99.3	98.2	97.7
Heavy Vehicles	0	0	0	0	0	0	2	2	1	61	0	62	0	44	1	45	218
% Heavy Vehicles	0	0	0	0	0	0	1.1	0.9	1	3.4	0	3.3	0	1.9	0.7	1.8	2.3



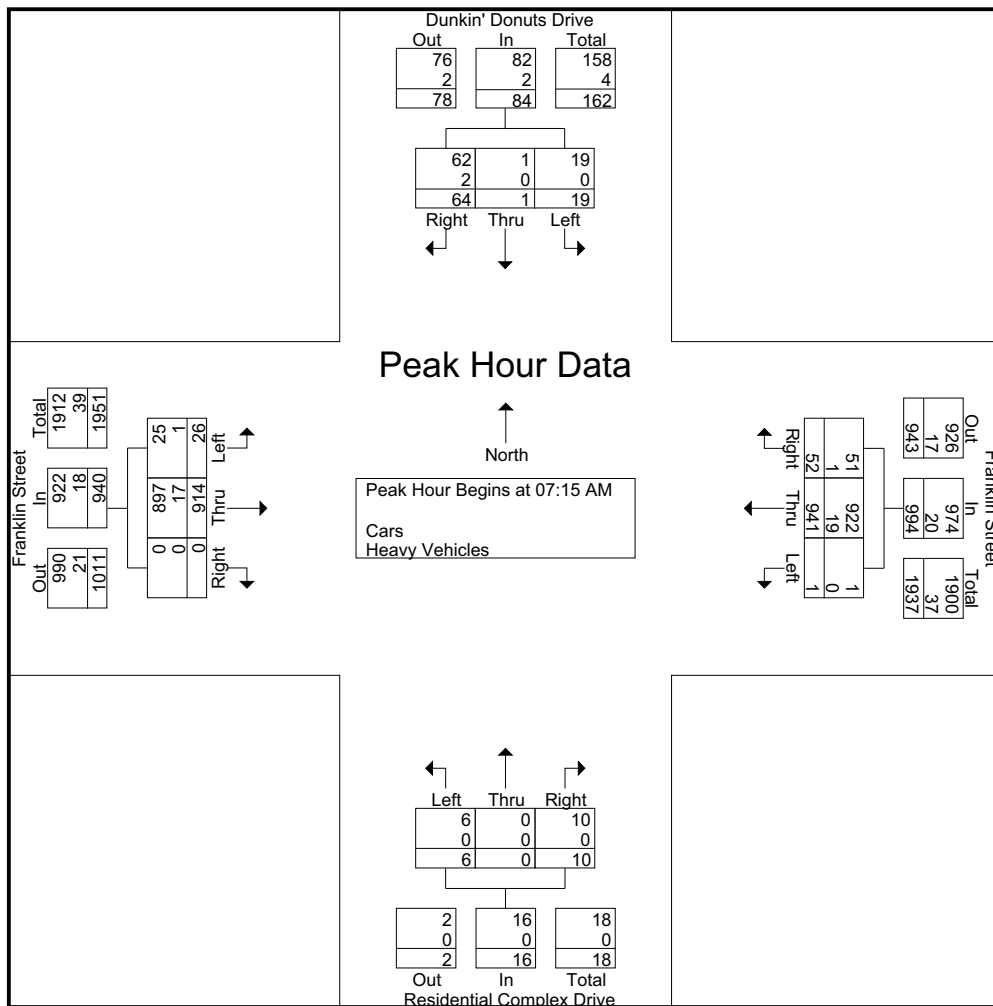
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5636
F: 617-801-8800
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File Name : Dunkins AM
Site Code : 9
Start Date : 9/19/2013
Page No : 2 of 4

	Residential Complex Drive Northbound				Dunkin' Donuts Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	1	0	1	2	10	1	17	28	7	236	0	243	0	231	13	244	517
07:30 AM	0	0	2	2	6	0	14	20	3	323	0	326	0	217	11	228	576
07:45 AM	3	0	3	6	1	0	8	9	6	174	0	180	1	255	7	263	458
08:00 AM	2	0	4	6	2	0	25	27	10	181	0	191	0	238	21	259	483
Total Volume	6	0	10	16	19	1	64	84	26	914	0	940	1	941	52	994	2034
% App. Total	37.5	0	62.5		22.6	1.2	76.2		2.8	97.2	0		0.1	94.7	5.2		
PHF	.500	.000	.625	.667	.475	.250	.640	.750	.650	.707	.000	.721	.250	.923	.619	.945	.883
Cars	6	0	10	16	19	1	62	82	25	897	0	922	1	922	51	974	1994
% Cars	100	0	100	100	100	100	96.9	97.6	96.2	98.1	0	98.1	100	98.0	98.1	98.0	98.0
Heavy Vehicles	0	0	0	0	0	0	2	2	1	17	0	18	0	19	1	20	40
% Heavy Vehicles	0	0	0	0	0	0	3.1	2.4	3.8	1.9	0	1.9	0	2.0	1.9	2.0	2.0



GPI Project #:
Stoneham, MA
Client: John DeBarros



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File Name : Dunkins AM
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Groups Printed- Cars

	Residential Complex Drive Northbound				Dunkin' Donuts Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	1	0	0	1	0	0	5	5	4	17	0	21	0	40	3	43	70
06:15 AM	1	1	0	2	0	0	8	8	7	48	0	55	0	116	5	121	186
06:30 AM	3	0	3	6	4	0	19	23	11	92	0	103	0	164	19	183	315
06:45 AM	3	0	1	4	4	0	17	21	11	124	1	136	0	207	10	217	378
Total	8	1	4	13	8	0	49	57	33	281	1	315	0	527	37	564	949
07:00 AM	2	0	0	2	6	0	12	18	14	156	0	170	0	242	12	254	444
07:15 AM	1	0	1	2	10	1	16	27	6	233	0	239	0	227	13	240	508
07:30 AM	0	0	2	2	6	0	14	20	3	319	0	322	0	215	11	226	570
07:45 AM	3	0	3	6	1	0	8	9	6	170	0	176	1	244	7	252	443
Total	6	0	6	12	23	1	50	74	29	878	0	907	1	928	43	972	1965
08:00 AM	2	0	4	6	2	0	24	26	10	175	0	185	0	236	20	256	473
08:15 AM	2	0	0	2	4	0	21	25	11	144	0	155	0	218	19	237	419
08:30 AM	2	0	1	3	6	2	20	28	8	113	3	124	1	207	7	215	370
08:45 AM	4	0	1	5	4	0	18	22	5	121	1	127	0	190	18	208	362
Total	10	0	6	16	16	2	83	101	34	553	4	591	1	851	64	916	1624
Grand Total	24	1	16	41	47	3	182	232	96	1712	5	1813	2	2306	144	2452	4538
Apprch %	58.5	2.4	39		20.3	1.3	78.4		5.3	94.4	0.3		0.1	94	5.9		
Total %	0.5	0	0.4	0.9	1	0.1	4	5.1	2.1	37.7	0.1	40	0	50.8	3.2	54	

	Residential Complex Drive Northbound				Dunkin' Donuts Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	1	0	1	2	10	1	16	27	6	233	0	239	0	227	13	240	508
07:30 AM	0	0	2	2	6	0	14	20	3	319	0	322	0	215	11	226	570
07:45 AM	3	0	3	6	1	0	8	9	6	170	0	176	1	244	7	252	443
08:00 AM	2	0	4	6	2	0	24	26	10	175	0	185	0	236	20	256	473
Total Volume	6	0	10	16	19	1	62	82	25	897	0	922	1	922	51	974	1994
% App. Total	37.5	0	62.5		23.2	1.2	75.6		2.7	97.3	0		0.1	94.7	5.2		
PHF	.500	.000	.625	.667	.475	.250	.646	.759	.625	.703	.000	.716	.250	.945	.638	.951	.875

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:45 AM				08:00 AM				07:15 AM				07:15 AM			
+0 mins.	3	0	3	6	2	0	24	26	6	233	0	239	0	227	13	240
+15 mins.	2	0	4	6	4	0	21	25	3	319	0	322	0	215	11	226
+30 mins.	2	0	0	2	6	2	20	28	6	170	0	176	1	244	7	252
+45 mins.	2	0	1	3	4	0	18	22	10	175	0	185	0	236	20	256
Total Volume	9	0	8	17	16	2	83	101	25	897	0	922	1	922	51	974
% App. Total	52.9	0	47.1		15.8	2	82.2		2.7	97.3	0		0.1	94.7	5.2	
PHF	.750	.000	.500	.708	.667	.250	.865	.902	.625	.703	.000	.716	.250	.945	.638	.951

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
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File Name : Dunkins AM
Site Code : 9
Start Date : 9/19/2013
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Groups Printed- Heavy Vehicles

	Residential Complex Drive Northbound				Dunkin' Donuts Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6
06:15 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6
06:30 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	1	0	1	5
06:45 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6
Total	0	0	0	0	0	0	0	0	0	16	0	16	0	7	0	7	23
07:00 AM	0	0	0	0	0	0	0	0	0	9	0	9	0	3	0	3	12
07:15 AM	0	0	0	0	0	0	1	1	1	3	0	4	0	4	0	4	9
07:30 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6
07:45 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	11	0	11	15
Total	0	0	0	0	0	0	1	1	1	20	0	21	0	20	0	20	42
08:00 AM	0	0	0	0	0	0	1	1	0	6	0	6	0	2	1	3	10
08:15 AM	0	0	0	0	0	0	0	0	0	10	0	10	0	2	0	2	12
08:30 AM	0	0	0	0	0	0	0	0	0	7	0	7	0	8	0	8	15
08:45 AM	0	0	0	0	0	0	0	0	0	2	0	2	0	5	0	5	7
Total	0	0	0	0	0	0	1	1	0	25	0	25	0	17	1	18	44
Grand Total	0	0	0	0	0	0	2	2	1	61	0	62	0	44	1	45	109
Apprch %	0	0	0		0	0	100		1.6	98.4	0		0	97.8	2.2		
Total %	0	0	0		0	0	1.8	1.8	0.9	56	0	56.9	0	40.4	0.9	41.3	

	Residential Complex Drive Northbound				Dunkin' Donuts Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	11	0	11	15
08:00 AM	0	0	0	0	0	0	1	1	0	6	0	6	0	2	1	3	10
08:15 AM	0	0	0	0	0	0	0	0	0	10	0	10	0	2	0	2	12
08:30 AM	0	0	0	0	0	0	0	0	0	7	0	7	0	8	0	8	15
Total Volume	0	0	0	0	0	0	1	1	0	27	0	27	0	23	1	24	52
% App. Total	0	0	0		0	0	100		0	100	0		0	95.8	4.2		
PHF	.000	.000	.000	.000	.000	.000	.250	.250	.000	.675	.000	.675	.000	.523	.250	.545	.867

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	06:00 AM				07:15 AM				07:45 AM				07:45 AM				
+0 mins.	0	0	0	0	0	0	1	1	0	4	0	4	0	11	0	11	
+15 mins.	0	0	0	0	0	0	0	0	0	6	0	6	0	2	1	3	
+30 mins.	0	0	0	0	0	0	0	0	0	10	0	10	0	2	0	2	
+45 mins.	0	0	0	0	0	0	1	1	0	7	0	7	0	8	0	8	
Total Volume	0	0	0	0	0	0	2	2	0	27	0	27	0	23	1	24	
% App. Total	0	0	0		0	0	100		0	100	0		0	95.8	4.2		
PHF	.000	.000	.000	.000	.000	.000	.500	.500	.000	.675	.000	.675	.000	.523	.250	.545	

Accurate Counts

978-664-2565

N/S Street : Dunkin Donuts / Private Dr
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470004
 Site Code : 16470004
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Dunkin Donuts From North				Franklin St From East				Private Dr From South				Franklin St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
07:15 AM	0	0	0	7	0	0	0	0	0	0	0	1	0	2	0	0	8	2	10
07:30 AM	0	0	0	4	0	1	0	0	0	0	0	2	0	0	0	0	6	1	7
07:45 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2
Total	0	0	0	12	0	2	0	0	0	0	0	3	0	2	0	0	15	4	19
08:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
Grand Total	0	0	0	12	0	3	0	0	0	0	0	3	0	2	0	0	15	5	20
Apprch %	0	0	0		0	100	0		0	0	0		0	100	0				
Total %	0	0	0		0	60	0		0	0	0		0	40	0		75	25	

	Dunkin Donuts From North				Franklin St From East				Private Dr From South				Franklin St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
07:30 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	3	0	3	0	0	0	0	0	2	0	2	5
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.750	.000	.750	.000	.000	.000	.000	.000	.250	.000	.250	.625

GPI Project #:
Stoneham, MA
Client: John DeBarros

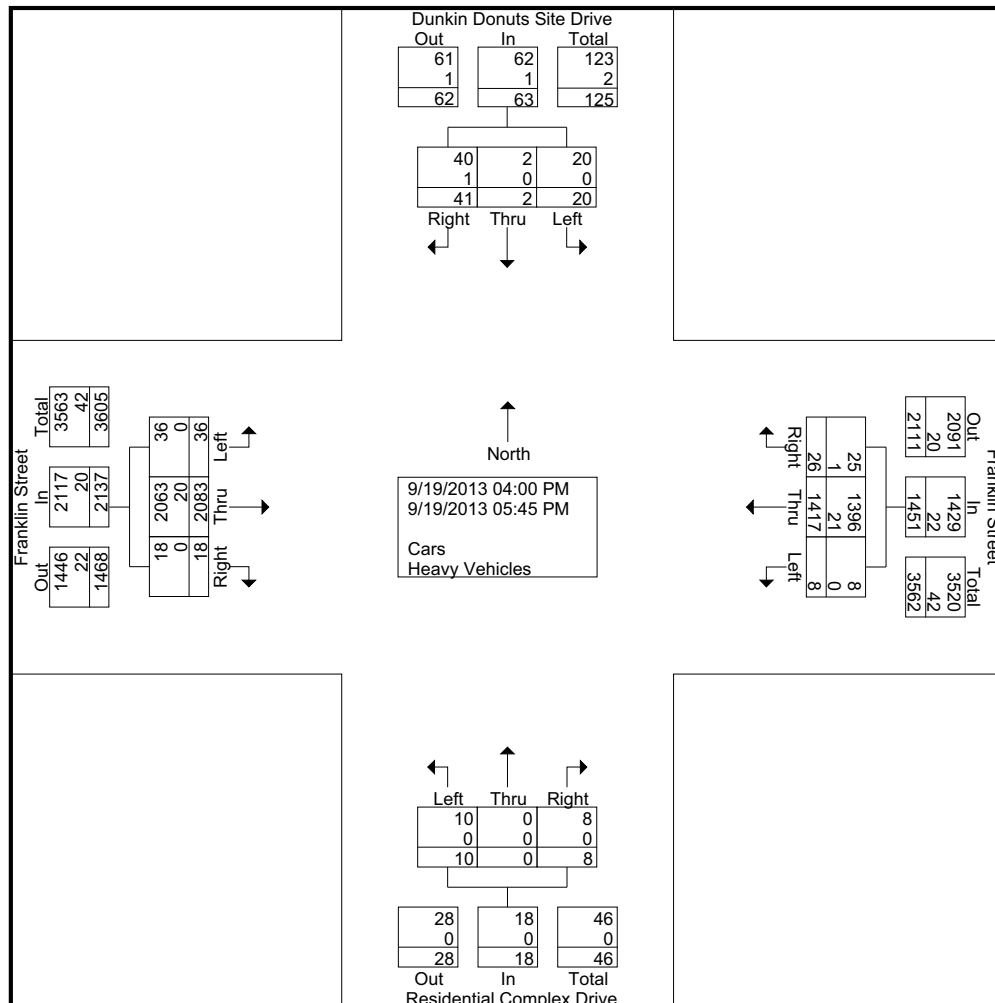


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-301-8800
www.tsetraffic.com

File Name : Dunkins PM
Site Code : 9
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

Start Time	Residential Complex Drive Northbound				Dunkin Donuts Site Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	1	0	0	1	3	0	4	7	3	243	2	248	1	143	3	147	403
04:15 PM	0	0	1	1	1	0	6	7	3	235	2	240	1	141	2	144	392
04:30 PM	1	0	2	3	2	0	6	8	3	243	2	248	1	144	6	151	410
04:45 PM	2	0	1	3	2	1	3	6	4	282	1	287	1	191	1	193	489
Total	4	0	4	8	8	1	19	28	13	1003	7	1023	4	619	12	635	1694
05:00 PM	2	0	1	3	4	0	4	8	7	256	3	266	3	190	2	195	472
05:15 PM	1	0	1	2	2	0	2	4	3	299	2	304	0	222	5	227	537
05:30 PM	1	0	0	1	1	0	13	14	8	258	4	270	0	223	4	227	512
05:45 PM	2	0	2	4	5	1	3	9	5	267	2	274	1	163	3	167	454
Total	6	0	4	10	12	1	22	35	23	1080	11	1114	4	798	14	816	1975
Grand Total	10	0	8	18	20	2	41	63	36	2083	18	2137	8	1417	26	1451	3669
Apprch %	55.6	0	44.4		31.7	3.2	65.1		1.7	97.5	0.8		0.6	97.7	1.8		
Total %	0.3	0	0.2	0.5	0.5	0.1	1.1	1.7	1	56.8	0.5	58.2	0.2	38.6	0.7	39.5	
Cars	10	0	8	18	20	2	40	62	36	2063	18	2117	8	1396	25	1429	7252
% Cars	100	0	100	100	100	100	97.6	98.4	100	99	100	99.1	100	98.5	96.2	98.5	98.8
Heavy Vehicles	0	0	0	0	0	0	1	1	0	20	0	20	0	21	1	22	86
% Heavy Vehicles	0	0	0	0	0	0	2.4	1.6	0	1	0	0.9	0	1.5	3.8	1.5	1.2



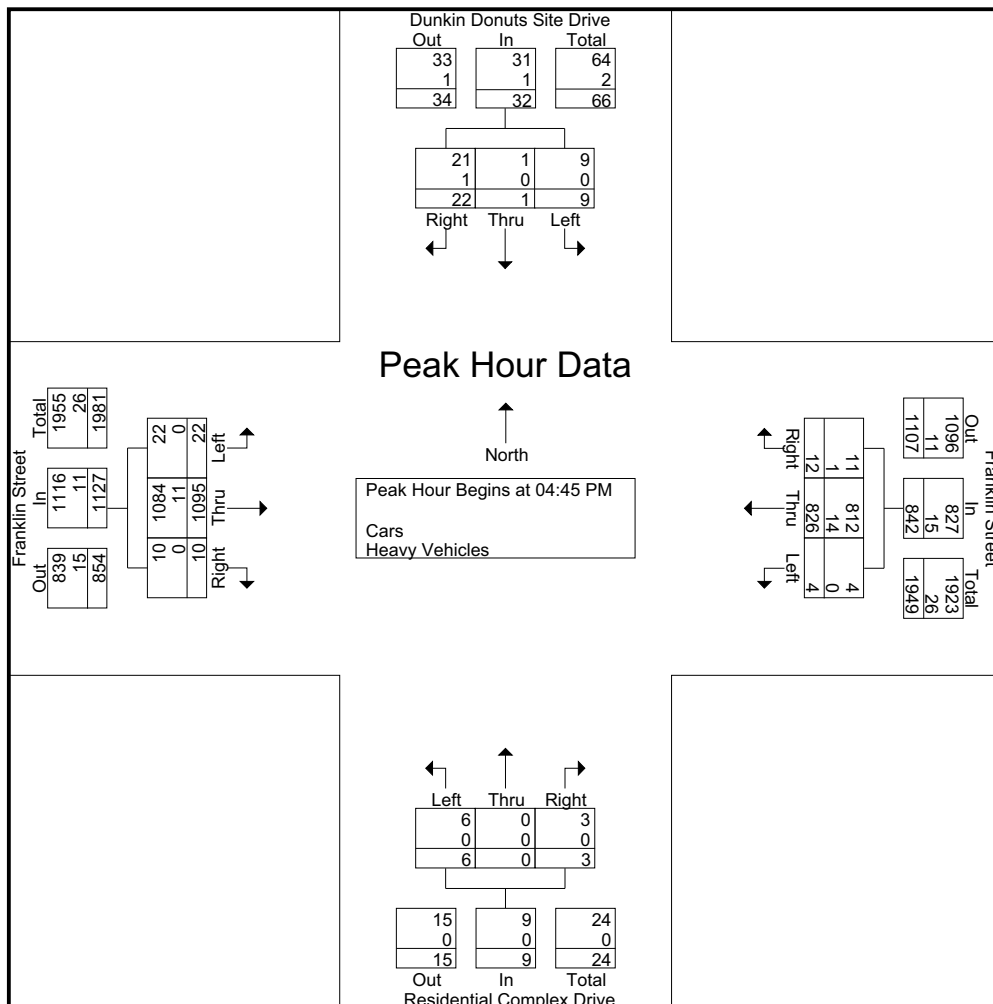
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
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File Name : Dunkins PM
Site Code : 9
Start Date : 9/19/2013
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	Residential Complex Drive Northbound				Dunkin Donuts Site Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	0	1	3	2	1	3	6	4	282	1	287	1	191	1	193	489
05:00 PM	2	0	1	3	4	0	4	8	7	256	3	266	3	190	2	195	472
05:15 PM	1	0	1	2	2	0	2	4	3	299	2	304	0	222	5	227	537
05:30 PM	1	0	0	1	1	0	13	14	8	258	4	270	0	223	4	227	512
Total Volume	6	0	3	9	9	1	22	32	22	1095	10	1127	4	826	12	842	2010
% App. Total	66.7	0	33.3		28.1	3.1	68.8		2	97.2	0.9		0.5	98.1	1.4		
PHF	.750	.000	.750	.750	.563	.250	.423	.571	.688	.916	.625	.927	.333	.926	.600	.927	.936
Cars	6	0	3	9	9	1	21	31	22	1084	10	1116	4	812	11	827	1983
% Cars	100	0	100	100	100	100	95.5	96.9	100	99.0	100	99.0	100	98.3	91.7	98.2	98.7
Heavy Vehicles	0	0	0	0	0	0	1	1	0	11	0	11	0	14	1	15	27
% Heavy Vehicles	0	0	0	0	0	0	4.5	3.1	0	1.0	0	1.0	0	1.7	8.3	1.8	1.3



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File Name : Dunkins PM
Site Code : 9
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Residential Complex Drive Northbound				Dunkin Donuts Site Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	1	0	0	1	3	0	4	7	3	241	2	246	1	142	3	146	400
04:15 PM	0	0	1	1	1	0	6	7	3	233	2	238	1	140	2	143	389
04:30 PM	1	0	2	3	2	0	6	8	3	240	2	245	1	142	6	149	405
04:45 PM	2	0	1	3	2	1	3	6	4	275	1	280	1	189	1	191	480
Total	4	0	4	8	8	1	19	28	13	989	7	1009	4	613	12	629	1674
05:00 PM	2	0	1	3	4	0	4	8	7	254	3	264	3	188	1	192	467
05:15 PM	1	0	1	2	2	0	2	4	3	299	2	304	0	220	5	225	535
05:30 PM	1	0	0	1	1	0	12	13	8	256	4	268	0	215	4	219	501
05:45 PM	2	0	2	4	5	1	3	9	5	265	2	272	1	160	3	164	449
Total	6	0	4	10	12	1	21	34	23	1074	11	1108	4	783	13	800	1952
Grand Total	10	0	8	18	20	2	40	62	36	2063	18	2117	8	1396	25	1429	3626
Apprch %	55.6	0	44.4		32.3	3.2	64.5		1.7	97.4	0.9		0.6	97.7	1.7		
Total %	0.3	0	0.2	0.5	0.6	0.1	1.1	1.7	1	56.9	0.5	58.4	0.2	38.5	0.7	39.4	

	Residential Complex Drive Northbound				Dunkin Donuts Site Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	0	1	3	2	1	3	6	4	275	1	280	1	189	1	191	480
05:00 PM	2	0	1	3	4	0	4	8	7	254	3	264	3	188	1	192	467
05:15 PM	1	0	1	2	2	0	2	4	3	299	2	304	0	220	5	225	535
05:30 PM	1	0	0	1	1	0	12	13	8	256	4	268	0	215	4	219	501
Total Volume	6	0	3	9	9	1	21	31	22	1084	10	1116	4	812	11	827	1983
% App. Total	66.7	0	33.3		29	3.2	67.7		2	97.1	0.9		0.5	98.2	1.3		
PHF	.750	.000	.750	.750	.563	.250	.438	.596	.688	.906	.625	.918	.333	.923	.550	.919	.927

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				04:45 PM				04:45 PM			
+0 mins.	1	0	2	3	4	0	4	8	4	275	1	280	1	189	1	191
+15 mins.	2	0	1	3	2	0	2	4	7	254	3	264	3	188	1	192
+30 mins.	2	0	1	3	1	0	12	13	3	299	2	304	0	220	5	225
+45 mins.	1	0	1	2	5	1	3	9	8	256	4	268	0	215	4	219
Total Volume	6	0	5	11	12	1	21	34	22	1084	10	1116	4	812	11	827
% App. Total	54.5	0	45.5		35.3	2.9	61.8		2	97.1	0.9		0.5	98.2	1.3	
PHF	.750	.000	.625	.917	.600	.250	.438	.654	.688	.906	.625	.918	.333	.923	.550	.919

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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File Name : Dunkins PM
Site Code : 9
Start Date : 9/19/2013
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Groups Printed- Heavy Vehicles

	Residential Complex Drive Northbound				Dunkin Donuts Site Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
04:15 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
04:30 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
04:45 PM	0	0	0	0	0	0	0	0	0	7	0	7	0	2	0	2	9
Total	0	0	0	0	0	0	0	0	0	14	0	14	0	6	0	6	20
05:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	2	1	3	5
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
05:30 PM	0	0	0	0	0	0	1	1	0	2	0	2	0	8	0	8	11
05:45 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	3	0	3	5
Total	0	0	0	0	0	0	1	1	0	6	0	6	0	15	1	16	23
Grand Total	0	0	0	0	0	0	1	1	0	20	0	20	0	21	1	22	43
Apprch %	0	0	0		0	0	100		0	100	0		0	95.5	4.5		
Total %	0	0	0		0	0	2.3	2.3	0	46.5	0	46.5	0	48.8	2.3	51.2	

	Residential Complex Drive Northbound				Dunkin Donuts Site Drive Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	0	0	0	0	0	0	0	7	0	7	0	2	0	2	9
05:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	2	1	3	5
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
05:30 PM	0	0	0	0	0	0	1	1	0	2	0	2	0	8	0	8	11
Total Volume	0	0	0	0	0	0	1	1	0	11	0	11	0	14	1	15	27
% App. Total	0	0	0		0	0	100		0	100	0		0	93.3	6.7		
PHF	.000	.000	.000	.000	.000	.000	.250	.250	.000	.393	.000	.393	.000	.438	.250	.469	.614

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:45 PM				04:00 PM				05:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	2	0	2	0	2	1	3
+15 mins.	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2
+30 mins.	0	0	0	0	0	0	0	0	0	3	0	3	0	8	0	8
+45 mins.	0	0	0	0	0	0	1	1	0	7	0	7	0	3	0	3
Total Volume	0	0	0	0	0	0	1	1	0	14	0	14	0	15	1	16
% App. Total	0	0	0		0	0	100		0	100	0		0	93.8	6.2	
PHF	.000	.000	.000	.000	.000	.000	.250	.250	.000	.500	.000	.500	.000	.469	.250	.500

Accurate Counts

978-664-2565

N/S Street : Dunkin Donuts / Private Dr
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470004
 Site Code : 16470004
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Dunkin Donuts From North				Franklin St From East				Private Dr From South				Franklin St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
04:45 PM	0	0	0	2	0	0	0	0	0	0	0	2	0	1	0	0	4	1	5
Total	0	0	0	2	0	0	0	0	0	0	0	2	0	1	0	0	4	1	5
05:00 PM	0	0	0	3	0	1	0	0	0	0	0	1	0	1	0	0	4	2	6
05:15 PM	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	6	0	6
05:30 PM	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	3	0	3
Grand Total	0	0	0	9	0	1	0	0	0	0	0	8	0	2	0	0	17	3	20
Apprch %	0	0	0		0	100	0		0	0	0		0	100	0				
Total %	0	0	0		0	33.3	0		0	0	0		0	66.7	0		85	15	

	Dunkin Donuts From North				Franklin St From East				Private Dr From South				Franklin St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:45 PM to 05:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
05:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0	2	3
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.500	.000	.500	.375

GPI Project #:
Stoneham, MA
Client: John DeBarros

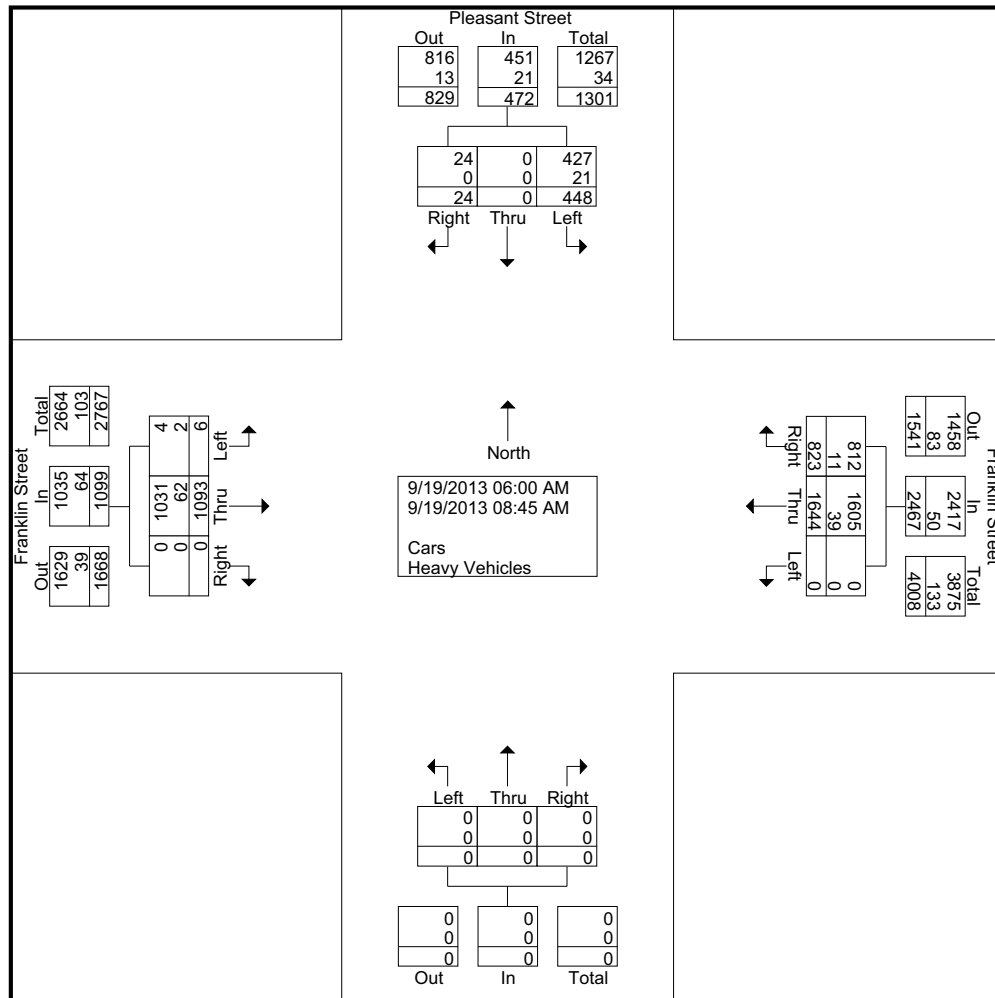


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-801-3800
www.tsetraffic.com

File Name : Pleafrank AM
Site Code : 7
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

Start Time	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
06:00 AM	0	0	0	0	17	0	1	18	0	37	0	37	0	59	24	83	138
06:15 AM	0	0	0	0	24	0	2	26	0	44	0	44	0	89	38	127	197
06:30 AM	0	0	0	0	33	0	1	34	1	51	0	52	0	119	66	185	271
06:45 AM	0	0	0	0	44	0	2	46	0	72	0	72	0	150	87	237	355
Total	0	0	0	0	118	0	6	124	1	204	0	205	0	417	215	632	961
07:00 AM	0	0	0	0	44	0	0	44	0	120	0	120	0	168	87	255	419
07:15 AM	0	0	0	0	51	0	1	52	0	152	0	152	0	156	91	247	451
07:30 AM	0	0	0	0	39	0	4	43	2	146	0	148	0	150	48	198	389
07:45 AM	0	0	0	0	40	0	6	46	1	111	0	112	0	179	89	268	426
Total	0	0	0	0	174	0	11	185	3	529	0	532	0	653	315	968	1685
08:00 AM	0	0	0	0	43	0	3	46	0	92	0	92	0	135	54	189	327
08:15 AM	0	0	0	0	43	0	3	46	0	88	0	88	0	172	83	255	389
08:30 AM	0	0	0	0	39	0	1	40	0	103	0	103	0	134	94	228	371
08:45 AM	0	0	0	0	31	0	0	31	2	77	0	79	0	133	62	195	305
Total	0	0	0	0	156	0	7	163	2	360	0	362	0	574	293	867	1392
Grand Total	0	0	0	0	448	0	24	472	6	1093	0	1099	0	1644	823	2467	4038
Apprch %	0	0	0	0	94.9	0	5.1	94.9	0.5	99.5	0	99.5	0	66.6	33.4	66.6	
Total %	0	0	0	0	11.1	0	0.6	11.7	0.1	27.1	0	27.2	0	40.7	20.4	61.1	
Cars	0	0	0	0	427	0	24	451	4	1031	0	1035	0	1605	812	2417	7806
% Cars	0	0	0	0	95.3	0	100	95.6	66.7	94.3	0	94.2	0	97.6	98.7	98	96.7
Heavy Vehicles	0	0	0	0	21	0	0	21	2	62	0	64	0	39	11	50	270
% Heavy Vehicles	0	0	0	0	4.7	0	0	4.4	33.3	5.7	0	5.8	0	2.4	1.3	2	3.3



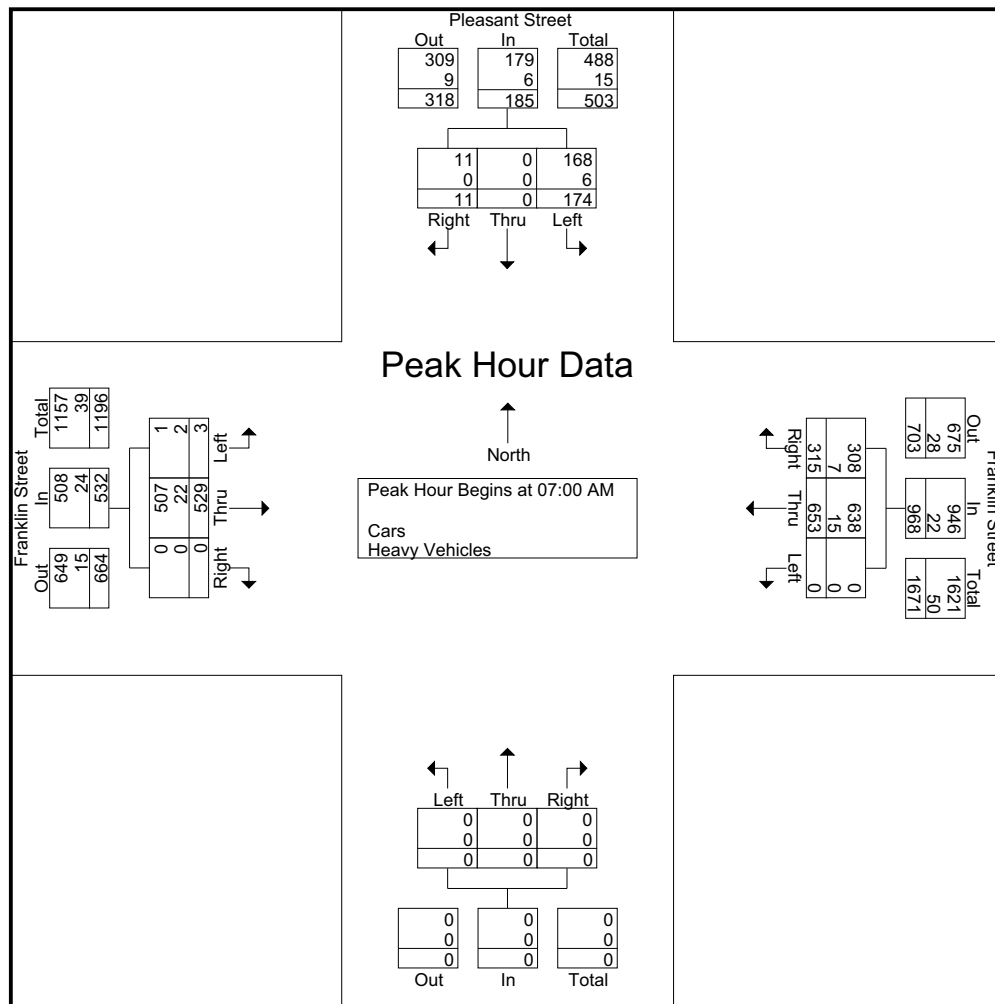
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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Site Code : 7
Start Date : 9/19/2013
Page No : 2 of 4

	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	44	0	0	44	0	120	0	120	0	168	87	255	419
07:15 AM	0	0	0	0	51	0	1	52	0	152	0	152	0	156	91	247	451
07:30 AM	0	0	0	0	39	0	4	43	2	146	0	148	0	150	48	198	389
07:45 AM	0	0	0	0	40	0	6	46	1	111	0	112	0	179	89	268	426
Total Volume	0	0	0	0	174	0	11	185	3	529	0	532	0	653	315	968	1685
% App. Total	0	0	0		94.1	0	5.9		0.6	99.4	0		0	67.5	32.5		
PHF	.000	.000	.000	.000	.853	.000	.458	.889	.375	.870	.000	.875	.000	.912	.865	.903	.934
Cars	0	0	0	0	168	0	11	179	1	507	0	508	0	638	308	946	1633
% Cars	0	0	0	0	96.6	0	100	96.8	33.3	95.8	0	95.5	0	97.7	97.8	97.7	96.9
Heavy Vehicles	0	0	0	0	6	0	0	6	2	22	0	24	0	15	7	22	52
% Heavy Vehicles	0	0	0	0	3.4	0	0	3.2	66.7	4.2	0	4.5	0	2.3	2.2	2.3	3.1



GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
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File Name : Pleafrank AM
Site Code : 7
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

Start Time	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
06:00 AM	0	0	0	0	16	0	1	17	0	36	0	36	0	57	24	81	134
06:15 AM	0	0	0	0	21	0	2	23	0	43	0	43	0	87	37	124	190
06:30 AM	0	0	0	0	32	0	1	33	1	46	0	47	0	118	65	183	263
06:45 AM	0	0	0	0	43	0	2	45	0	69	0	69	0	147	86	233	347
Total	0	0	0	0	112	0	6	118	1	194	0	195	0	409	212	621	934
07:00 AM	0	0	0	0	44	0	0	44	0	114	0	114	0	165	86	251	409
07:15 AM	0	0	0	0	50	0	1	51	0	149	0	149	0	153	91	244	444
07:30 AM	0	0	0	0	38	0	4	42	0	138	0	138	0	146	47	193	373
07:45 AM	0	0	0	0	36	0	6	42	1	106	0	107	0	174	84	258	407
Total	0	0	0	0	168	0	11	179	1	507	0	508	0	638	308	946	1633
08:00 AM	0	0	0	0	42	0	3	45	0	82	0	82	0	131	54	185	312
08:15 AM	0	0	0	0	38	0	3	41	0	82	0	82	0	168	83	251	374
08:30 AM	0	0	0	0	38	0	1	39	0	96	0	96	0	131	93	224	359
08:45 AM	0	0	0	0	29	0	0	29	2	70	0	72	0	128	62	190	291
Total	0	0	0	0	147	0	7	154	2	330	0	332	0	558	292	850	1336
Grand Total	0	0	0	0	427	0	24	451	4	1031	0	1035	0	1605	812	2417	3903
Apprch %	0	0	0		94.7	0	5.3		0.4	99.6	0		0	66.4	33.6		
Total %	0	0	0		10.9	0	0.6	11.6	0.1	26.4	0	26.5	0	41.1	20.8	61.9	

	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	44	0	0	44	0	114	0	114	0	165	86	251	409
07:15 AM	0	0	0	0	50	0	1	51	0	149	0	149	0	153	91	244	444
07:30 AM	0	0	0	0	38	0	4	42	0	138	0	138	0	146	47	193	373
07:45 AM	0	0	0	0	36	0	6	42	1	106	0	107	0	174	84	258	407
Total Volume	0	0	0	0	168	0	11	179	1	507	0	508	0	638	308	946	1633
% App. Total	0	0	0		93.9	0	6.1		0.2	99.8	0		0	67.4	32.6		
PHF	.000	.000	.000	.000	.840	.000	.458	.877	.250	.851	.000	.852	.000	.917	.846	.917	.919

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	06:00 AM				06:45 AM				07:00 AM				07:00 AM			
+0 mins.	0	0	0	0	43	0	2	45	0	114	0	114	0	165	86	251
+15 mins.	0	0	0	0	44	0	0	44	0	149	0	149	0	153	91	244
+30 mins.	0	0	0	0	50	0	1	51	0	138	0	138	0	146	47	193
+45 mins.	0	0	0	0	38	0	4	42	1	106	0	107	0	174	84	258
Total Volume	0	0	0	0	175	0	7	182	1	507	0	508	0	638	308	946
% App. Total	0	0	0		96.2	0	3.8		0.2	99.8	0		0	67.4	32.6	
PHF	.000	.000	.000	.000	.875	.000	.438	.892	.250	.851	.000	.852	.000	.917	.846	.917

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5636
F: 617-301-8300
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File Name : Pleafrank AM
Site Code : 7
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

Start Time	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
06:00 AM	0	0	0	0	1	0	0	1	0	1	0	1	0	2	0	2	4
06:15 AM	0	0	0	0	3	0	0	3	0	1	0	1	0	2	1	3	7
06:30 AM	0	0	0	0	1	0	0	1	0	5	0	5	0	1	1	2	8
06:45 AM	0	0	0	0	1	0	0	1	0	3	0	3	0	3	1	4	8
Total	0	0	0	0	6	0	0	6	0	10	0	10	0	8	3	11	27
07:00 AM	0	0	0	0	0	0	0	0	0	6	0	6	0	3	1	4	10
07:15 AM	0	0	0	0	1	0	0	1	0	3	0	3	0	3	0	3	7
07:30 AM	0	0	0	0	1	0	0	1	2	8	0	10	0	4	1	5	16
07:45 AM	0	0	0	0	4	0	0	4	0	5	0	5	0	5	5	10	19
Total	0	0	0	0	6	0	0	6	2	22	0	24	0	15	7	22	52
08:00 AM	0	0	0	0	1	0	0	1	0	10	0	10	0	4	0	4	15
08:15 AM	0	0	0	0	5	0	0	5	0	6	0	6	0	4	0	4	15
08:30 AM	0	0	0	0	1	0	0	1	0	7	0	7	0	3	1	4	12
08:45 AM	0	0	0	0	2	0	0	2	0	7	0	7	0	5	0	5	14
Total	0	0	0	0	9	0	0	9	0	30	0	30	0	16	1	17	56
Grand Total	0	0	0	0	21	0	0	21	2	62	0	64	0	39	11	50	135
Apprch %	0	0	0		100	0	0		3.1	96.9	0		0	78	22		
Total %	0	0	0		15.6	0	0	15.6	1.5	45.9	0	47.4	0	28.9	8.1	37	

	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	1	0	0	1	2	8	0	10	0	4	1	5	16
07:45 AM	0	0	0	0	4	0	0	4	0	5	0	5	0	5	5	10	19
08:00 AM	0	0	0	0	1	0	0	1	0	10	0	10	0	4	0	4	15
08:15 AM	0	0	0	0	5	0	0	5	0	6	0	6	0	4	0	4	15
Total Volume	0	0	0	0	11	0	0	11	2	29	0	31	0	17	6	23	65
% App. Total	0	0	0		100	0	0		6.5	93.5	0		0	73.9	26.1		
PHF	.000	.000	.000	.000	.550	.000	.000	.550	.250	.725	.000	.775	.000	.850	.300	.575	.855

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	06:00 AM				07:30 AM				07:30 AM				07:30 AM			
+0 mins.	0	0	0	0	1	0	0	1	2	8	0	10	0	4	1	5
+15 mins.	0	0	0	0	4	0	0	4	0	5	0	5	0	5	5	10
+30 mins.	0	0	0	0	1	0	0	1	0	10	0	10	0	4	0	4
+45 mins.	0	0	0	0	5	0	0	5	0	6	0	6	0	4	0	4
Total Volume	0	0	0	0	11	0	0	11	2	29	0	31	0	17	6	23
% App. Total	0	0	0		100	0	0		6.5	93.5	0		0	73.9	26.1	
PHF	.000	.000	.000	.000	.550	.000	.000	.550	.250	.725	.000	.775	.000	.850	.300	.575

Accurate Counts

978-664-2565

N/S Street : Pleasant Street
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470005
Site Code : 16470005
Start Date : 4/10/2014
Page No : 8

Groups Printed- Bikes Peds

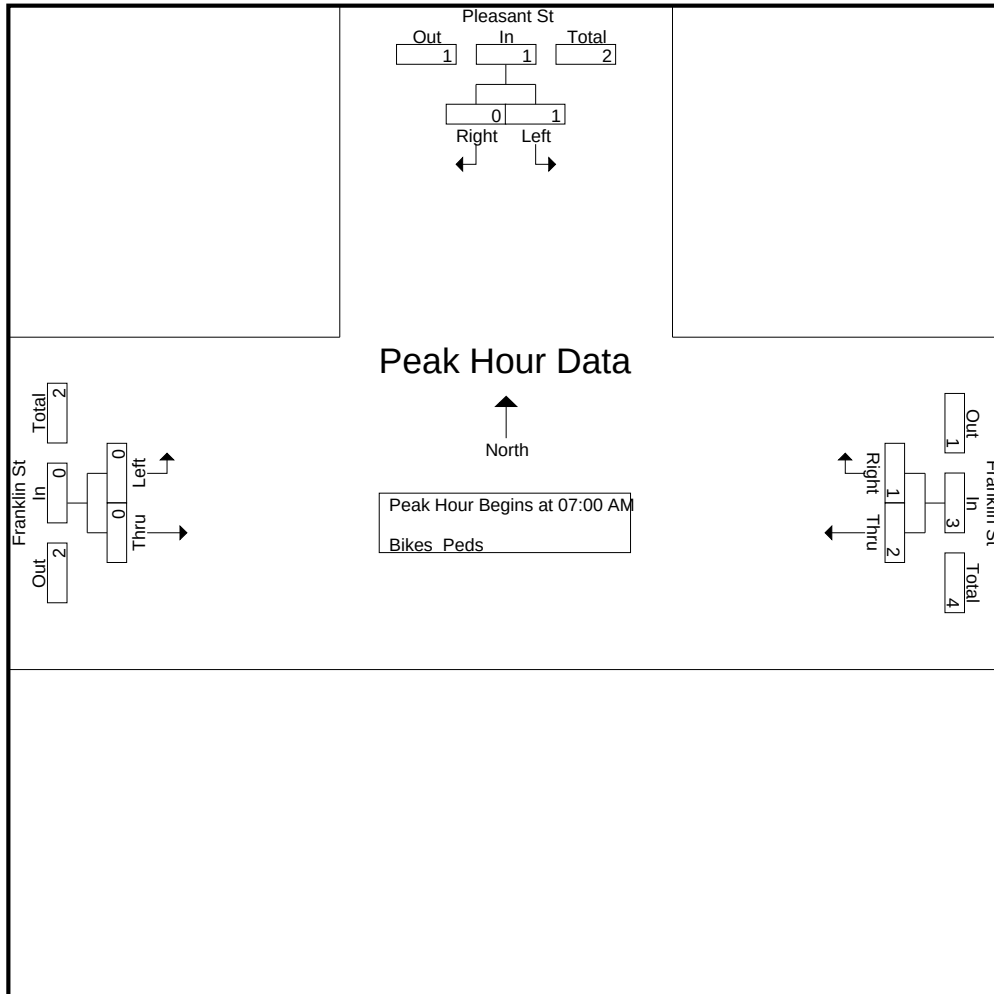
	Pleasant St From North			Franklin St From East			Franklin St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	1	0	0	0	0	0	0	1	1
07:15 AM	1	0	0	0	0	0	0	0	0	0	1	1
07:30 AM	0	0	0	0	1	1	0	0	0	1	1	2
07:45 AM	0	0	0	1	0	0	0	0	0	0	1	1
Total	1	0	0	2	1	1	0	0	0	1	4	5
Grand Total	1	0	0	2	1	1	0	0	0	1	4	5
Apprch %	100	0		66.7	33.3		0	0				
Total %	25	0		50	25		0	0		20	80	

	Pleasant St From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total

Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM

07:00 AM	0	0	0	1	0	1	0	0	0	1
07:15 AM	1	0	1	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	1	1	0	0	0	1
07:45 AM	0	0	0	1	0	1	0	0	0	1
Total Volume	1	0	1	2	1	3	0	0	0	4
% App. Total	100	0		66.7	33.3		0	0		
PHF	.250	.000	.250	.500	.250	.750	.000	.000	.000	1.00



GPI Project #:
Stoneham, MA
Client: John DeBarros

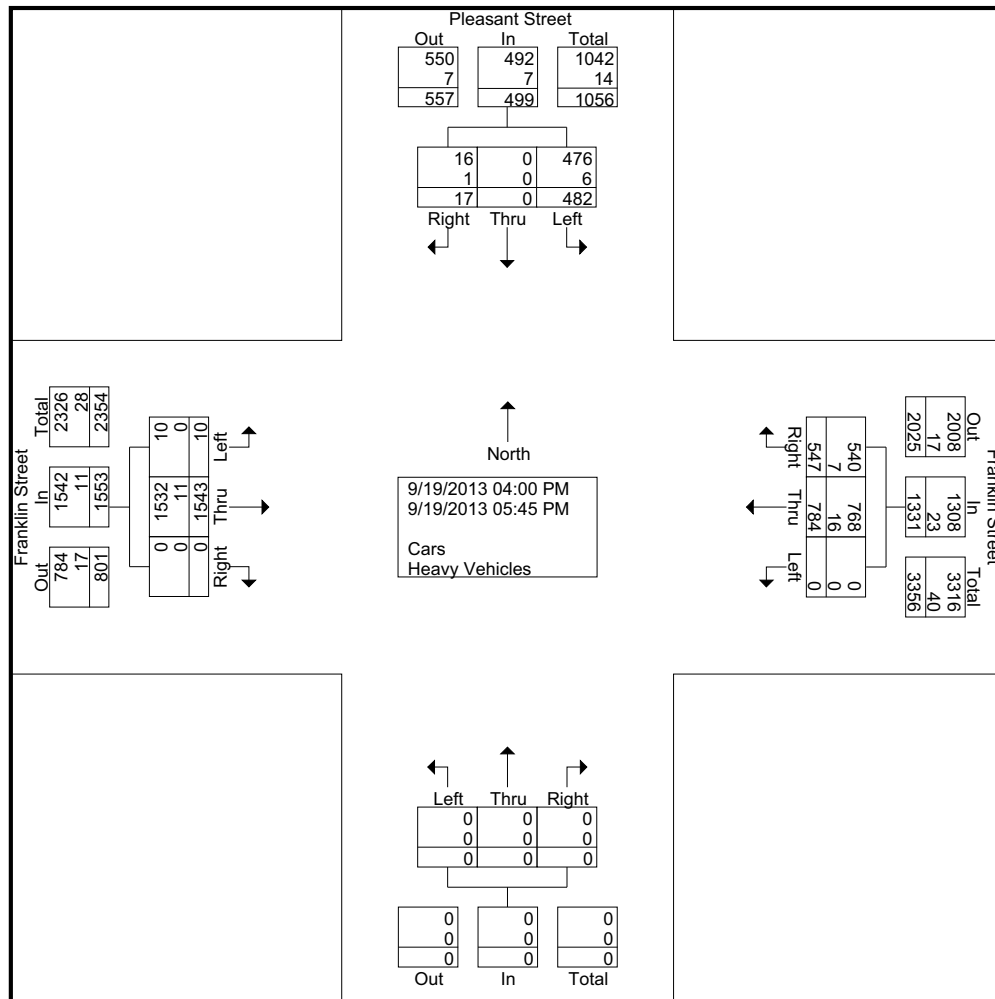


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-301-3800
www.tsetraffic.com

File Name : Pleafrank PM
Site Code : 7
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

Start Time	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	0	0	0	0	52	0	2	54	2	167	0	169	0	90	58	148	371
04:15 PM	0	0	0	0	50	0	2	52	2	170	0	172	0	87	62	149	373
04:30 PM	0	0	0	0	57	0	3	60	0	191	0	191	0	89	56	145	396
04:45 PM	0	0	0	0	58	0	3	61	1	204	0	205	0	110	68	178	444
Total	0	0	0	0	217	0	10	227	5	732	0	737	0	376	244	620	1584
05:00 PM	0	0	0	0	72	0	0	72	2	196	0	198	0	92	76	168	438
05:15 PM	0	0	0	0	63	0	1	64	1	193	0	194	0	121	70	191	449
05:30 PM	0	0	0	0	54	0	4	58	2	205	0	207	0	115	86	201	466
05:45 PM	0	0	0	0	76	0	2	78	0	217	0	217	0	80	71	151	446
Total	0	0	0	0	265	0	7	272	5	811	0	816	0	408	303	711	1799
Grand Total	0	0	0	0	482	0	17	499	10	1543	0	1553	0	784	547	1331	3383
Apprch %	0	0	0		96.6	0	3.4		0.6	99.4	0		0	58.9	41.1		
Total %	0	0	0	0	14.2	0	0.5	14.8	0.3	45.6	0	45.9	0	23.2	16.2	39.3	
Cars	0	0	0	0	476	0	16	492	10	1532	0	1542	0	768	540	1308	6684
% Cars	0	0	0	0	98.8	0	94.1	98.6	100	99.3	0	99.3	0	98	98.7	98.3	98.8
Heavy Vehicles	0	0	0	0	6	0	1	7	0	11	0	11	0	16	7	23	82
% Heavy Vehicles	0	0	0	0	1.2	0	5.9	1.4	0	0.7	0	0.7	0	2	1.3	1.7	1.2



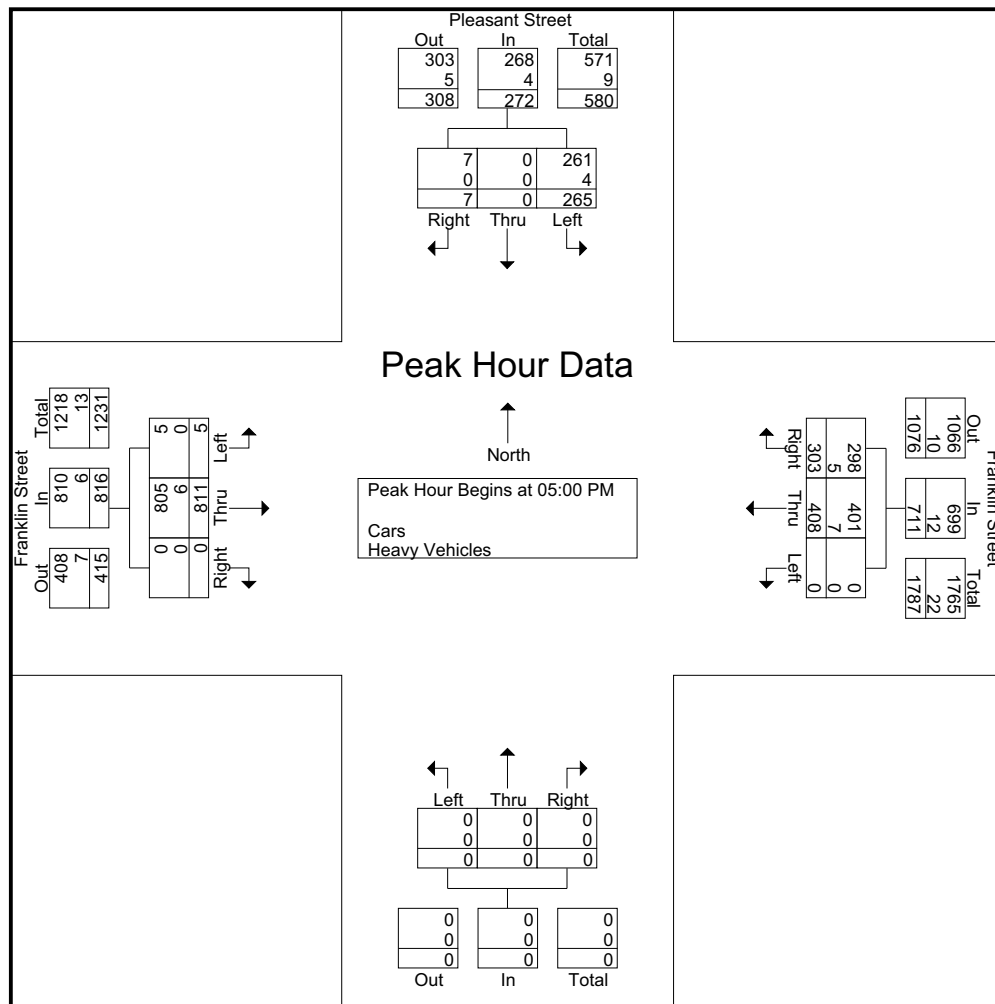
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
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	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	72	0	0	72	2	196	0	198	0	92	76	168	438
05:15 PM	0	0	0	0	63	0	1	64	1	193	0	194	0	121	70	191	449
05:30 PM	0	0	0	0	54	0	4	58	2	205	0	207	0	115	86	201	466
05:45 PM	0	0	0	0	76	0	2	78	0	217	0	217	0	80	71	151	446
Total Volume	0	0	0	0	265	0	7	272	5	811	0	816	0	408	303	711	1799
% App. Total	0	0	0	0	97.4	0	2.6		0.6	99.4	0		0	57.4	42.6		
PHF	.000	.000	.000	.000	.872	.000	.438	.872	.625	.934	.000	.940	.000	.843	.881	.884	.965
Cars	0	0	0	0	261	0	7	268	5	805	0	810	0	401	298	699	1777
% Cars	0	0	0	0	98.5	0	100	98.5	100	99.3	0	99.3	0	98.3	98.3	98.3	98.8
Heavy Vehicles	0	0	0	0	4	0	0	4	0	6	0	6	0	7	5	12	22
% Heavy Vehicles	0	0	0	0	1.5	0	0	1.5	0	0.7	0	0.7	0	1.7	1.7	1.7	1.2



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Groups Printed- Cars

Start Time	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	0	0	0	0	52	0	2	54	2	166	0	168	0	89	58	147	369
04:15 PM	0	0	0	0	50	0	2	52	2	169	0	171	0	86	60	146	369
04:30 PM	0	0	0	0	55	0	2	57	0	189	0	189	0	88	56	144	390
04:45 PM	0	0	0	0	58	0	3	61	1	203	0	204	0	104	68	172	437
Total	0	0	0	0	215	0	9	224	5	727	0	732	0	367	242	609	1565
05:00 PM	0	0	0	0	71	0	0	71	2	196	0	198	0	91	75	166	435
05:15 PM	0	0	0	0	61	0	1	62	1	190	0	191	0	119	66	185	438
05:30 PM	0	0	0	0	53	0	4	57	2	204	0	206	0	114	86	200	463
05:45 PM	0	0	0	0	76	0	2	78	0	215	0	215	0	77	71	148	441
Total	0	0	0	0	261	0	7	268	5	805	0	810	0	401	298	699	1777
Grand Total	0	0	0	0	476	0	16	492	10	1532	0	1542	0	768	540	1308	3342
Apprch %	0	0	0		96.7	0	3.3		0.6	99.4	0		0	58.7	41.3		
Total %	0	0	0	0	14.2	0	0.5	14.7	0.3	45.8	0	46.1	0	23	16.2	39.1	

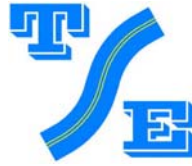
	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	71	0	0	71	2	196	0	198	0	91	75	166	435
05:15 PM	0	0	0	0	61	0	1	62	1	190	0	191	0	119	66	185	438
05:30 PM	0	0	0	0	53	0	4	57	2	204	0	206	0	114	86	200	463
05:45 PM	0	0	0	0	76	0	2	78	0	215	0	215	0	77	71	148	441
Total Volume	0	0	0	0	261	0	7	268	5	805	0	810	0	401	298	699	1777
% App. Total	0	0	0	0	97.4	0	2.6		0.6	99.4	0		0	57.4	42.6		
PHF	.000	.000	.000	.000	.859	.000	.438	.859	.625	.936	.000	.942	.000	.842	.866	.874	.960

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				05:00 PM				05:00 PM				04:45 PM			
+0 mins.	0	0	0	0	71	0	0	71	2	196	0	198	0	104	68	172
+15 mins.	0	0	0	0	61	0	1	62	1	190	0	191	0	91	75	166
+30 mins.	0	0	0	0	53	0	4	57	2	204	0	206	0	119	66	185
+45 mins.	0	0	0	0	76	0	2	78	0	215	0	215	0	114	86	200
Total Volume	0	0	0	0	261	0	7	268	5	805	0	810	0	428	295	723
% App. Total	0	0	0		97.4	0	2.6		0.6	99.4	0		0	59.2	40.8	
PHF	.000	.000	.000	.000	.859	.000	.438	.859	.625	.936	.000	.942	.000	.899	.858	.904

GPI Project #:
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Groups Printed- Heavy Vehicles

	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1	3	4
04:30 PM	0	0	0	0	2	0	1	3	0	2	0	2	0	1	0	1	6
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	6	0	6	7
Total	0	0	0	0	2	0	1	3	0	5	0	5	0	9	2	11	19
05:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	2	3
05:15 PM	0	0	0	0	2	0	0	2	0	3	0	3	0	2	4	6	11
05:30 PM	0	0	0	0	1	0	0	1	0	1	0	1	0	1	0	1	3
05:45 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	3	0	3	5
Total	0	0	0	0	4	0	0	4	0	6	0	6	0	7	5	12	22
Grand Total	0	0	0	0	6	0	1	7	0	11	0	11	0	16	7	23	41
Apprch %	0	0	0		85.7	0	14.3		0	100	0		0	69.6	30.4		
Total %	0	0	0		14.6	0	2.4	17.1	0	26.8	0	26.8	0	39	17.1	56.1	

	Northbound				Pleasant Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	2	0	1	3	0	2	0	2	0	1	0	1	6
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	6	0	6	7
05:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	2	3
05:15 PM	0	0	0	0	2	0	0	2	0	3	0	3	0	2	4	6	11
Total Volume	0	0	0	0	5	0	1	6	0	6	0	6	0	10	5	15	27
% App. Total	0	0	0		83.3	0	16.7		0	100	0		0	66.7	33.3		
PHF	.000	.000	.000	.000	.625	.000	.250	.500	.000	.500	.000	.500	.000	.417	.313	.625	.614

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:30 PM				04:30 PM				04:30 PM			
+0 mins.	0	0	0	0	2	0	1	3	0	2	0	2	0	1	0	1
+15 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	6	0	6
+30 mins.	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	2
+45 mins.	0	0	0	0	2	0	0	2	0	3	0	3	0	2	4	6
Total Volume	0	0	0	0	5	0	1	6	0	6	0	6	0	10	5	15
% App. Total	0	0	0		83.3	0	16.7		0	100	0		0	66.7	33.3	
PHF	.000	.000	.000	.000	.625	.000	.250	.500	.000	.500	.000	.500	.000	.417	.313	.625

Accurate Counts

978-664-2565

N/S Street : Pleasant Street
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470005
Site Code : 16470005
Start Date : 4/10/2014
Page No : 8

Groups Printed- Bikes Peds

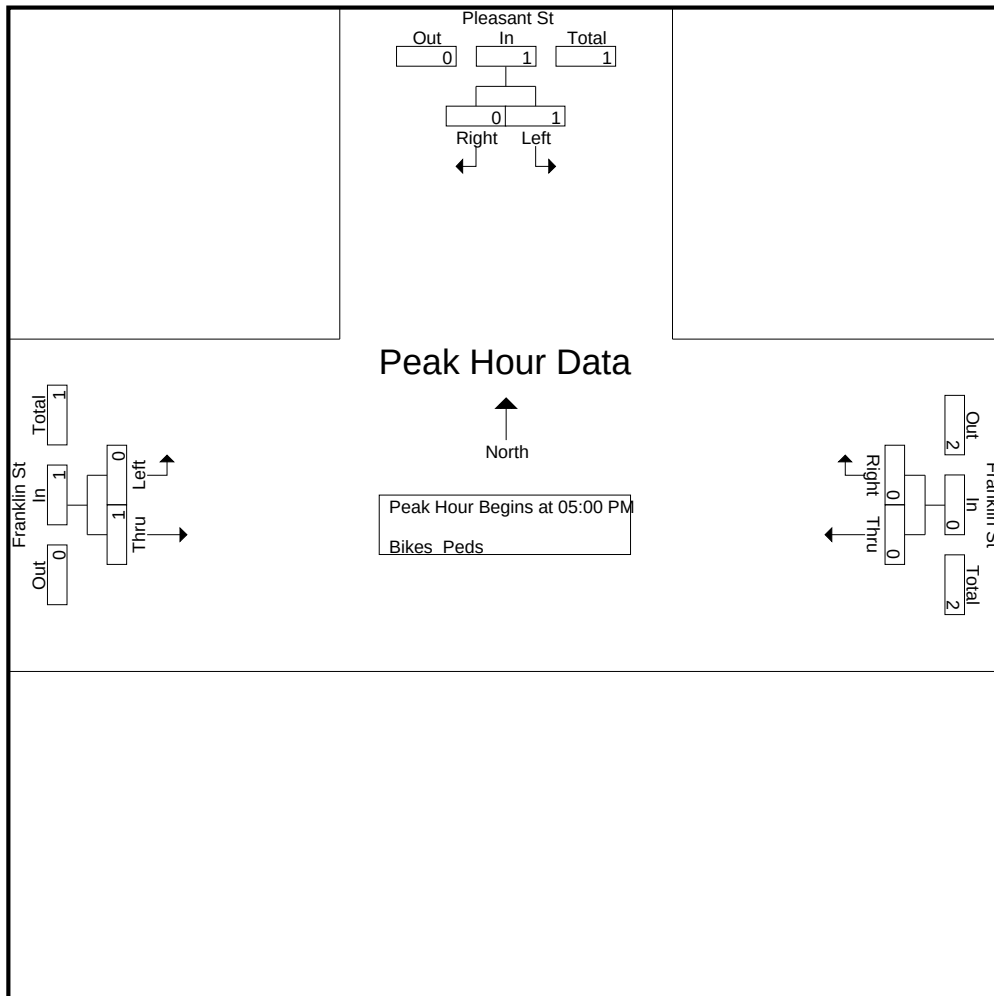
	Pleasant St From North			Franklin St From East			Franklin St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
05:00 PM	0	0	1	0	0	0	0	0	0	1	0	1
05:15 PM	0	0	2	0	0	0	0	0	0	2	0	2
05:30 PM	0	0	0	0	0	0	0	0	1	1	0	1
05:45 PM	1	0	0	0	0	1	0	1	0	1	2	3
Total	1	0	3	0	0	1	0	1	1	5	2	7
Grand Total	1	0	3	0	0	1	0	1	1	5	2	7
Apprch %	100	0		0	0		0	100				
Total %	50	0		0	0		0	50		71.4	28.6	

	Pleasant St From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total

Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	1	0	1	0	0	0	0	1	1	2
Total Volume	1	0	1	0	0	0	0	1	1	2
% App. Total	100	0		0	0		0	100		
PHF	.250	.000	.250	.000	.000	.000	.000	.250	.250	.250



GPI Project #:
Stoneham, MA
Client: John DeBarros

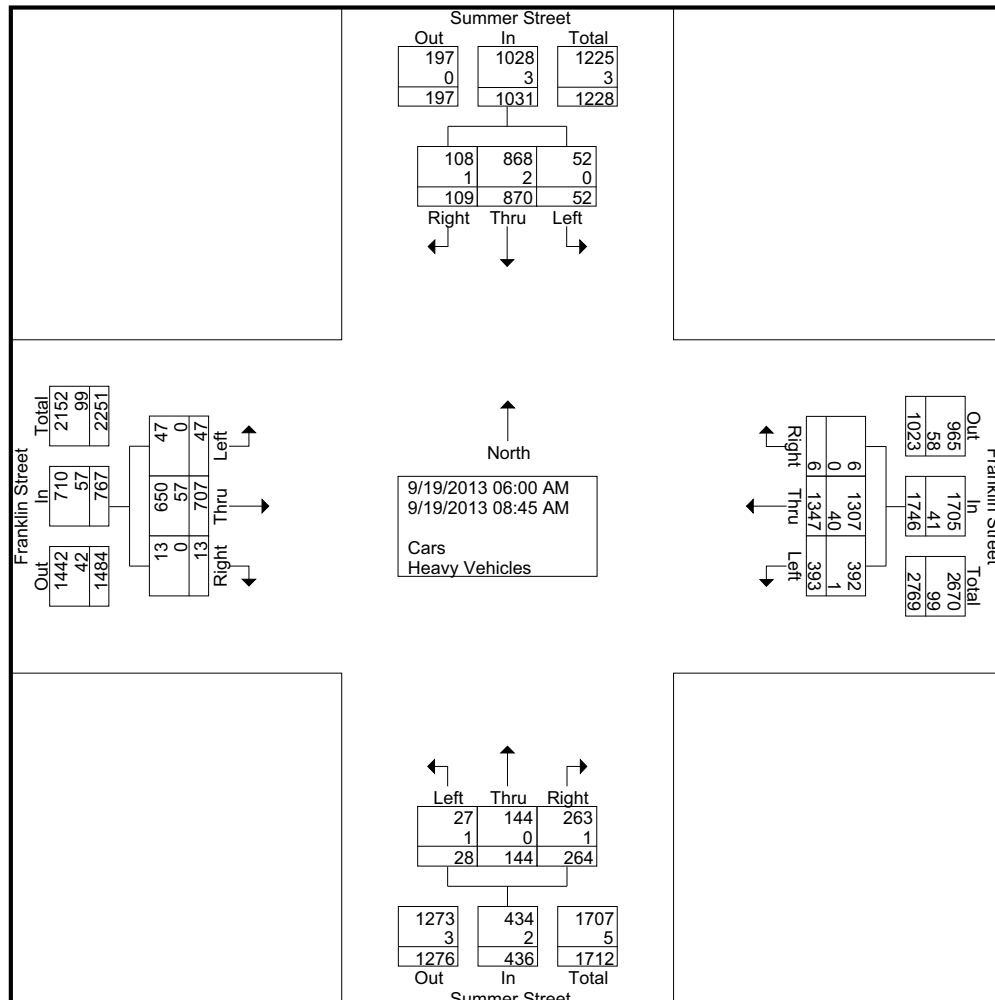


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www.tsetraffic.com

File Name : Sumfrank AM
Site Code : 6
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	1	3	4	8	0	45	3	48	1	27	0	28	17	53	1	71	155
06:15 AM	3	5	4	12	1	59	6	66	0	28	1	29	25	67	0	92	199
06:30 AM	2	5	10	17	2	75	8	85	1	40	1	42	30	98	0	128	272
06:45 AM	2	10	15	27	3	79	7	89	0	39	2	41	40	130	0	170	327
Total	8	23	33	64	6	258	24	288	2	134	4	140	112	348	1	461	953
07:00 AM	3	12	37	52	9	72	7	88	6	61	3	70	40	126	0	166	376
07:15 AM	2	16	52	70	7	79	5	91	4	75	2	81	29	136	2	167	409
07:30 AM	2	19	47	68	10	93	11	114	6	95	2	103	43	121	0	164	449
07:45 AM	5	21	30	56	3	85	27	115	1	63	1	65	42	148	0	190	426
Total	12	68	166	246	29	329	50	408	17	294	8	319	154	531	2	687	1660
08:00 AM	4	18	25	47	3	86	12	101	3	66	1	70	30	110	0	140	358
08:15 AM	1	10	16	27	6	65	9	80	12	66	0	78	40	131	1	172	357
08:30 AM	1	11	13	25	5	66	7	78	5	72	0	77	26	105	1	132	312
08:45 AM	2	14	11	27	3	66	7	76	8	75	0	83	31	122	1	154	340
Total	8	53	65	126	17	283	35	335	28	279	1	308	127	468	3	598	1367
Grand Total	28	144	264	436	52	870	109	1031	47	707	13	767	393	1347	6	1746	3980
Apprch %	6.4	33	60.6		5	84.4	10.6		6.1	92.2	1.7		22.5	77.1	0.3		
Total %	0.7	3.6	6.6	11	1.3	21.9	2.7	25.9	1.2	17.8	0.3	19.3	9.9	33.8	0.2	43.9	
Cars	27	144	263	434	52	868	108	1028	47	650	13	710	392	1307	6	1705	7754
% Cars	96.4	100	99.6	99.5	100	99.8	99.1	99.7	100	91.9	100	92.6	99.7	97	100	97.7	97.4
Heavy Vehicles	1	0	1	2	0	2	1	3	0	57	0	57	1	40	0	41	206
% Heavy Vehicles	3.6	0	0.4	0.5	0	0.2	0.9	0.3	0	8.1	0	7.4	0.3	3	0	2.3	2.6



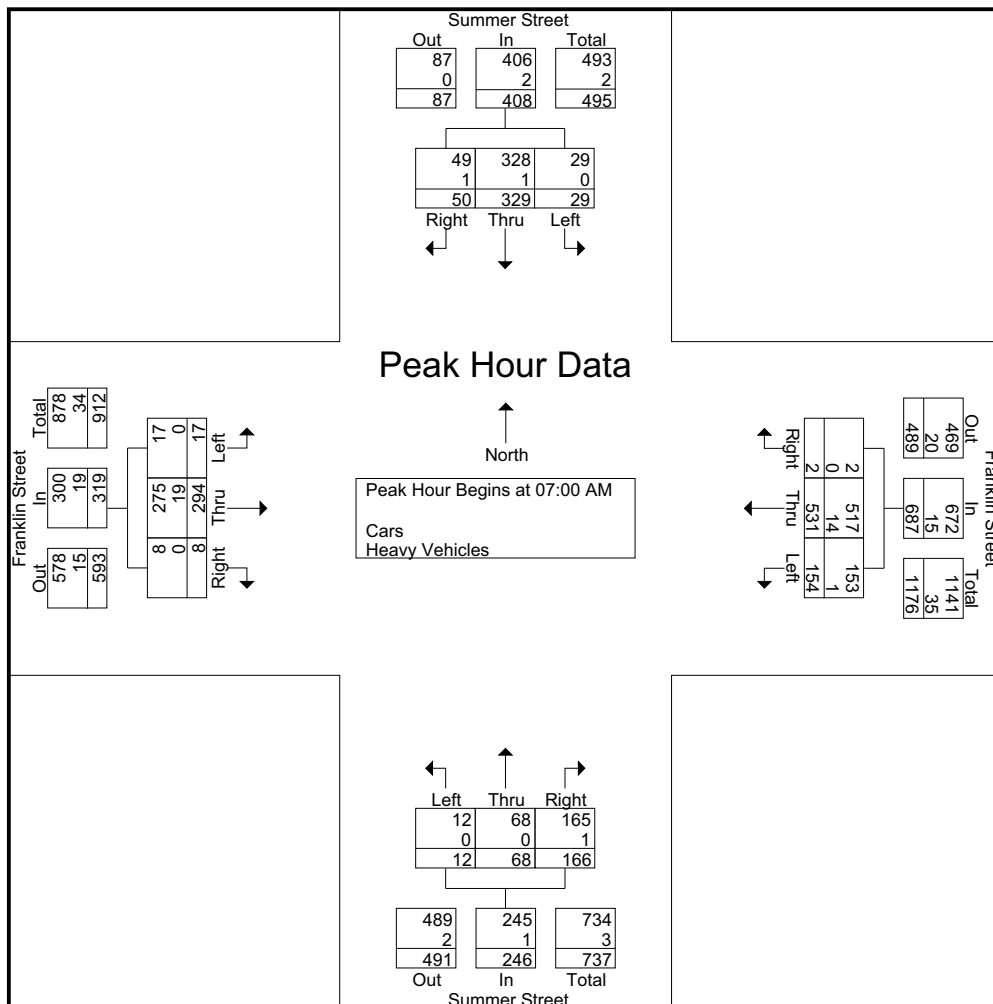
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	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	3	12	37	52	9	72	7	88	6	61	3	70	40	126	0	166	376
07:15 AM	2	16	52	70	7	79	5	91	4	75	2	81	29	136	2	167	409
07:30 AM	2	19	47	68	10	93	11	114	6	95	2	103	43	121	0	164	449
07:45 AM	5	21	30	56	3	85	27	115	1	63	1	65	42	148	0	190	426
Total Volume	12	68	166	246	29	329	50	408	17	294	8	319	154	531	2	687	1660
% App. Total	4.9	27.6	67.5		7.1	80.6	12.3		5.3	92.2	2.5		22.4	77.3	0.3		
PHF	.600	.810	.798	.879	.725	.884	.463	.887	.708	.774	.667	.774	.895	.897	.250	.904	.924
Cars	12	68	165	245	29	328	49	406	17	275	8	300	153	517	2	672	1623
% Cars	100	100	99.4	99.6	100	99.7	98.0	99.5	100	93.5	100	94.0	99.4	97.4	100	97.8	97.8
Heavy Vehicles	0	0	1	1	0	1	1	2	0	19	0	19	1	14	0	15	37
% Heavy Vehicles	0	0	0.6	0.4	0	0.3	2.0	0.5	0	6.5	0	6.0	0.6	2.6	0	2.2	2.2



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Site Code : 6
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	1	3	4	8	0	45	3	48	1	26	0	27	17	50	1	68	151
06:15 AM	3	5	4	12	1	59	6	66	0	26	1	27	25	66	0	91	196
06:30 AM	2	5	10	17	2	75	8	85	1	35	1	37	30	95	0	125	264
06:45 AM	2	10	15	27	3	78	7	88	0	37	2	39	40	127	0	167	321
Total	8	23	33	64	6	257	24	287	2	124	4	130	112	338	1	451	932
07:00 AM	3	12	37	52	9	72	7	88	6	57	3	66	40	123	0	163	369
07:15 AM	2	16	52	70	7	78	5	90	4	71	2	77	29	133	2	164	401
07:30 AM	2	19	47	68	10	93	11	114	6	88	2	96	43	115	0	158	436
07:45 AM	5	21	29	55	3	85	26	114	1	59	1	61	41	146	0	187	417
Total	12	68	165	245	29	328	49	406	17	275	8	300	153	517	2	672	1623
08:00 AM	3	18	25	46	3	86	12	101	3	58	1	62	30	106	0	136	345
08:15 AM	1	10	16	27	6	65	9	80	12	60	0	72	40	128	1	169	348
08:30 AM	1	11	13	25	5	66	7	78	5	66	0	71	26	101	1	128	302
08:45 AM	2	14	11	27	3	66	7	76	8	67	0	75	31	117	1	149	327
Total	7	53	65	125	17	283	35	335	28	251	1	280	127	452	3	582	1322
Grand Total	27	144	263	434	52	868	108	1028	47	650	13	710	392	1307	6	1705	3877
Apprch %	6.2	33.2	60.6		5.1	84.4	10.5		6.6	91.5	1.8		23	76.7	0.4		
Total %	0.7	3.7	6.8	11.2	1.3	22.4	2.8	26.5	1.2	16.8	0.3	18.3	10.1	33.7	0.2	44	

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	3	12	37	52	9	72	7	88	6	57	3	66	40	123	0	163	369
07:15 AM	2	16	52	70	7	78	5	90	4	71	2	77	29	133	2	164	401
07:30 AM	2	19	47	68	10	93	11	114	6	88	2	96	43	115	0	158	436
07:45 AM	5	21	29	55	3	85	26	114	1	59	1	61	41	146	0	187	417
Total Volume	12	68	165	245	29	328	49	406	17	275	8	300	153	517	2	672	1623
% App. Total	4.9	27.8	67.3		7.1	80.8	12.1		5.7	91.7	2.7		22.8	76.9	0.3		
PHF	.600	.810	.793	.875	.725	.882	.471	.890	.708	.781	.667	.781	.890	.885	.250	.898	.931

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:00 AM				07:15 AM				07:00 AM				07:00 AM			
+0 mins.	3	12	37	52	7	78	5	90	6	57	3	66	40	123	0	163
+15 mins.	2	16	52	70	10	93	11	114	4	71	2	77	29	133	2	164
+30 mins.	2	19	47	68	3	85	26	114	6	88	2	96	43	115	0	158
+45 mins.	5	21	29	55	3	86	12	101	1	59	1	61	41	146	0	187
Total Volume	12	68	165	245	23	342	54	419	17	275	8	300	153	517	2	672
% App. Total	4.9	27.8	67.3		5.5	81.6	12.9		5.7	91.7	2.7		22.8	76.9	0.3	
PHF	.600	.810	.793	.875	.575	.919	.519	.919	.708	.781	.667	.781	.890	.885	.250	.898

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5636
F: 617-301-3300
www.tsetraffic.com

File Name : Sumfrank AM
Site Code : 6
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	3	4
06:15 AM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
06:30 AM	0	0	0	0	0	0	0	0	0	5	0	5	0	3	0	3	8
06:45 AM	0	0	0	0	0	1	0	1	0	2	0	2	0	3	0	3	6
Total	0	0	0	0	0	1	0	1	0	10	0	10	0	10	0	10	21
07:00 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	3	0	3	7
07:15 AM	0	0	0	0	0	1	0	1	0	4	0	4	0	3	0	3	8
07:30 AM	0	0	0	0	0	0	0	0	0	7	0	7	0	6	0	6	13
07:45 AM	0	0	1	1	0	0	1	1	0	4	0	4	1	2	0	3	9
Total	0	0	1	1	0	1	1	2	0	19	0	19	1	14	0	15	37
08:00 AM	1	0	0	1	0	0	0	0	0	8	0	8	0	4	0	4	13
08:15 AM	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3	9
08:30 AM	0	0	0	0	0	0	0	0	0	6	0	6	0	4	0	4	10
08:45 AM	0	0	0	0	0	0	0	0	0	8	0	8	0	5	0	5	13
Total	1	0	0	1	0	0	0	0	0	28	0	28	0	16	0	16	45
Grand Total	1	0	1	2	0	2	1	3	0	57	0	57	1	40	0	41	103
Apprch %	50	0	50		0	66.7	33.3		0	100	0		2.4	97.6	0		
Total %	1	0	1	1.9	0	1.9	1	2.9	0	55.3	0	55.3	1	38.8	0	39.8	

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	1	0	0	1	0	0	0	0	0	8	0	8	0	4	0	4	13
08:15 AM	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3	9
08:30 AM	0	0	0	0	0	0	0	0	0	6	0	6	0	4	0	4	10
08:45 AM	0	0	0	0	0	0	0	0	0	8	0	8	0	5	0	5	13
Total Volume	1	0	0	1	0	0	0	0	0	28	0	28	0	16	0	16	45
% App. Total	100	0	0		0	0	0		0	100	0		0	100	0		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.875	.000	.875	.000	.800	.000	.800	.865

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				06:30 AM				08:00 AM				07:15 AM				
+0 mins.	0	0	0	0	0	0	0	0	0	8	0	8	0	3	0	3	
+15 mins.	0	0	0	0	0	1	0	1	0	6	0	6	0	6	0	6	
+30 mins.	0	0	1	1	0	0	0	0	0	6	0	6	1	2	0	3	
+45 mins.	1	0	0	1	0	1	0	1	0	8	0	8	0	4	0	4	
Total Volume	1	0	1	2	0	2	0	2	0	28	0	28	1	15	0	16	
% App. Total	50	0	50		0	100	0		0	100	0		6.2	93.8	0		
PHF	.250	.000	.250	.500	.000	.500	.000	.500	.000	.875	.000	.875	.250	.625	.000	.667	

Accurate Counts

978-664-2565

N/S Street : Summer Street
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470006
 Site Code : 16470006
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Summer St From North				Franklin St From East				Summer St From South				Franklin St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
07:00 AM	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	1	2	3
07:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
07:45 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	3	0	1	0	0	0	1	0	1	0	1	3	4	7
Grand Total	0	0	0	0	0	3	0	1	0	0	0	1	0	1	0	1	3	4	7
Apprch %	0	0	0		0	100	0		0	0	0		0	100	0				
Total %	0	0	0		0	75	0		0	0	0		0	25	0		42.9	57.1	

	Summer St From North				Franklin St From East				Summer St From South				Franklin St From West				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	3	0	3	0	0	0	0	0	1	0	1	4
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.375	.000	.375	.000	.000	.000	.000	.000	.250	.000	.250	.500

GPI Project #:
Stoneham, MA
Client: John DeBarros

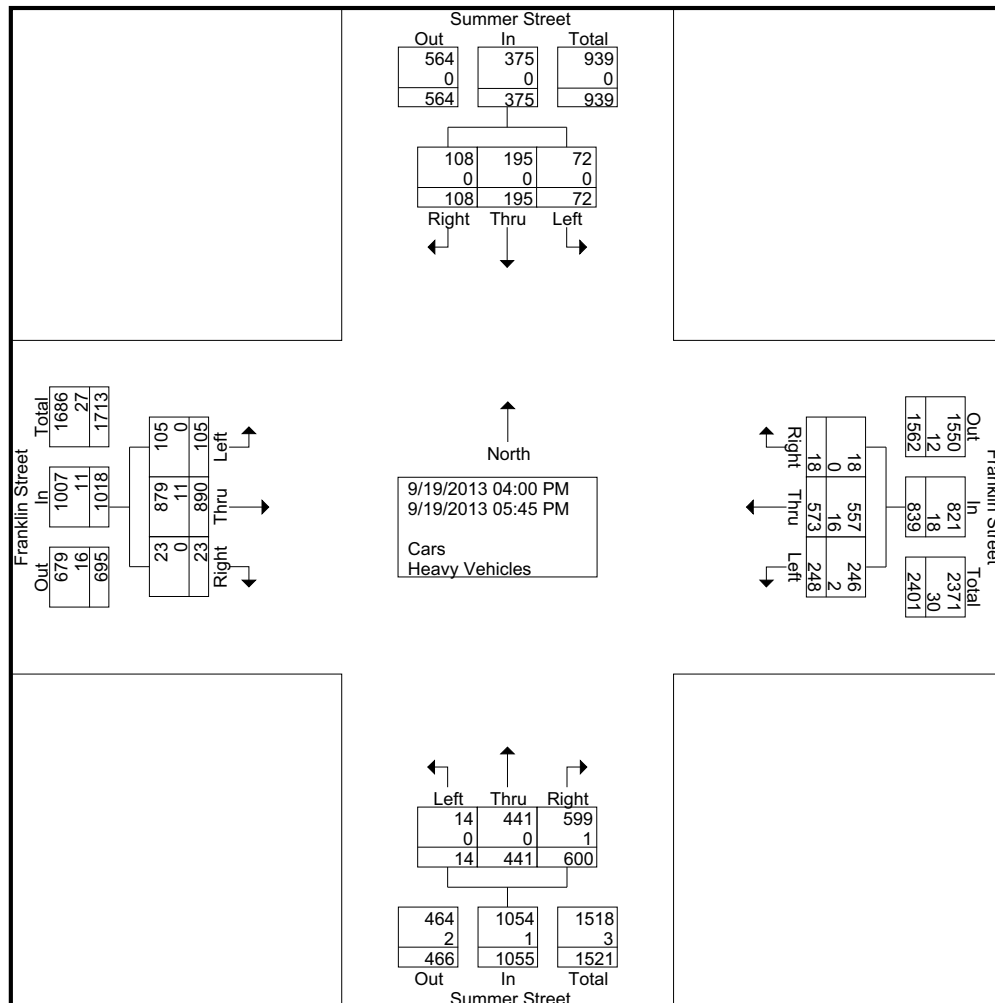


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Sumfrank PM
Site Code : 6
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	2	38	63	103	8	18	10	36	11	100	2	113	26	56	3	85	337
04:15 PM	0	38	63	101	7	22	11	40	11	94	3	108	29	55	2	86	335
04:30 PM	3	43	79	125	10	20	11	41	9	102	6	117	30	64	3	97	380
04:45 PM	3	44	79	126	6	22	15	43	10	121	1	132	38	66	3	107	408
Total	8	163	284	455	31	82	47	160	41	417	12	470	123	241	11	375	1460
05:00 PM	1	53	69	123	7	31	19	57	17	114	2	133	27	59	1	87	400
05:15 PM	2	68	78	148	10	36	15	61	16	118	3	137	31	99	2	132	478
05:30 PM	1	78	87	166	13	25	15	53	17	119	3	139	37	94	2	133	491
05:45 PM	2	79	82	163	11	21	12	44	14	122	3	139	30	80	2	112	458
Total	6	278	316	600	41	113	61	215	64	473	11	548	125	332	7	464	1827
Grand Total	14	441	600	1055	72	195	108	375	105	890	23	1018	248	573	18	839	3287
Apprch %	1.3	41.8	56.9		19.2	52	28.8		10.3	87.4	2.3		29.6	68.3	2.1		
Total %	0.4	13.4	18.3	32.1	2.2	5.9	3.3	11.4	3.2	27.1	0.7	31	7.5	17.4	0.5	25.5	
Cars	14	441	599	1054	72	195	108	375	105	879	23	1007	246	557	18	821	6514
% Cars	100	100	99.8	99.9	100	100	100	100	100	98.8	100	98.9	99.2	97.2	100	97.9	99.1
Heavy Vehicles	0	0	1	1	0	0	0	0	0	11	0	11	2	16	0	18	60
% Heavy Vehicles	0	0	0.2	0.1	0	0	0	0	0	1.2	0	1.1	0.8	2.8	0	2.1	0.9



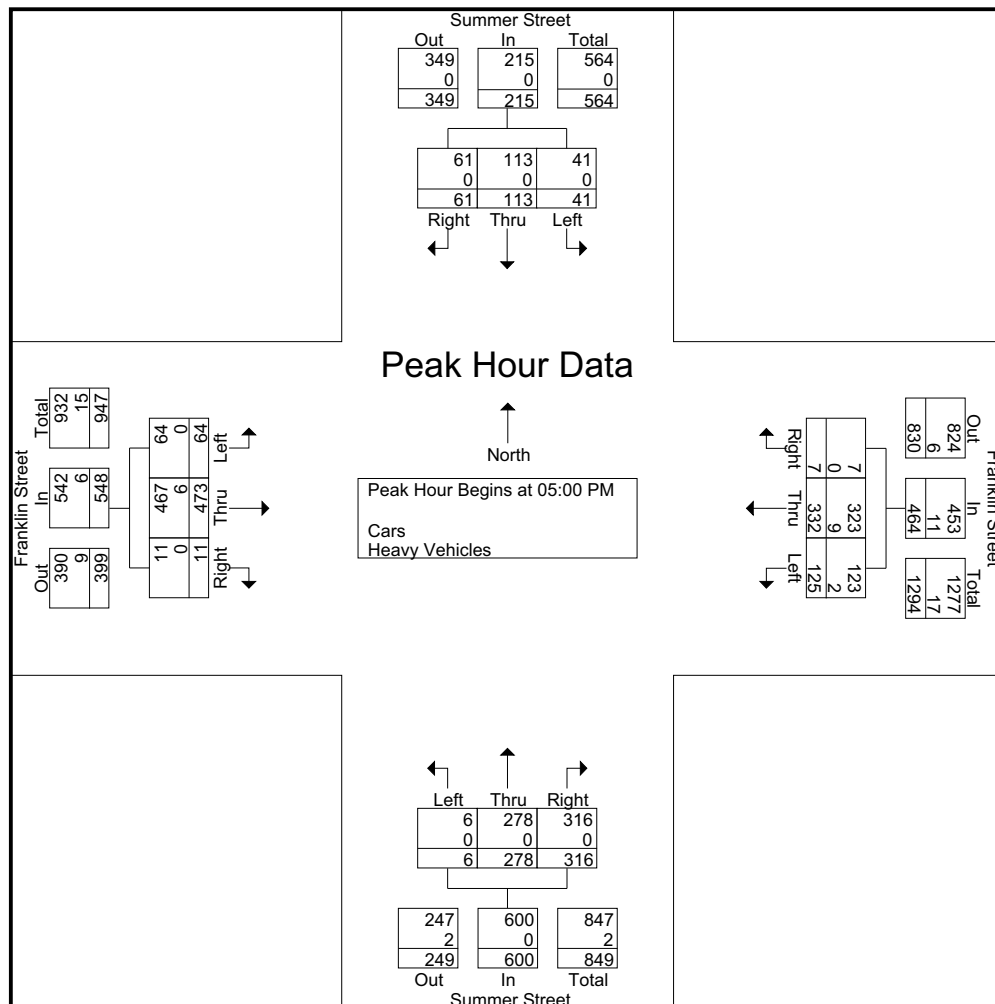
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
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File Name : Sumfrank PM
Site Code : 6
Start Date : 9/19/2013
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	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	1	53	69	123	7	31	19	57	17	114	2	133	27	59	1	87	400
05:15 PM	2	68	78	148	10	36	15	61	16	118	3	137	31	99	2	132	478
05:30 PM	1	78	87	166	13	25	15	53	17	119	3	139	37	94	2	133	491
05:45 PM	2	79	82	163	11	21	12	44	14	122	3	139	30	80	2	112	458
Total Volume	6	278	316	600	41	113	61	215	64	473	11	548	125	332	7	464	1827
% App. Total	1	46.3	52.7		19.1	52.6	28.4		11.7	86.3	2		26.9	71.6	1.5		
PHF	.750	.880	.908	.904	.788	.785	.803	.881	.941	.969	.917	.986	.845	.838	.875	.872	.930
Cars	6	278	316	600	41	113	61	215	64	467	11	542	123	323	7	453	1810
% Cars	100	100	100	100	100	100	100	100	100	98.7	100	98.9	98.4	97.3	100	97.6	99.1
Heavy Vehicles	0	0	0	0	0	0	0	0	0	6	0	6	2	9	0	11	17
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	1.3	0	1.1	1.6	2.7	0	2.4	0.9



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File Name : Sumfrank PM
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Start Date : 9/19/2013
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Groups Printed- Cars

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	2	38	63	103	8	18	10	36	11	99	2	112	26	55	3	84	335
04:15 PM	0	38	63	101	7	22	11	40	11	93	3	107	29	54	2	85	333
04:30 PM	3	43	79	125	10	20	11	41	9	100	6	115	30	62	3	95	376
04:45 PM	3	44	78	125	6	22	15	43	10	120	1	131	38	63	3	104	403
Total	8	163	283	454	31	82	47	160	41	412	12	465	123	234	11	368	1447
05:00 PM	1	53	69	123	7	31	19	57	17	112	2	131	27	56	1	84	395
05:15 PM	2	68	78	148	10	36	15	61	16	117	3	136	31	97	2	130	475
05:30 PM	1	78	87	166	13	25	15	53	17	118	3	138	35	93	2	130	487
05:45 PM	2	79	82	163	11	21	12	44	14	120	3	137	30	77	2	109	453
Total	6	278	316	600	41	113	61	215	64	467	11	542	123	323	7	453	1810
Grand Total	14	441	599	1054	72	195	108	375	105	879	23	1007	246	557	18	821	3257
Apprch %	1.3	41.8	56.8		19.2	52	28.8		10.4	87.3	2.3		30	67.8	2.2		
Total %	0.4	13.5	18.4	32.4	2.2	6	3.3	11.5	3.2	27	0.7	30.9	7.6	17.1	0.6	25.2	

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	1	53	69	123	7	31	19	57	17	112	2	131	27	56	1	84	395
05:15 PM	2	68	78	148	10	36	15	61	16	117	3	136	31	97	2	130	475
05:30 PM	1	78	87	166	13	25	15	53	17	118	3	138	35	93	2	130	487
05:45 PM	2	79	82	163	11	21	12	44	14	120	3	137	30	77	2	109	453
Total Volume	6	278	316	600	41	113	61	215	64	467	11	542	123	323	7	453	1810
% App. Total	1	46.3	52.7		19.1	52.6	28.4		11.8	86.2	2		27.2	71.3	1.5		
PHF	.750	.880	.908	.904	.788	.785	.803	.881	.941	.973	.917	.982	.879	.832	.875	.871	.929

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	1	53	69	123	7	31	19	57	17	112	2	131	27	56	1	84
+15 mins.	2	68	78	148	10	36	15	61	16	117	3	136	31	97	2	130
+30 mins.	1	78	87	166	13	25	15	53	17	118	3	138	35	93	2	130
+45 mins.	2	79	82	163	11	21	12	44	14	120	3	137	30	77	2	109
Total Volume	6	278	316	600	41	113	61	215	64	467	11	542	123	323	7	453
% App. Total	1	46.3	52.7		19.1	52.6	28.4		11.8	86.2	2		27.2	71.3	1.5	
PHF	.750	.880	.908	.904	.788	.785	.803	.881	.941	.973	.917	.982	.879	.832	.875	.871

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File Name : Sumfrank PM
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Groups Printed- Heavy Vehicles

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:30 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2	4
04:45 PM	0	0	1	1	0	0	0	0	0	1	0	1	0	3	0	3	5
Total	0	0	1	1	0	0	0	0	0	5	0	5	0	7	0	7	13
05:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	3	0	3	5
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
05:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1	3	4
05:45 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	3	0	3	5
Total	0	0	0	0	0	0	0	0	0	6	0	6	0	9	0	11	17
Grand Total	0	0	1	1	0	0	0	0	0	11	0	11	2	16	0	18	30
Apprch %	0	0	100		0	0	0		0	100	0		11.1	88.9	0		
Total %	0	0	3.3	3.3	0	0	0	0	0	36.7	0	36.7	6.7	53.3	0	60	

	Summer Street Northbound				Summer Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2	4
04:45 PM	0	0	1	1	0	0	0	0	0	1	0	1	0	3	0	3	5
05:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	3	0	3	5
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
Total Volume	0	0	1	1	0	0	0	0	0	6	0	6	0	10	0	10	17
% App. Total	0	0	100		0	0	0		0	100	0		0	100	0		
PHF	.000	.000	.250	.250	.000	.000	.000	.000	.000	.750	.000	.750	.000	.833	.000	.833	.850

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:15 PM				04:45 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	3	
+15 mins.	0	0	0	0	0	0	0	0	0	2	0	2	0	3	0	3	
+30 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	
+45 mins.	0	0	1	1	0	0	0	0	0	2	0	2	1	1	0	3	
Total Volume	0	0	1	1	0	0	0	0	0	6	0	6	2	9	0	11	
% App. Total	0	0	100		0	0	0		0	100	0		18.2	81.8	0		
PHF	.000	.000	.250	.250	.000	.000	.000	.000	.000	.750	.000	.750	.250	.750	.000	.917	

Accurate Counts

978-664-2565

N/S Street : Summer Street
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470006
 Site Code : 16470006
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Summer St From North				Franklin St From East				Summer St From South				Franklin St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
05:00 PM	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	0	2	2	4
05:15 PM	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	3	1	4
05:30 PM	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	2
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	1	2	1	0	0	2	0	0	0	2	1	1	0	1	7	4	11
Grand Total	0	0	1	2	1	0	0	2	0	0	0	2	1	1	0	1	7	4	11
Apprch %	0	0	100		100	0	0		0	0	0		50	50	0				
Total %	0	0	25		25	0	0		0	0	0		25	25	0		63.6	36.4	

	Summer St From North				Franklin St From East				Summer St From South				Franklin St From West				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	2
05:15 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	1	1	1	0	0	1	0	0	0	0	1	1	0	2	4
% App. Total	0	0	100		100	0	0		0	0	0		50	50	0		
PHF	.000	.000	.250	.250	.250	.000	.000	.250	.000	.000	.000	.000	.250	.250	.000	.500	.500

GPI Project #:
Stoneham, MA
Client: John DeBarros

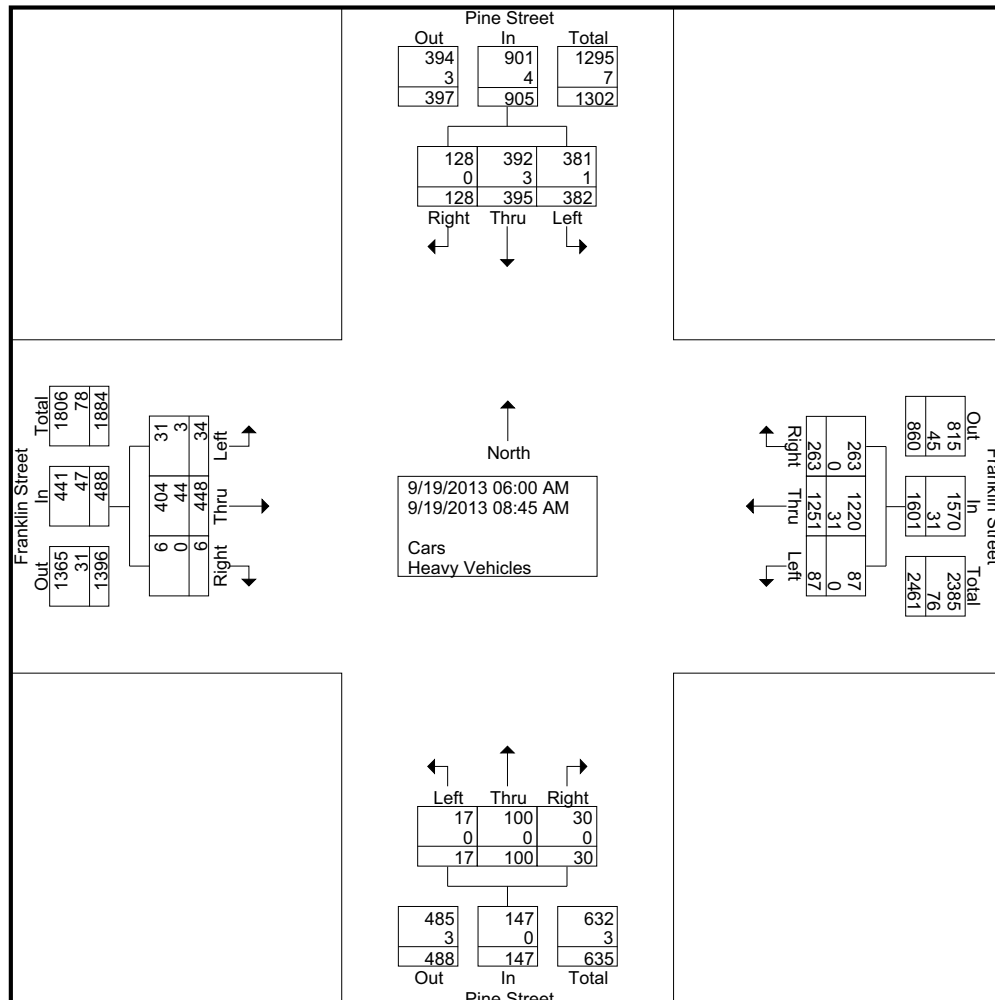


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Pine AM
Site Code : 8
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
06:00 AM	0	0	1	1	8	17	4	29	1	15	0	16	2	32	4	38	84
06:15 AM	0	4	0	4	12	21	4	37	1	18	1	20	1	45	4	50	111
06:30 AM	0	3	1	4	13	24	4	41	4	30	0	34	3	77	12	92	171
06:45 AM	1	1	0	2	26	27	10	63	2	29	0	31	3	86	21	110	206
Total	1	8	2	11	59	89	22	170	8	92	1	101	9	240	41	290	572
07:00 AM	1	1	1	3	30	32	12	74	2	39	0	41	5	104	23	132	250
07:15 AM	1	11	4	16	64	42	21	127	1	57	1	59	4	123	28	155	357
07:30 AM	2	6	3	11	49	43	18	110	0	45	0	45	5	110	31	146	312
07:45 AM	1	22	4	27	52	55	22	129	1	33	1	35	13	127	48	188	379
Total	5	40	12	57	195	172	73	440	4	174	2	180	27	464	130	621	1298
08:00 AM	3	15	4	22	43	40	14	97	3	36	1	40	14	139	34	187	346
08:15 AM	5	12	4	21	25	38	9	72	7	45	0	52	14	142	20	176	321
08:30 AM	3	10	3	16	30	33	5	68	5	44	0	49	11	136	17	164	297
08:45 AM	0	15	5	20	30	23	5	58	7	57	2	66	12	130	21	163	307
Total	11	52	16	79	128	134	33	295	22	182	3	207	51	547	92	690	1271
Grand Total	17	100	30	147	382	395	128	905	34	448	6	488	87	1251	263	1601	3141
Apprch %	11.6	68	20.4		42.2	43.6	14.1		7	91.8	1.2		5.4	78.1	16.4		
Total %	0.5	3.2	1	4.7	12.2	12.6	4.1	28.8	1.1	14.3	0.2	15.5	2.8	39.8	8.4	51	
Cars	17	100	30	147	381	392	128	901	31	404	6	441	87	1220	263	1570	6118
% Cars	100	100	100	100	99.7	99.2	100	99.6	91.2	90.2	100	90.4	100	97.5	100	98.1	97.4
Heavy Vehicles	0	0	0	0	1	3	0	4	3	44	0	47	0	31	0	31	164
% Heavy Vehicles	0	0	0	0	0.3	0.8	0	0.4	8.8	9.8	0	9.6	0	2.5	0	1.9	2.6



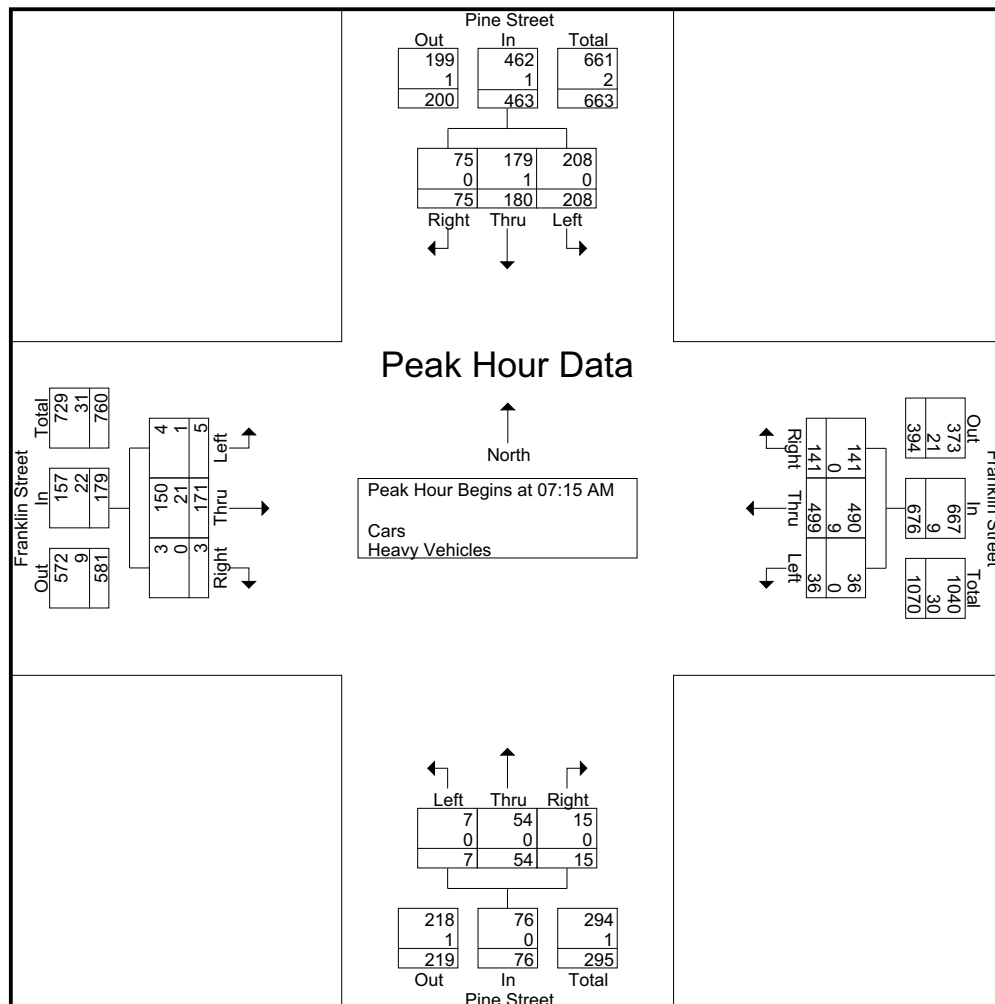
GPI Project #:
Stoneham, MA
Client: John DeBarros



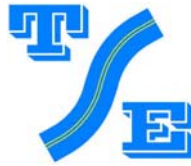
Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
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File Name : Pine AM
Site Code : 8
Start Date : 9/19/2013
Page No : 2 of 4

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	1	11	4	16	64	42	21	127	1	57	1	59	4	123	28	155	357
07:30 AM	2	6	3	11	49	43	18	110	0	45	0	45	5	110	31	146	312
07:45 AM	1	22	4	27	52	55	22	129	1	33	1	35	13	127	48	188	379
08:00 AM	3	15	4	22	43	40	14	97	3	36	1	40	14	139	34	187	346
Total Volume	7	54	15	76	208	180	75	463	5	171	3	179	36	499	141	676	1394
% App. Total	9.2	71.1	19.7		44.9	38.9	16.2		2.8	95.5	1.7		5.3	73.8	20.9		
PHF	.583	.614	.938	.704	.813	.818	.852	.897	.417	.750	.750	.758	.643	.897	.734	.899	.920
Cars	7	54	15	76	208	179	75	462	4	150	3	157	36	490	141	667	1362
% Cars	100	100	100	100	100	99.4	100	99.8	80.0	87.7	100	87.7	100	98.2	100	98.7	97.7
Heavy Vehicles	0	0	0	0	0	1	0	1	1	21	0	22	0	9	0	9	32
% Heavy Vehicles	0	0	0	0	0	0.6	0	0.2	20.0	12.3	0	12.3	0	1.8	0	1.3	2.3



GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
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File Name : Pine AM
Site Code : 8
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	0	1	1	8	17	4	29	1	14	0	15	2	30	4	36	81
06:15 AM	0	4	0	4	12	21	4	37	1	17	1	19	1	43	4	48	108
06:30 AM	0	3	1	4	13	24	4	41	2	27	0	29	3	76	12	91	165
06:45 AM	1	1	0	2	25	27	10	62	2	28	0	30	3	84	21	108	202
Total	1	8	2	11	58	89	22	169	6	86	1	93	9	233	41	283	556
07:00 AM	1	1	1	3	30	30	12	72	2	34	0	36	5	101	23	129	240
07:15 AM	1	11	4	16	64	42	21	127	0	52	1	53	4	120	28	152	348
07:30 AM	2	6	3	11	49	43	18	110	0	41	0	41	5	108	31	144	306
07:45 AM	1	22	4	27	52	54	22	128	1	27	1	29	13	126	48	187	371
Total	5	40	12	57	195	169	73	437	3	154	2	159	27	455	130	612	1265
08:00 AM	3	15	4	22	43	40	14	97	3	30	1	34	14	136	34	184	337
08:15 AM	5	12	4	21	25	38	9	72	7	38	0	45	14	139	20	173	311
08:30 AM	3	10	3	16	30	33	5	68	5	41	0	46	11	132	17	160	290
08:45 AM	0	15	5	20	30	23	5	58	7	55	2	64	12	125	21	158	300
Total	11	52	16	79	128	134	33	295	22	164	3	189	51	532	92	675	1238
Grand Total	17	100	30	147	381	392	128	901	31	404	6	441	87	1220	263	1570	3059
Apprch %	11.6	68	20.4		42.3	43.5	14.2		7	91.6	1.4		5.5	77.7	16.8		
Total %	0.6	3.3	1	4.8	12.5	12.8	4.2	29.5	1	13.2	0.2	14.4	2.8	39.9	8.6	51.3	

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	1	11	4	16	64	42	21	127	0	52	1	53	4	120	28	152	348
07:30 AM	2	6	3	11	49	43	18	110	0	41	0	41	5	108	31	144	306
07:45 AM	1	22	4	27	52	54	22	128	1	27	1	29	13	126	48	187	371
08:00 AM	3	15	4	22	43	40	14	97	3	30	1	34	14	136	34	184	337
Total Volume	7	54	15	76	208	179	75	462	4	150	3	157	36	490	141	667	1362
% App. Total	9.2	71.1	19.7		45	38.7	16.2		2.5	95.5	1.9		5.4	73.5	21.1		
PHF	.583	.614	.938	.704	.813	.829	.852	.902	.333	.721	.750	.741	.643	.901	.734	.892	.918

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:15 AM				08:00 AM				07:45 AM			
+0 mins.	1	22	4	27	64	42	21	127	3	30	1	34	13	126	48	187
+15 mins.	3	15	4	22	49	43	18	110	7	38	0	45	14	136	34	184
+30 mins.	5	12	4	21	52	54	22	128	5	41	0	46	14	139	20	173
+45 mins.	3	10	3	16	43	40	14	97	7	55	2	64	11	132	17	160
Total Volume	12	59	15	86	208	179	75	462	22	164	3	189	52	533	119	704
% App. Total	14	68.6	17.4		45	38.7	16.2		11.6	86.8	1.6		7.4	75.7	16.9	
PHF	.600	.670	.938	.796	.813	.829	.852	.902	.786	.745	.375	.738	.929	.959	.620	.941

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-301-3800
www.tsetraffic.com

File Name : Pine AM
Site Code : 8
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
06:15 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
06:30 AM	0	0	0	0	0	0	0	0	2	3	0	5	0	1	0	1	6
06:45 AM	0	0	0	0	1	0	0	1	0	1	0	1	0	2	0	2	4
Total	0	0	0	0	1	0	0	1	2	6	0	8	0	7	0	7	16
07:00 AM	0	0	0	0	0	2	0	2	0	5	0	5	0	3	0	3	10
07:15 AM	0	0	0	0	0	0	0	0	1	5	0	6	0	3	0	3	9
07:30 AM	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6
07:45 AM	0	0	0	0	0	1	0	1	0	6	0	6	0	1	0	1	8
Total	0	0	0	0	0	3	0	3	1	20	0	21	0	9	0	9	33
08:00 AM	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3	9
08:15 AM	0	0	0	0	0	0	0	0	0	7	0	7	0	3	0	3	10
08:30 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	4	0	4	7
08:45 AM	0	0	0	0	0	0	0	0	0	2	0	2	0	5	0	5	7
Total	0	0	0	0	0	0	0	0	0	18	0	18	0	15	0	15	33
Grand Total	0	0	0	0	1	3	0	4	3	44	0	47	0	31	0	31	82
Apprch %	0	0	0		25	75	0		6.4	93.6	0		0	100	0		
Total %	0	0	0		1.2	3.7	0	4.9	3.7	53.7	0	57.3	0	37.8	0	37.8	

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	0	0	0	0	1	0	1	0	6	0	6	0	1	0	1	8
08:00 AM	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3	9
08:15 AM	0	0	0	0	0	0	0	0	0	7	0	7	0	3	0	3	10
08:30 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	4	0	4	7
Total Volume	0	0	0	0	0	1	0	1	0	22	0	22	0	11	0	11	34
% App. Total	0	0	0		0	100	0		0	100	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.786	.000	.786	.000	.688	.000	.688	.850

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	06:00 AM				06:15 AM				07:30 AM				08:00 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	4	0	4	0	3	0	3
+15 mins.	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3
+30 mins.	0	0	0	0	1	0	0	1	0	6	0	6	0	4	0	4
+45 mins.	0	0	0	0	0	2	0	2	0	7	0	7	0	5	0	5
Total Volume	0	0	0	0	1	2	0	3	0	23	0	23	0	15	0	15
% App. Total	0	0	0		33.3	66.7	0		0	100	0		0	100	0	
PHF	.000	.000	.000	.000	.250	.250	.000	.375	.000	.821	.000	.821	.000	.750	.000	.750

Accurate Counts
978-664-2565

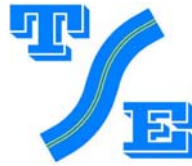
N/S Street : Pine Street
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470007
Site Code : 16470007
Start Date : 4/10/2014
Page No : 13

Groups Printed- Bikes Peds

[illegible][illegible]

GPI Project #:
Stoneham, MA
Client: John DeBarros

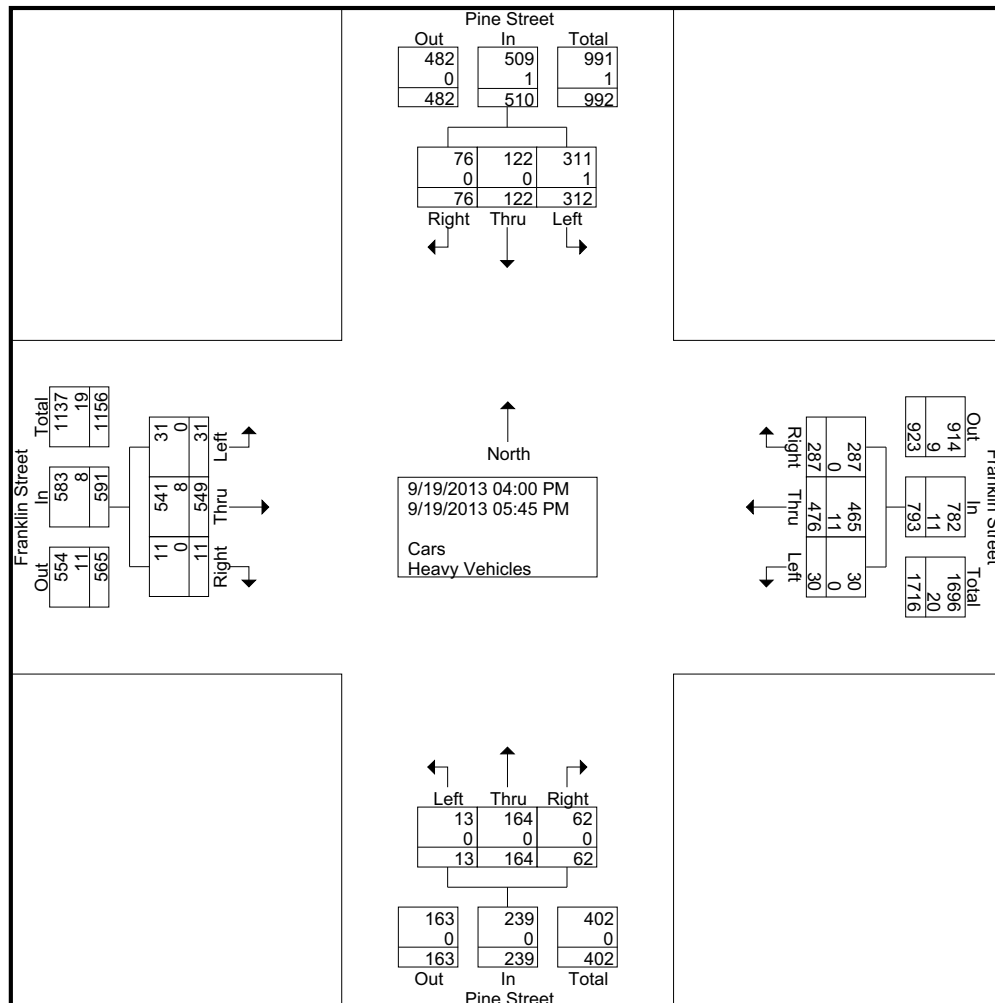


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Pine PM
Site Code : 8
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	2	17	3	22	35	16	7	58	4	69	1	74	2	52	24	78	232
04:15 PM	0	14	3	17	37	14	9	60	4	63	0	67	3	45	27	75	219
04:30 PM	3	14	3	20	39	14	8	61	4	68	0	72	2	48	25	75	228
04:45 PM	1	20	9	30	37	17	11	65	4	71	1	76	3	63	29	95	266
Total	6	65	18	89	148	61	35	244	16	271	2	289	10	208	105	323	945
05:00 PM	1	24	8	33	36	12	10	58	3	63	1	67	6	57	37	100	258
05:15 PM	3	28	10	41	51	14	10	75	2	69	1	72	6	65	51	122	310
05:30 PM	2	22	13	37	38	21	15	74	6	76	5	87	5	88	44	137	335
05:45 PM	1	25	13	39	39	14	6	59	4	70	2	76	3	58	50	111	285
Total	7	99	44	150	164	61	41	266	15	278	9	302	20	268	182	470	1188
Grand Total	13	164	62	239	312	122	76	510	31	549	11	591	30	476	287	793	2133
Apprch %	5.4	68.6	25.9		61.2	23.9	14.9		5.2	92.9	1.9		3.8	60	36.2		
Total %	0.6	7.7	2.9	11.2	14.6	5.7	3.6	23.9	1.5	25.7	0.5	27.7	1.4	22.3	13.5	37.2	
Cars	13	164	62	239	311	122	76	509	31	541	11	583	30	465	287	782	4226
% Cars	100	100	100	100	99.7	100	100	99.8	100	98.5	100	98.6	100	97.7	100	98.6	99.1
Heavy Vehicles	0	0	0	0	1	0	0	1	0	8	0	8	0	11	0	11	40
% Heavy Vehicles	0	0	0	0	0.3	0	0	0.2	0	1.5	0	1.4	0	2.3	0	1.4	0.9



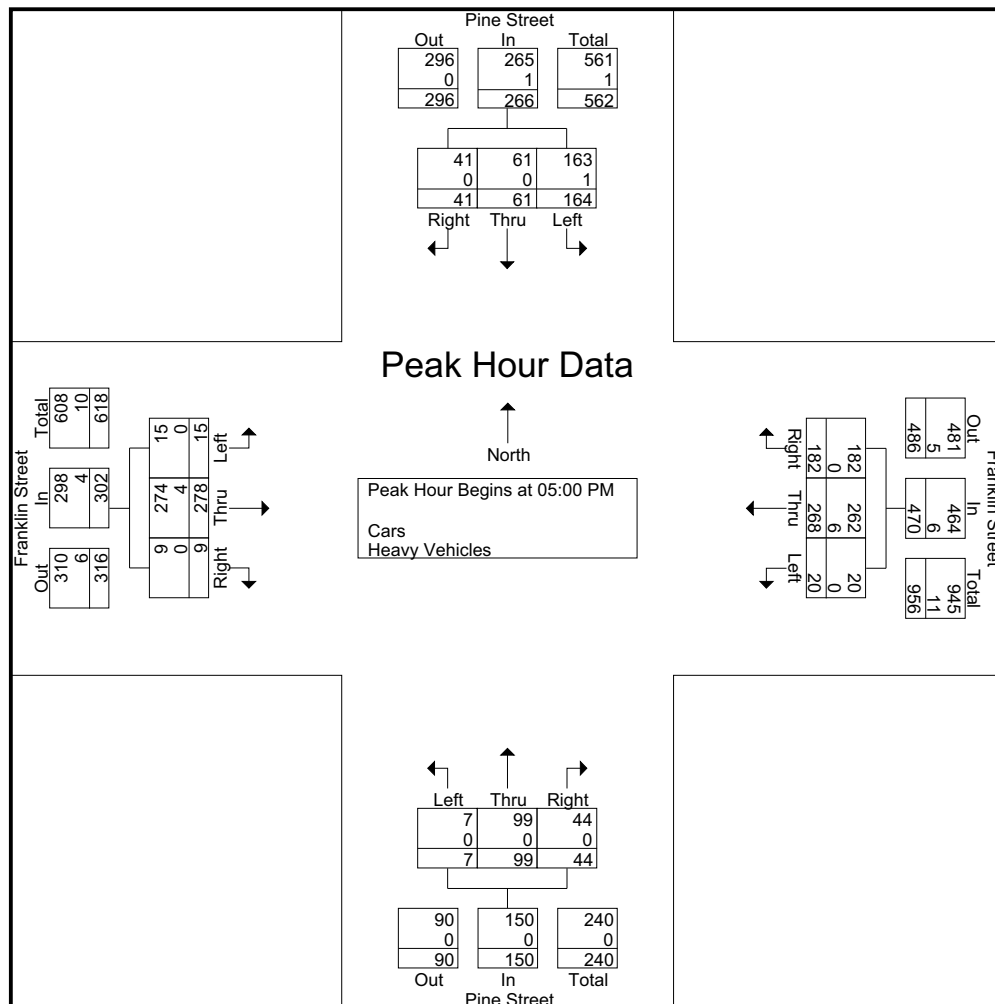
GPI Project #:
Stoneham, MA
Client: John DeBarros



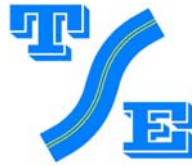
Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5686
F: 617-801-8800
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File Name : Pine PM
Site Code : 8
Start Date : 9/19/2013
Page No : 2 of 4

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	1	24	8	33	36	12	10	58	3	63	1	67	6	57	37	100	258
05:15 PM	3	28	10	41	51	14	10	75	2	69	1	72	6	65	51	122	310
05:30 PM	2	22	13	37	38	21	15	74	6	76	5	87	5	88	44	137	335
05:45 PM	1	25	13	39	39	14	6	59	4	70	2	76	3	58	50	111	285
Total Volume	7	99	44	150	164	61	41	266	15	278	9	302	20	268	182	470	1188
% App. Total	4.7	66	29.3		61.7	22.9	15.4		5	92.1	3		4.3	57	38.7		
PHF	.583	.884	.846	.915	.804	.726	.683	.887	.625	.914	.450	.868	.833	.761	.892	.858	.887
Cars	7	99	44	150	163	61	41	265	15	274	9	298	20	262	182	464	1177
% Cars	100	100	100	100	99.4	100	100	99.6	100	98.6	100	98.7	100	97.8	100	98.7	99.1
Heavy Vehicles	0	0	0	0	1	0	0	1	0	4	0	4	0	6	0	6	11
% Heavy Vehicles	0	0	0	0	0.6	0	0	0.4	0	1.4	0	1.3	0	2.2	0	1.3	0.9



GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
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File Name : Pine PM
Site Code : 8
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	2	17	3	22	35	16	7	58	4	68	1	73	2	51	24	77	230
04:15 PM	0	14	3	17	37	14	9	60	4	62	0	66	3	44	27	74	217
04:30 PM	3	14	3	20	39	14	8	61	4	67	0	71	2	47	25	74	226
04:45 PM	1	20	9	30	37	17	11	65	4	70	1	75	3	61	29	93	263
Total	6	65	18	89	148	61	35	244	16	267	2	285	10	203	105	318	936
05:00 PM	1	24	8	33	36	12	10	58	3	62	1	66	6	56	37	99	256
05:15 PM	3	28	10	41	51	14	10	75	2	68	1	71	6	63	51	120	307
05:30 PM	2	22	13	37	37	21	15	73	6	75	5	86	5	87	44	136	332
05:45 PM	1	25	13	39	39	14	6	59	4	69	2	75	3	56	50	109	282
Total	7	99	44	150	163	61	41	265	15	274	9	298	20	262	182	464	1177
Grand Total	13	164	62	239	311	122	76	509	31	541	11	583	30	465	287	782	2113
Apprch %	5.4	68.6	25.9		61.1	24	14.9		5.3	92.8	1.9		3.8	59.5	36.7		
Total %	0.6	7.8	2.9	11.3	14.7	5.8	3.6	24.1	1.5	25.6	0.5	27.6	1.4	22	13.6	37	

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	1	24	8	33	36	12	10	58	3	62	1	66	6	56	37	99	256
05:15 PM	3	28	10	41	51	14	10	75	2	68	1	71	6	63	51	120	307
05:30 PM	2	22	13	37	37	21	15	73	6	75	5	86	5	87	44	136	332
05:45 PM	1	25	13	39	39	14	6	59	4	69	2	75	3	56	50	109	282
Total Volume	7	99	44	150	163	61	41	265	15	274	9	298	20	262	182	464	1177
% App. Total	4.7	66	29.3		61.5	23	15.5		5	91.9	3		4.3	56.5	39.2		
PHF	.583	.884	.846	.915	.799	.726	.683	.883	.625	.913	.450	.866	.833	.753	.892	.853	.886

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM				04:45 PM				04:45 PM				05:00 PM			
+0 mins.	1	24	8	33	37	17	11	65	4	70	1	75	6	56	37	99
+15 mins.	3	28	10	41	36	12	10	58	3	62	1	66	6	63	51	120
+30 mins.	2	22	13	37	51	14	10	75	2	68	1	71	5	87	44	136
+45 mins.	1	25	13	39	37	21	15	73	6	75	5	86	3	56	50	109
Total Volume	7	99	44	150	161	64	46	271	15	275	8	298	20	262	182	464
% App. Total	4.7	66	29.3		59.4	23.6	17		5	92.3	2.7		4.3	56.5	39.2	
PHF	.583	.884	.846	.915	.789	.762	.767	.903	.625	.917	.400	.866	.833	.753	.892	.853

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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File Name : Pine PM
Site Code : 8
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
Total	0	0	0	0	0	0	0	0	0	4	0	4	0	5	0	5	9
05:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
05:30 PM	0	0	0	0	1	0	0	1	0	1	0	1	0	1	0	1	3
05:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
Total	0	0	0	0	1	0	0	1	0	4	0	4	0	6	0	6	11
Grand Total	0	0	0	0	1	0	0	1	0	8	0	8	0	11	0	11	20
Apprch %	0	0	0		100	0	0		0	100	0		0	100	0		
Total %	0	0	0		5	0	0	5	0	40	0	40	0	55	0	55	

	Pine Street Northbound				Pine Street Southbound				Franklin Street Eastbound				Franklin Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
05:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
05:30 PM	0	0	0	0	1	0	0	1	0	1	0	1	0	1	0	1	3
Total Volume	0	0	0	0	1	0	0	1	0	4	0	4	0	6	0	6	11
% App. Total	0	0	0		100	0	0		0	100	0		0	100	0		
PHF	.000	.000	.000	.000	.250	.000	.000	.250	.000	1.000	.000	1.000	.000	.750	.000	.750	.917

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:45 PM				04:00 PM				04:30 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
+15 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2
+30 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
+45 mins.	0	0	0	0	1	0	0	1	0	1	0	1	0	2	0	2
Total Volume	0	0	0	0	1	0	0	1	0	4	0	4	0	6	0	6
% App. Total	0	0	0		100	0	0		0	100	0		0	100	0	
PHF	.000	.000	.000	.000	.250	.000	.000	.250	.000	1.000	.000	1.000	.000	.750	.000	.750

Accurate Counts

978-664-2565

N/S Street : Pine Street
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

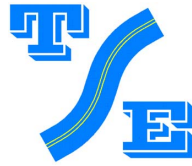
File Name : 16470007
 Site Code : 16470007
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Pine St From North				Franklin St From East				Pine St From South				Franklin St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
05:00 PM	0	0	1	0	0	1	0	0	0	0	0	3	0	0	0	7	10	2	12
05:15 PM	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	1	6	0	6
05:30 PM	0	0	0	1	0	0	0	2	0	0	0	3	0	0	0	1	7	0	7
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	1	1	0	1	0	4	0	0	0	9	0	0	1	9	23	3	26
Grand Total	0	0	1	1	0	1	0	4	0	0	0	9	0	0	1	9	23	3	26
Apprch %	0	0	100		0	100	0		0	0	0		0	0	100				
Total %	0	0	33.3		0	33.3	0		0	0	0		0	0	33.3		88.5	11.5	

	Pine St From North				Franklin St From East				Pine St From South				Franklin St From West				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total Volume	0	0	1	1	0	1	0	1	0	0	0	0	0	0	1	1	3
% App. Total	0	0	100		0	100	0		0	0	0		0	0	100		
PHF	.000	.000	.250	.250	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.250	.250	.375

GPI Project #:
Stoneham, MA
Client: John DeBarros

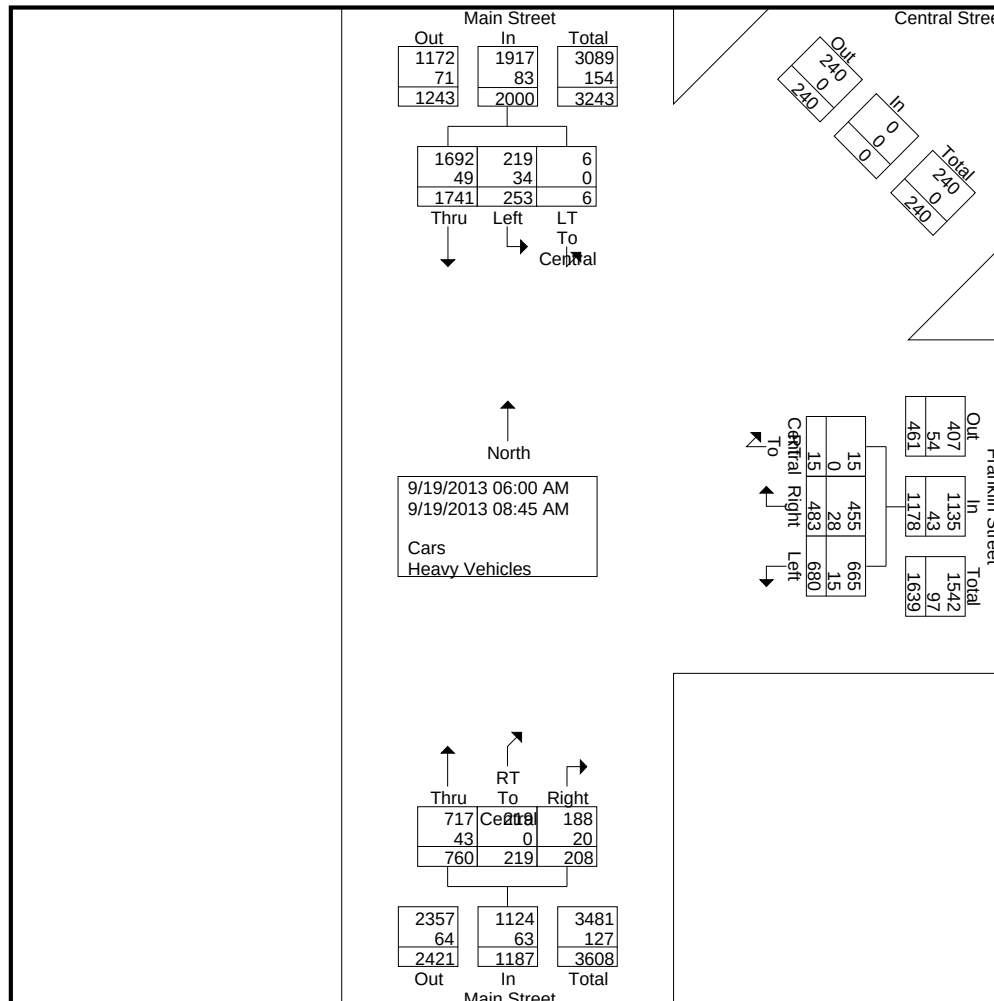


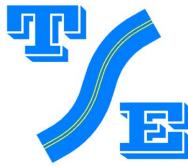
Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
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File Name : Mainfrank AM
Site Code : 5
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

Start Time	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				Int. Total
	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	
06:00 AM	27	6	8	41	1	16	143	160	24	24	0	48	249
06:15 AM	37	6	13	56	0	17	156	173	26	22	1	49	278
06:30 AM	42	5	9	56	0	20	180	200	43	28	1	72	328
06:45 AM	40	12	17	69	1	18	167	186	63	19	2	84	339
Total	146	29	47	222	2	71	646	719	156	93	4	253	1194
07:00 AM	44	15	22	81	0	16	146	162	63	45	1	109	352
07:15 AM	42	29	21	92	1	19	167	187	81	47	1	129	408
07:30 AM	65	28	22	115	0	27	140	167	63	56	3	122	404
07:45 AM	93	36	20	149	0	18	141	159	95	52	0	147	455
Total	244	108	85	437	1	80	594	675	302	200	5	507	1619
08:00 AM	109	27	25	161	1	30	131	162	78	45	2	125	448
08:15 AM	99	20	17	136	0	20	133	153	66	49	3	118	407
08:30 AM	106	19	22	147	1	32	133	166	32	58	1	91	404
08:45 AM	56	16	12	84	1	20	104	125	46	38	0	84	293
Total	370	82	76	528	3	102	501	606	222	190	6	418	1552
Grand Total	760	219	208	1187	6	253	1741	2000	680	483	15	1178	4365
Apprch %	64	18.4	17.5		0.3	12.6	87.1		57.7	41	1.3		
Total %	17.4	5	4.8	27.2	0.1	5.8	39.9	45.8	15.6	11.1	0.3	27	
Cars	717	219	188	1124	6	219	1692	1917	665	455	15	1135	8352
% Cars	94.3	100	90.4	94.7	100	86.6	97.2	95.8	97.8	94.2	100	96.3	95.7
Heavy Vehicles	43	0	20	63	0	34	49	83	15	28	0	43	378
% Heavy Vehicles	5.7	0	9.6	5.3	0	13.4	2.8	4.2	2.2	5.8	0	3.7	4.3



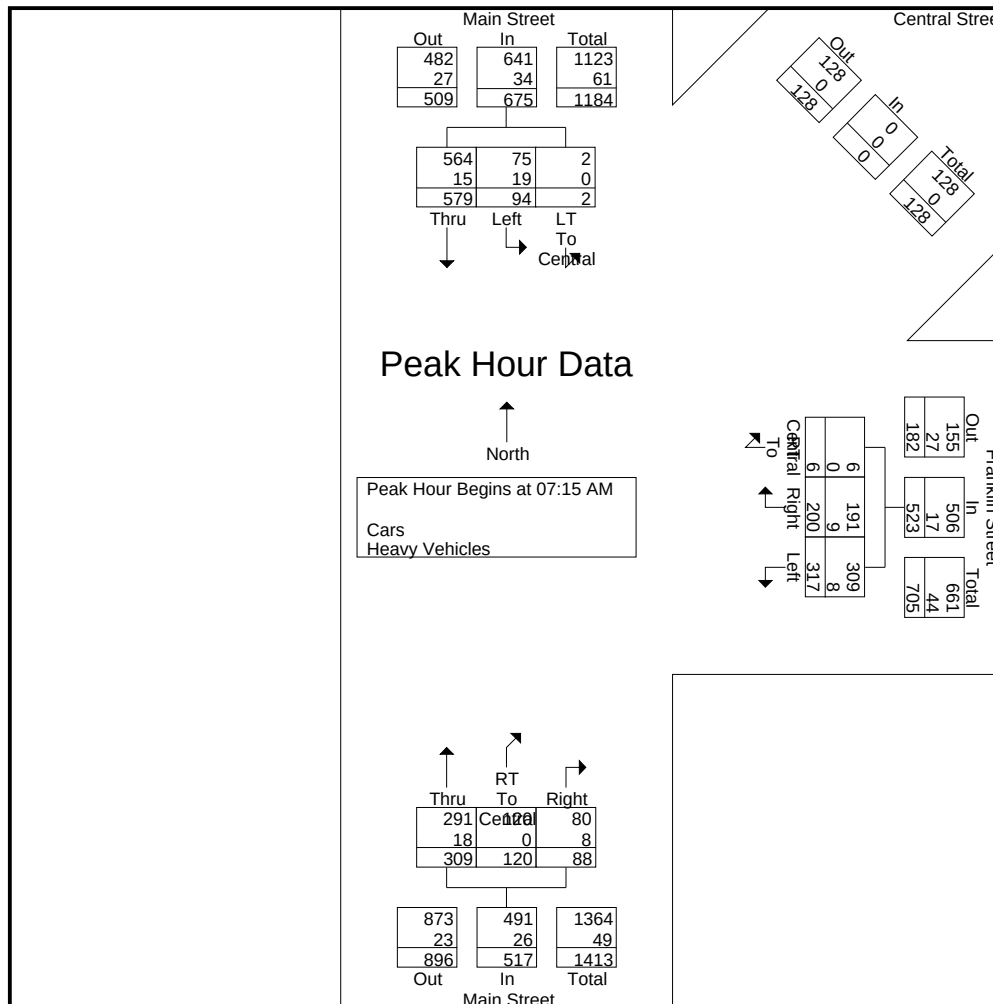


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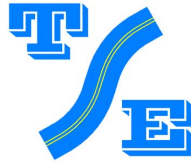
GPI Project #:
Stoneham, MA
Client: John DeBarros

File Name : Mainfrank AM
Site Code : 5
Start Date : 9/19/2013
Page No : 2 of 4

	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				
Start Time	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	42	29	21	92	1	19	167	187	81	47	1	129	408
07:30 AM	65	28	22	115	0	27	140	167	63	56	3	122	404
07:45 AM	93	36	20	149	0	18	141	159	95	52	0	147	455
08:00 AM	109	27	25	161	1	30	131	162	78	45	2	125	448
Total Volume	309	120	88	517	2	94	579	675	317	200	6	523	1715
% App. Total	59.8	23.2	17		0.3	13.9	85.8		60.6	38.2	1.1		
PHF	.709	.833	.880	.803	.500	.783	.867	.902	.834	.893	.500	.889	.942
Cars	291	120	80	491	2	75	564	641	309	191	6	506	1638
% Cars	94.2	100	90.9	95.0	100	79.8	97.4	95.0	97.5	95.5	100	96.7	95.5
Heavy Vehicles	18	0	8	26	0	19	15	34	8	9	0	17	77
% Heavy Vehicles	5.8	0	9.1	5.0	0	20.2	2.6	5.0	2.5	4.5	0	3.3	4.5



GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
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File Name : Mainfrank AM
Site Code : 5
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

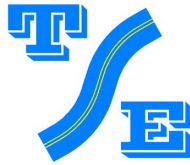
Start Time	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				Int. Total
	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	
06:00 AM	26	6	8	40	1	16	137	154	24	23	0	47	241
06:15 AM	35	6	11	52	0	16	154	170	26	18	1	45	267
06:30 AM	40	5	6	51	0	19	175	194	43	27	1	71	316
06:45 AM	38	12	15	65	1	17	163	181	62	16	2	80	326
Total	139	29	40	208	2	68	629	699	155	84	4	243	1150
07:00 AM	39	15	20	74	0	15	140	155	62	43	1	106	335
07:15 AM	42	29	20	91	1	15	163	179	78	44	1	123	393
07:30 AM	61	28	22	111	0	16	136	152	62	52	3	117	380
07:45 AM	86	36	19	141	0	16	138	154	92	52	0	144	439
Total	228	108	81	417	1	62	577	640	294	191	5	490	1547
08:00 AM	102	27	19	148	1	28	127	156	77	43	2	122	426
08:15 AM	94	20	17	131	0	16	130	146	64	48	3	115	392
08:30 AM	103	19	20	142	1	29	128	158	32	54	1	87	387
08:45 AM	51	16	11	78	1	16	101	118	43	35	0	78	274
Total	350	82	67	499	3	89	486	578	216	180	6	402	1479
Grand Total	717	219	188	1124	6	219	1692	1917	665	455	15	1135	4176
Apprch %	63.8	19.5	16.7		0.3	11.4	88.3		58.6	40.1	1.3		
Total %	17.2	5.2	4.5	26.9	0.1	5.2	40.5	45.9	15.9	10.9	0.4	27.2	

	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				
Start Time	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	86	36	19	141	0	16	138	154	92	52	0	144	439
08:00 AM	102	27	19	148	1	28	127	156	77	43	2	122	426
08:15 AM	94	20	17	131	0	16	130	146	64	48	3	115	392
08:30 AM	103	19	20	142	1	29	128	158	32	54	1	87	387
Total Volume	385	102	75	562	2	89	523	614	265	197	6	468	1644
% App. Total	68.5	18.1	13.3		0.3	14.5	85.2		56.6	42.1	1.3		
PHF	.934	.708	.938	.949	.500	.767	.947	.972	.720	.912	.500	.813	.936

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				06:30 AM				07:15 AM			
+0 mins.	86	36	19	141	0	19	175	194	78	44	1	123
+15 mins.	102	27	19	148	1	17	163	181	62	52	3	117
+30 mins.	94	20	17	131	0	15	140	155	92	52	0	144
+45 mins.	103	19	20	142	1	15	163	179	77	43	2	122
Total Volume	385	102	75	562	2	66	641	709	309	191	6	506
% App. Total	68.5	18.1	13.3		0.3	9.3	90.4		61.1	37.7	1.2	
PHF	.934	.708	.938	.949	.500	.868	.916	.914	.840	.918	.500	.878

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Mainfrank AM
Site Code : 5
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

Start Time	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				Int. Total
	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	
06:00 AM	1	0	0	1	0	0	6	6	0	1	0	1	8
06:15 AM	2	0	2	4	0	1	2	3	0	4	0	4	11
06:30 AM	2	0	3	5	0	1	5	6	0	1	0	1	12
06:45 AM	2	0	2	4	0	1	4	5	1	3	0	4	13
Total	7	0	7	14	0	3	17	20	1	9	0	10	44
07:00 AM	5	0	2	7	0	1	6	7	1	2	0	3	17
07:15 AM	0	0	1	1	0	4	4	8	3	3	0	6	15
07:30 AM	4	0	0	4	0	11	4	15	1	4	0	5	24
07:45 AM	7	0	1	8	0	2	3	5	3	0	0	3	16
Total	16	0	4	20	0	18	17	35	8	9	0	17	72
08:00 AM	7	0	6	13	0	2	4	6	1	2	0	3	22
08:15 AM	5	0	0	5	0	4	3	7	2	1	0	3	15
08:30 AM	3	0	2	5	0	3	5	8	0	4	0	4	17
08:45 AM	5	0	1	6	0	4	3	7	3	3	0	6	19
Total	20	0	9	29	0	13	15	28	6	10	0	16	73
Grand Total	43	0	20	63	0	34	49	83	15	28	0	43	189
Apprch %	68.3	0	31.7		0	41	59		34.9	65.1	0		
Total %	22.8	0	10.6	33.3	0	18	25.9	43.9	7.9	14.8	0	22.8	

	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				
Start Time	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	0	1	1	0	4	4	8	3	3	0	6	15
07:30 AM	4	0	0	4	0	11	4	15	1	4	0	5	24
07:45 AM	7	0	1	8	0	2	3	5	3	0	0	3	16
08:00 AM	7	0	6	13	0	2	4	6	1	2	0	3	22
Total Volume	18	0	8	26	0	19	15	34	8	9	0	17	77
% App. Total	69.2	0	30.8		0	55.9	44.1		47.1	52.9	0		
PHF	.643	.000	.333	.500	.000	.432	.938	.567	.667	.563	.000	.708	.802

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				06:45 AM				06:45 AM			
+0 mins.	7	0	1	8	0	1	4	5	1	3	0	4
+15 mins.	7	0	6	13	0	1	6	7	1	2	0	3
+30 mins.	5	0	0	5	0	4	4	8	3	3	0	6
+45 mins.	3	0	2	5	0	11	4	15	1	4	0	5
Total Volume	22	0	9	31	0	17	18	35	6	12	0	18
% App. Total	71	0	29		0	48.6	51.4		33.3	66.7	0	
PHF	.786	.000	.375	.596	.000	.386	.750	.583	.500	.750	.000	.750

Accurate Counts
978-664-2565

N/S Street : Main Street / Central St
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470008
Site Code : 16470008
Start Date : 4/10/2014
Page No : 13

Groups Printed- Bikes Peds

[illegible][illegible]

GPI Project #:
Stoneham, MA
Client: John DeBarros

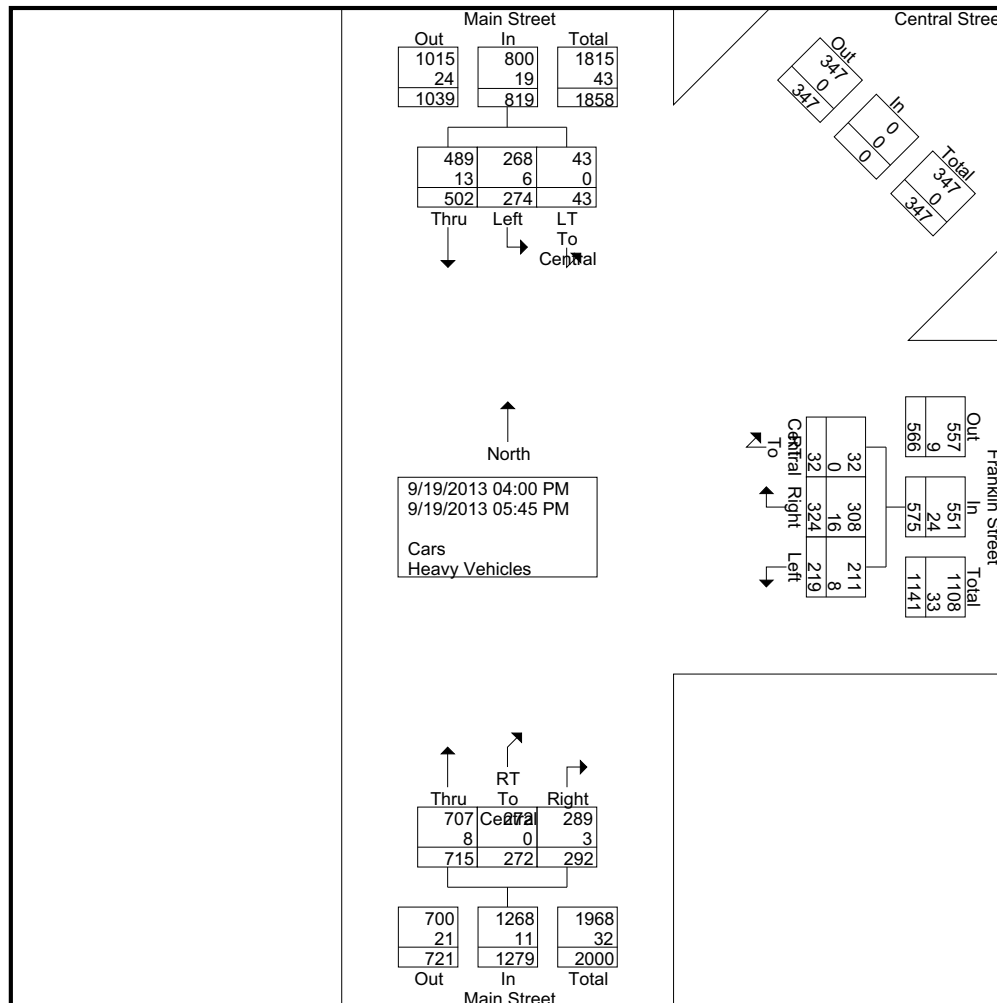


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
www.tsetraffic.com

File Name : Mainfrank PM
Site Code : 5
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

Start Time	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				Int. Total
	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	
04:00 PM	95	24	38	157	4	36	46	86	29	42	3	74	317
04:15 PM	101	27	35	163	3	30	87	120	25	39	4	68	351
04:30 PM	102	36	38	176	6	31	71	108	26	41	6	73	357
04:45 PM	97	39	43	179	3	43	76	122	27	39	6	72	373
Total	395	126	154	675	16	140	280	436	107	161	19	287	1398
05:00 PM	85	38	42	165	9	41	58	108	20	43	2	65	338
05:15 PM	56	37	33	126	5	29	52	86	30	43	2	75	287
05:30 PM	106	47	37	190	6	43	63	112	34	44	5	83	385
05:45 PM	73	24	26	123	7	21	49	77	28	33	4	65	265
Total	320	146	138	604	27	134	222	383	112	163	13	288	1275
Grand Total	715	272	292	1279	43	274	502	819	219	324	32	575	2673
Apprch %	55.9	21.3	22.8		5.3	33.5	61.3		38.1	56.3	5.6		
Total %	26.7	10.2	10.9	47.8	1.6	10.3	18.8	30.6	8.2	12.1	1.2	21.5	
Cars	707	272	289	1268	43	268	489	800	211	308	32	551	5238
% Cars	98.9	100	99	99.1	100	97.8	97.4	97.7	96.3	95.1	100	95.8	98
Heavy Vehicles	8	0	3	11	0	6	13	19	8	16	0	24	108
% Heavy Vehicles	1.1	0	1	0.9	0	2.2	2.6	2.3	3.7	4.9	0	4.2	2



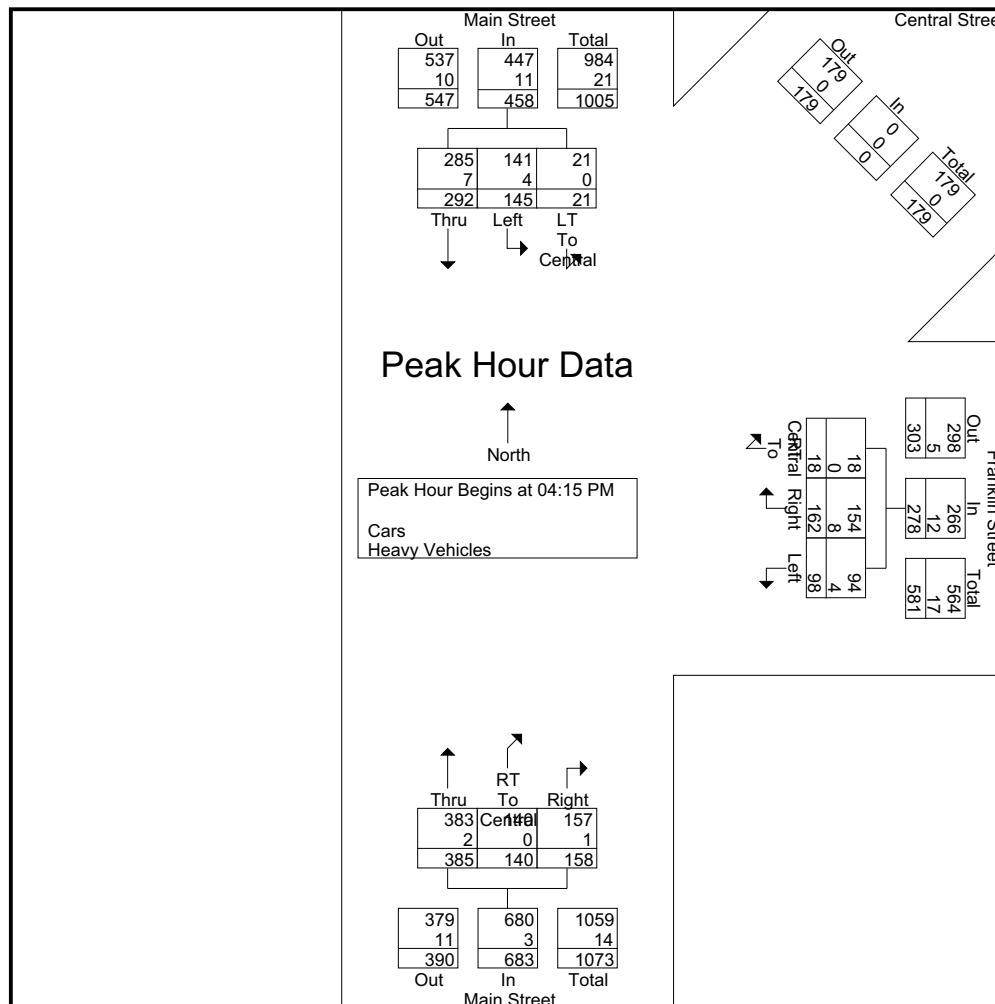
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
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File Name : Mainfrank PM
Site Code : 5
Start Date : 9/19/2013
Page No : 2 of 4

	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				
Start Time	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	101	27	35	163	3	30	87	120	25	39	4	68	351
04:30 PM	102	36	38	176	6	31	71	108	26	41	6	73	357
04:45 PM	97	39	43	179	3	43	76	122	27	39	6	72	373
05:00 PM	85	38	42	165	9	41	58	108	20	43	2	65	338
Total Volume	385	140	158	683	21	145	292	458	98	162	18	278	1419
% App. Total	56.4	20.5	23.1		4.6	31.7	63.8		35.3	58.3	6.5		
PHF	.944	.897	.919	.954	.583	.843	.839	.939	.907	.942	.750	.952	.951
Cars	383	140	157	680	21	141	285	447	94	154	18	266	1393
% Cars	99.5	100	99.4	99.6	100	97.2	97.6	97.6	95.9	95.1	100	95.7	98.2
Heavy Vehicles	2	0	1	3	0	4	7	11	4	8	0	12	26
% Heavy Vehicles	0.5	0	0.6	0.4	0	2.8	2.4	2.4	4.1	4.9	0	4.3	1.8



GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
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File Name : Mainfrank PM
Site Code : 5
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

Start Time	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				Int. Total
	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	
04:00 PM	94	24	38	156	4	36	44	84	28	40	3	71	311
04:15 PM	101	27	35	163	3	30	85	118	25	35	4	64	345
04:30 PM	101	36	38	175	6	31	69	106	24	40	6	70	351
04:45 PM	96	39	43	178	3	43	76	122	26	36	6	68	368
Total	392	126	154	672	16	140	274	430	103	151	19	273	1375
05:00 PM	85	38	41	164	9	37	55	101	19	43	2	64	329
05:15 PM	56	37	32	125	5	29	50	84	29	42	2	73	282
05:30 PM	101	47	37	185	6	41	62	109	32	40	5	77	371
05:45 PM	73	24	25	122	7	21	48	76	28	32	4	64	262
Total	315	146	135	596	27	128	215	370	108	157	13	278	1244
Grand Total	707	272	289	1268	43	268	489	800	211	308	32	551	2619
Apprch %	55.8	21.5	22.8		5.4	33.5	61.1		38.3	55.9	5.8		
Total %	27	10.4	11	48.4	1.6	10.2	18.7	30.5	8.1	11.8	1.2	21	

	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				
Start Time	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	101	27	35	163	3	30	85	118	25	35	4	64	345
04:30 PM	101	36	38	175	6	31	69	106	24	40	6	70	351
04:45 PM	96	39	43	178	3	43	76	122	26	36	6	68	368
05:00 PM	85	38	41	164	9	37	55	101	19	43	2	64	329
Total Volume	383	140	157	680	21	141	285	447	94	154	18	266	1393
% App. Total	56.3	20.6	23.1		4.7	31.5	63.8		35.3	57.9	6.8		
PHF	.948	.897	.913	.955	.583	.820	.838	.916	.904	.895	.750	.950	.946

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:15 PM				04:45 PM				04:45 PM			
+0 mins.	101	27	35	163	3	30	85	118	26	36	6	68
+15 mins.	101	36	38	175	6	31	69	106	19	43	2	64
+30 mins.	96	39	43	178	3	43	76	122	29	42	2	73
+45 mins.	85	38	41	164	9	37	55	101	32	40	5	77
Total Volume	383	140	157	680	21	141	285	447	106	161	15	282
% App. Total	56.3	20.6	23.1		4.7	31.5	63.8		37.6	57.1	5.3	
PHF	.948	.897	.913	.955	.583	.820	.838	.916	.828	.936	.625	.916

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5636
F: 617-301-3300
www.tsetraffic.com

File Name : Mainfrank PM
Site Code : 5
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

Start Time	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				Int. Total
	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	
04:00 PM	1	0	0	1	0	0	2	2	1	2	0	3	6
04:15 PM	0	0	0	0	0	0	2	2	0	4	0	4	6
04:30 PM	1	0	0	1	0	0	2	2	2	1	0	3	6
04:45 PM	1	0	0	1	0	0	0	0	1	3	0	4	5
Total	3	0	0	3	0	0	6	6	4	10	0	14	23
05:00 PM	0	0	1	1	0	4	3	7	1	0	0	1	9
05:15 PM	0	0	1	1	0	0	2	2	1	1	0	2	5
05:30 PM	5	0	0	5	0	2	1	3	2	4	0	6	14
05:45 PM	0	0	1	1	0	0	1	1	0	1	0	1	3
Total	5	0	3	8	0	6	7	13	4	6	0	10	31
Grand Total	8	0	3	11	0	6	13	19	8	16	0	24	54
Apprch %	72.7	0	27.3		0	31.6	68.4		33.3	66.7	0		
Total %	14.8	0	5.6	20.4	0	11.1	24.1	35.2	14.8	29.6	0	44.4	

	Main Street Northbound				Main Street Southbound				Franklin Street Westbound				
Start Time	Thru	RT To Central	Right	App. Total	LT To Central	Left	Thru	App. Total	Left	Right	RT To Central	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	1	0	0	1	0	0	0	0	1	3	0	4	5
05:00 PM	0	0	1	1	0	4	3	7	1	0	0	1	9
05:15 PM	0	0	1	1	0	0	2	2	1	1	0	2	5
05:30 PM	5	0	0	5	0	2	1	3	2	4	0	6	14
Total Volume	6	0	2	8	0	6	6	12	5	8	0	13	33
% App. Total	75	0	25		0	50	50		38.5	61.5	0		
PHF	.300	.000	.500	.400	.000	.375	.500	.429	.625	.500	.000	.542	.589

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				04:00 PM			
+0 mins.	1	0	0	1	0	4	3	7	1	2	0	3
+15 mins.	0	0	1	1	0	0	2	2	0	4	0	4
+30 mins.	0	0	1	1	0	2	1	3	2	1	0	3
+45 mins.	5	0	0	5	0	0	1	1	1	3	0	4
Total Volume	6	0	2	8	0	6	7	13	4	10	0	14
% App. Total	75	0	25		0	46.2	53.8		28.6	71.4	0	
PHF	.300	.000	.500	.400	.000	.375	.583	.464	.500	.625	.000	.875

Accurate Counts

978-664-2565

N/S Street : Main Street / Central St
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470008
 Site Code : 16470008
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Main St From North				Central St From Northeast				Franklin St From East				Main St From South				Exclu. Total	Inclu. Total	Int. Total
Start Time	HdLt	Left	Thru	Peds	HdLt	BrLt	HdRt	Peds	Left	Right	HdRt	Peds	Thru	BrRt	Right	Peds			
04:15 PM	0	0	0	3	0	0	0	4	0	0	0	1	0	0	0	1	9	0	9
04:30 PM	0	0	0	4	0	0	0	1	0	0	0	4	0	0	1	4	13	1	14
04:45 PM	0	0	0	6	0	0	0	8	0	0	0	9	0	0	0	0	23	0	23
Total	0	0	0	13	0	0	0	13	0	0	0	14	0	0	1	5	45	1	46
05:00 PM	0	0	0	1	0	0	0	5	0	0	0	5	0	0	0	7	18	0	18
Grand Total	0	0	0	14	0	0	0	18	0	0	0	19	0	0	1	12	63	1	64
Apprch %	0	0	0		0	0	0		0	0	0		0	0	100				
Total %	0	0	0		0	0	0		0	0	0		0	0	100		98.4	1.6	

	Main St From North				Central St From Northeast				Franklin St From East				Main St From South				Int. Total
Start Time	HdLt	Left	Thru	App. Total	HdLt	BrLt	HdRt	App. Total	Left	Right	HdRt	App. Total	Thru	BrRt	Right	App. Total	
Peak Hour Analysis From 04:15 PM to 05:00 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
% App. Total	0	0	0		0	0	0		0	0	0		0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.250

GPI Project #:
Stoneham, MA
Client: John DeBarros

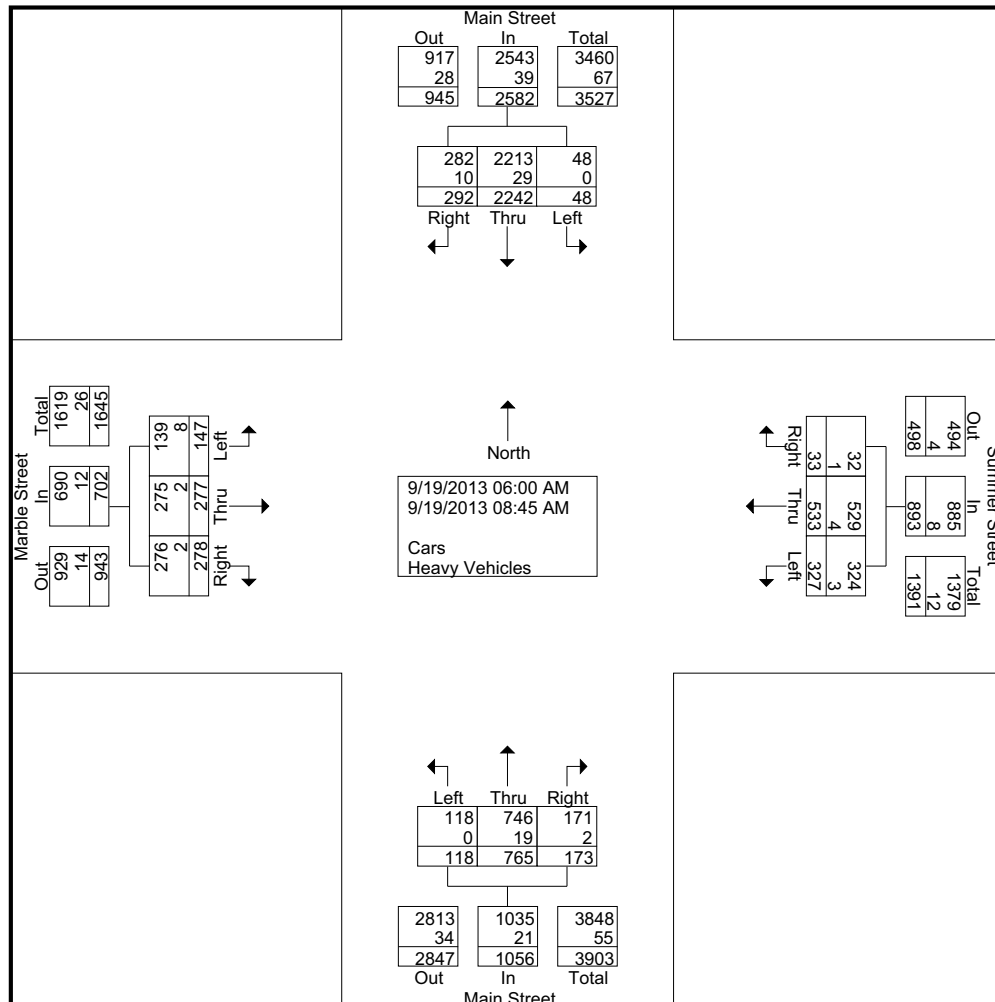


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-301-8800
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File Name : Mainsum AM
Site Code : 4
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	3	22	3	28	2	146	10	158	5	7	12	24	30	27	2	59	269
06:15 AM	2	30	4	36	3	188	14	205	5	5	16	26	42	33	1	76	343
06:30 AM	1	36	4	41	1	208	17	226	7	5	13	25	27	37	1	65	357
06:45 AM	8	42	12	62	2	228	22	252	8	18	18	44	32	61	1	94	452
Total	14	130	23	167	8	770	63	841	25	35	59	119	131	158	5	294	1421
07:00 AM	4	42	10	56	1	201	27	229	10	29	35	74	32	57	7	96	455
07:15 AM	10	54	25	89	0	212	31	243	15	26	35	76	30	41	2	73	481
07:30 AM	16	49	18	83	5	204	25	234	8	40	28	76	34	52	4	90	483
07:45 AM	19	64	12	95	8	204	32	244	17	22	30	69	25	53	3	81	489
Total	49	209	65	323	14	821	115	950	50	117	128	295	121	203	16	340	1908
08:00 AM	17	98	25	140	12	167	35	214	12	36	35	83	16	49	2	67	504
08:15 AM	12	105	19	136	9	156	33	198	17	38	26	81	19	47	3	69	484
08:30 AM	14	114	20	148	3	170	26	199	25	36	16	77	25	50	5	80	504
08:45 AM	12	109	21	142	2	158	20	180	18	15	14	47	15	26	2	43	412
Total	55	426	85	566	26	651	114	791	72	125	91	288	75	172	12	259	1904
Grand Total	118	765	173	1056	48	2242	292	2582	147	277	278	702	327	533	33	893	5233
Apprch %	11.2	72.4	16.4		1.9	86.8	11.3		20.9	39.5	39.6		36.6	59.7	3.7		
Total %	2.3	14.6	3.3	20.2	0.9	42.8	5.6	49.3	2.8	5.3	5.3	13.4	6.2	10.2	0.6	17.1	
Cars	118	746	171	1035	48	2213	282	2543	139	275	276	690	324	529	32	885	10306
% Cars	100	97.5	98.8	98	100	98.7	96.6	98.5	94.6	99.3	99.3	98.3	99.1	99.2	97	99.1	98.5
Heavy Vehicles	0	19	2	21	0	29	10	39	8	2	2	12	3	4	1	8	160
% Heavy Vehicles	0	2.5	1.2	2	0	1.3	3.4	1.5	5.4	0.7	0.7	1.7	0.9	0.8	3	0.9	1.5



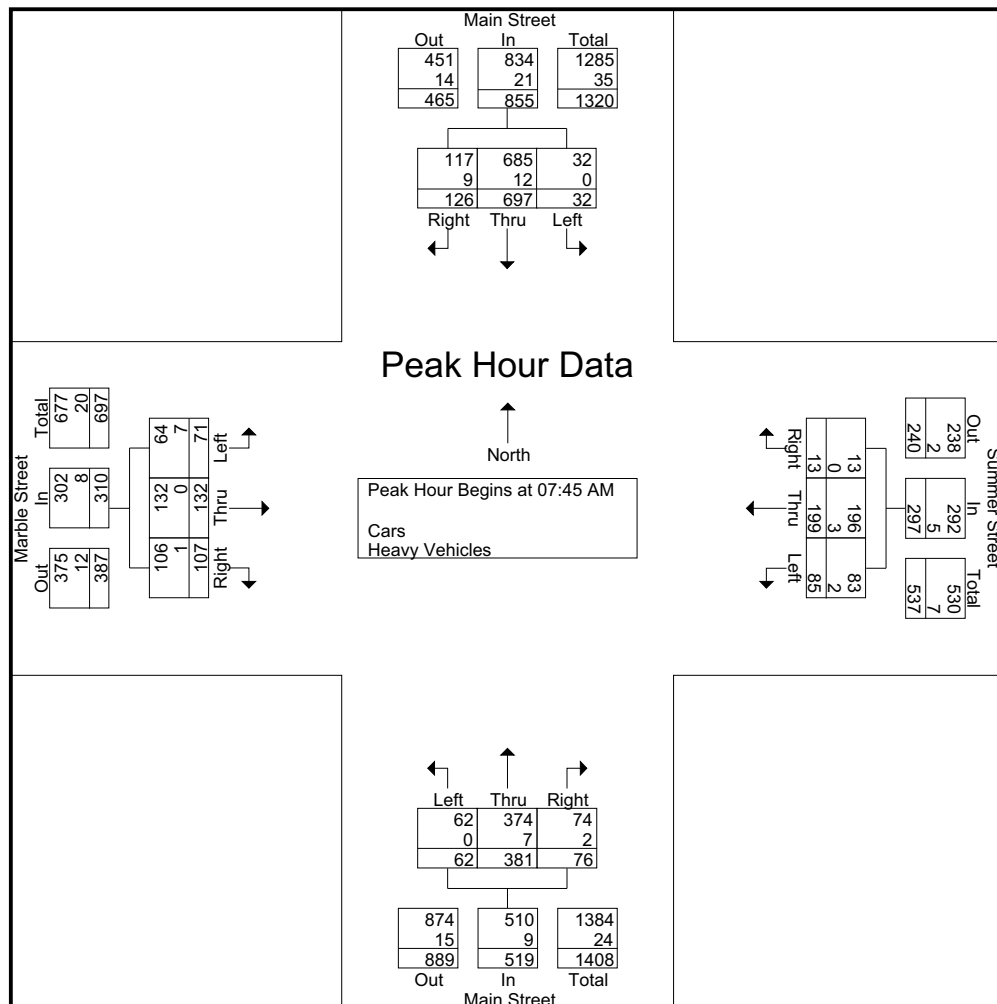
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8800
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File Name : Mainsum AM
Site Code : 4
Start Date : 9/19/2013
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	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	19	64	12	95	8	204	32	244	17	22	30	69	25	53	3	81	489
08:00 AM	17	98	25	140	12	167	35	214	12	36	35	83	16	49	2	67	504
08:15 AM	12	105	19	136	9	156	33	198	17	38	26	81	19	47	3	69	484
08:30 AM	14	114	20	148	3	170	26	199	25	36	16	77	25	50	5	80	504
Total Volume	62	381	76	519	32	697	126	855	71	132	107	310	85	199	13	297	1981
% App. Total	11.9	73.4	14.6		3.7	81.5	14.7		22.9	42.6	34.5		28.6	67	4.4		
PHF	.816	.836	.760	.877	.667	.854	.900	.876	.710	.868	.764	.934	.850	.939	.650	.917	.983
Cars	62	374	74	510	32	685	117	834	64	132	106	302	83	196	13	292	1938
% Cars	100	98.2	97.4	98.3	100	98.3	92.9	97.5	90.1	100	99.1	97.4	97.6	98.5	100	98.3	97.8
Heavy Vehicles	0	7	2	9	0	12	9	21	7	0	1	8	2	3	0	5	43
% Heavy Vehicles	0	1.8	2.6	1.7	0	1.7	7.1	2.5	9.9	0	0.9	2.6	2.4	1.5	0	1.7	2.2



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File Name : Mainsum AM
Site Code : 4
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Groups Printed- Cars

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	3	20	3	26	2	144	10	156	5	7	12	24	30	27	2	59	265
06:15 AM	2	28	4	34	3	186	14	203	5	5	16	26	41	33	1	75	338
06:30 AM	1	34	4	39	1	205	17	223	7	5	13	25	27	37	1	65	352
06:45 AM	8	41	12	61	2	226	22	250	7	18	18	43	32	61	1	94	448
Total	14	123	23	160	8	761	63	832	24	35	59	118	130	158	5	293	1403
07:00 AM	4	41	10	55	1	199	26	226	10	28	35	73	32	57	7	96	450
07:15 AM	10	54	25	89	0	210	31	241	15	26	35	76	30	41	2	73	479
07:30 AM	16	47	18	81	5	202	25	232	8	40	27	75	34	52	3	89	477
07:45 AM	19	62	11	92	8	202	32	242	17	22	30	69	25	52	3	80	483
Total	49	204	64	317	14	813	114	941	50	116	127	293	121	202	15	338	1889
08:00 AM	17	97	25	139	12	164	32	208	10	36	35	81	14	48	2	64	492
08:15 AM	12	103	19	134	9	152	27	188	14	38	26	78	19	46	3	68	468
08:30 AM	14	112	19	145	3	167	26	196	23	36	15	74	25	50	5	80	495
08:45 AM	12	107	21	140	2	156	20	178	18	14	14	46	15	25	2	42	406
Total	55	419	84	558	26	639	105	770	65	124	90	279	73	169	12	254	1861
Grand Total	118	746	171	1035	48	2213	282	2543	139	275	276	690	324	529	32	885	5153
Apprch %	11.4	72.1	16.5		1.9	87	11.1		20.1	39.9	40		36.6	59.8	3.6		
Total %	2.3	14.5	3.3	20.1	0.9	42.9	5.5	49.3	2.7	5.3	5.4	13.4	6.3	10.3	0.6	17.2	

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	19	62	11	92	8	202	32	242	17	22	30	69	25	52	3	80	483
08:00 AM	17	97	25	139	12	164	32	208	10	36	35	81	14	48	2	64	492
08:15 AM	12	103	19	134	9	152	27	188	14	38	26	78	19	46	3	68	468
08:30 AM	14	112	19	145	3	167	26	196	23	36	15	74	25	50	5	80	495
Total Volume	62	374	74	510	32	685	117	834	64	132	106	302	83	196	13	292	1938
% App. Total	12.2	73.3	14.5		3.8	82.1	14		21.2	43.7	35.1		28.4	67.1	4.5		
PHF	.816	.835	.740	.879	.667	.848	.914	.862	.696	.868	.757	.932	.830	.942	.650	.913	.979

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				06:45 AM				07:30 AM				06:45 AM			
+0 mins.	17	97	25	139	2	226	22	250	8	40	27	75	32	61	1	94
+15 mins.	12	103	19	134	1	199	26	226	17	22	30	69	32	57	7	96
+30 mins.	14	112	19	145	0	210	31	241	10	36	35	81	30	41	2	73
+45 mins.	12	107	21	140	5	202	25	232	14	38	26	78	34	52	3	89
Total Volume	55	419	84	558	8	837	104	949	49	136	118	303	128	211	13	352
% App. Total	9.9	75.1	15.1		0.8	88.2	11		16.2	44.9	38.9		36.4	59.9	3.7	
PHF	.809	.935	.840	.962	.400	.926	.839	.949	.721	.850	.843	.935	.941	.865	.464	.917

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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File Name : Mainsum AM
Site Code : 4
Start Date : 9/19/2013
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Groups Printed- Heavy Vehicles

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0	0	4
06:15 AM	0	2	0	2	0	2	0	2	0	0	0	0	1	0	0	1	5
06:30 AM	0	2	0	2	0	3	0	3	0	0	0	0	0	0	0	0	5
06:45 AM	0	1	0	1	0	2	0	2	1	0	0	1	0	0	0	0	4
Total	0	7	0	7	0	9	0	9	1	0	0	1	1	0	0	1	18
07:00 AM	0	1	0	1	0	2	1	3	0	1	0	1	0	0	0	0	5
07:15 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
07:30 AM	0	2	0	2	0	2	0	2	0	0	1	1	0	0	1	1	6
07:45 AM	0	2	1	3	0	2	0	2	0	0	0	0	0	1	0	1	6
Total	0	5	1	6	0	8	1	9	0	1	1	2	0	1	1	2	19
08:00 AM	0	1	0	1	0	3	3	6	2	0	0	2	2	1	0	3	12
08:15 AM	0	2	0	2	0	4	6	10	3	0	0	3	0	1	0	1	16
08:30 AM	0	2	1	3	0	3	0	3	2	0	1	3	0	0	0	0	9
08:45 AM	0	2	0	2	0	2	0	2	0	1	0	1	0	1	0	1	6
Total	0	7	1	8	0	12	9	21	7	1	1	9	2	3	0	5	43
Grand Total	0	19	2	21	0	29	10	39	8	2	2	12	3	4	1	8	80
Apprch %	0	90.5	9.5		0	74.4	25.6		66.7	16.7	16.7		37.5	50	12.5		
Total %	0	23.8	2.5	26.2	0	36.2	12.5	48.8	10	2.5	2.5	15	3.8	5	1.2	10	

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	2	1	3	0	2	0	2	0	0	0	0	0	1	0	1	6
08:00 AM	0	1	0	1	0	3	3	6	2	0	0	2	2	1	0	3	12
08:15 AM	0	2	0	2	0	4	6	10	3	0	0	3	0	1	0	1	16
08:30 AM	0	2	1	3	0	3	0	3	2	0	1	3	0	0	0	0	9
Total Volume	0	7	2	9	0	12	9	21	7	0	1	8	2	3	0	5	43
% App. Total	0	77.8	22.2		0	57.1	42.9		87.5	0	12.5		40	60	0		
PHF	.000	.875	.500	.750	.000	.750	.375	.525	.583	.000	.250	.667	.250	.750	.000	.417	.672

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:45 AM				08:00 AM				07:30 AM				
+0 mins.	0	2	1	3	0	2	0	2	2	0	0	2	0	0	1	1	
+15 mins.	0	1	0	1	0	3	3	6	3	0	0	3	0	1	0	1	
+30 mins.	0	2	0	2	0	4	6	10	2	0	1	3	2	1	0	3	
+45 mins.	0	2	1	3	0	3	0	3	0	1	0	1	0	1	0	1	
Total Volume	0	7	2	9	0	12	9	21	7	1	1	9	2	3	1	6	
% App. Total	0	77.8	22.2		0	57.1	42.9		77.8	11.1	11.1		33.3	50	16.7		
PHF	.000	.875	.500	.750	.000	.750	.375	.525	.583	.250	.250	.750	.250	.750	.250	.500	

Accurate Counts

978-664-2565

N/S Street : Main Street
 E/W Street : Summer St / Marble St
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470009
 Site Code : 16470009
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Main St From North				Summer St From East				Main St From South				Marble St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
07:45 AM	0	0	0	6	0	1	0	3	0	0	0	0	0	0	0	0	9	1	10
Total	0	0	0	6	0	1	0	3	0	0	0	0	0	0	0	0	9	1	10
08:00 AM	0	0	0	11	0	0	0	2	0	0	0	11	0	1	0	0	24	1	25
08:15 AM	0	0	0	6	0	0	0	4	0	0	0	8	0	0	0	0	18	0	18
08:30 AM	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	3	0	3
Grand Total	0	0	0	24	0	1	0	9	0	0	0	20	0	1	0	1	54	2	56
Apprch %	0	0	0		0	100	0		0	0	0		0	100	0				
Total %	0	0	0		0	50	0		0	0	0		0	50	0		96.4	3.6	

	Main St From North				Summer St From East				Main St From South				Marble St From West						
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total			Int. Total
Peak Hour Analysis From 07:45 AM to 08:30 AM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 07:45 AM																			
07:45 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0		1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1		1	
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
Total Volume	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1			2
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0				
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250			.500

GPI Project #:
Stoneham, MA
Client: John DeBarros

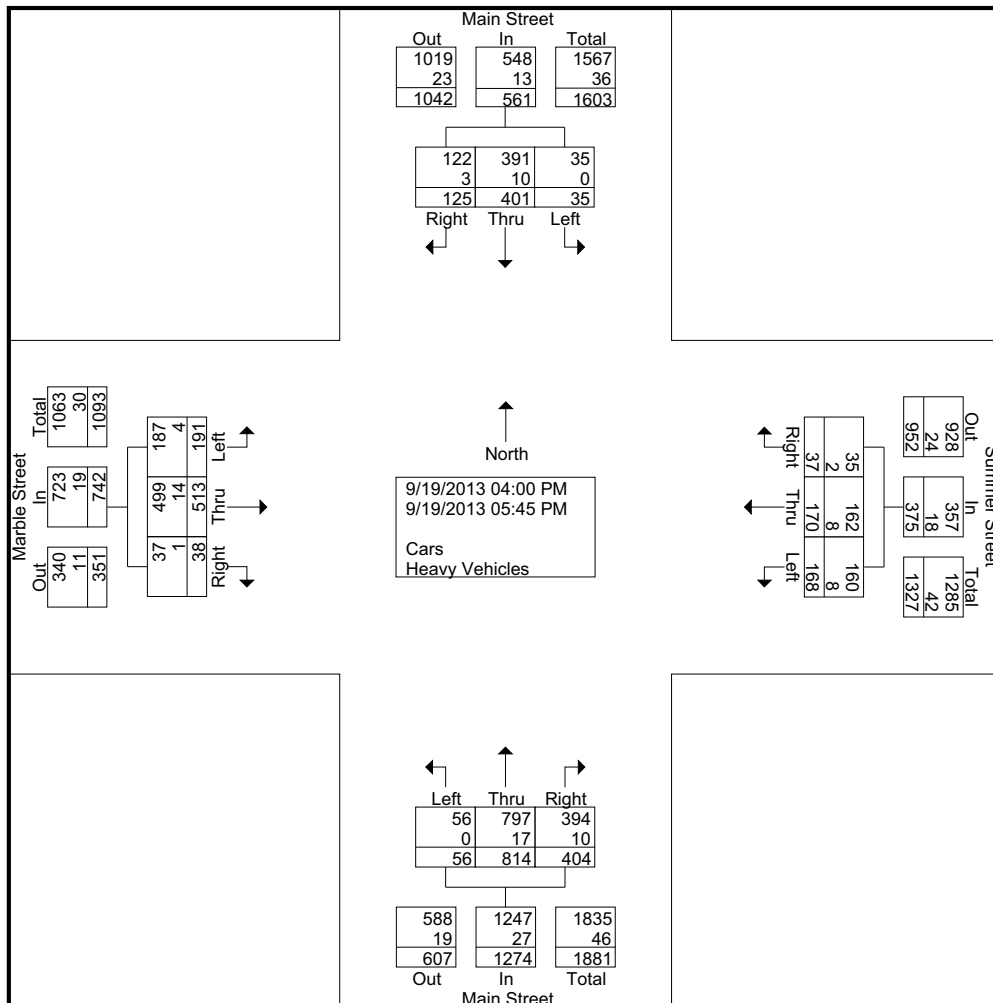


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Site Code : 4
Start Date : 9/19/2013
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Groups Printed- Cars - Heavy Vehicles

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	4	70	44	118	4	45	7	56	23	66	5	94	22	11	4	37	305
04:15 PM	9	90	48	147	4	39	11	54	17	68	2	87	16	16	2	34	322
04:30 PM	6	93	48	147	3	49	9	61	22	64	4	90	17	14	2	33	331
04:45 PM	8	113	51	172	6	51	16	73	26	57	2	85	21	16	3	40	370
Total	27	366	191	584	17	184	43	244	88	255	13	356	76	57	11	144	1328
05:00 PM	5	134	48	187	4	44	19	67	29	68	4	101	28	30	7	65	420
05:15 PM	7	119	56	182	7	58	26	91	27	57	3	87	29	31	6	66	426
05:30 PM	10	98	65	173	1	68	22	91	25	61	7	93	15	27	3	45	402
05:45 PM	7	97	44	148	6	47	15	68	22	72	11	105	20	25	10	55	376
Total	29	448	213	690	18	217	82	317	103	258	25	386	92	113	26	231	1624
Grand Total	56	814	404	1274	35	401	125	561	191	513	38	742	168	170	37	375	2952
Apprch %	4.4	63.9	31.7		6.2	71.5	22.3		25.7	69.1	5.1		44.8	45.3	9.9		
Total %	1.9	27.6	13.7	43.2	1.2	13.6	4.2	19	6.5	17.4	1.3	25.1	5.7	5.8	1.3	12.7	
Cars	56	797	394	1247	35	391	122	548	187	499	37	723	160	162	35	357	5750
% Cars	100	97.9	97.5	97.9	100	97.5	97.6	97.7	97.9	97.3	97.4	97.4	95.2	95.3	94.6	95.2	97.4
Heavy Vehicles	0	17	10	27	0	10	3	13	4	14	1	19	8	8	2	18	154
% Heavy Vehicles	0	2.1	2.5	2.1	0	2.5	2.4	2.3	2.1	2.7	2.6	2.6	4.8	4.7	5.4	4.8	2.6



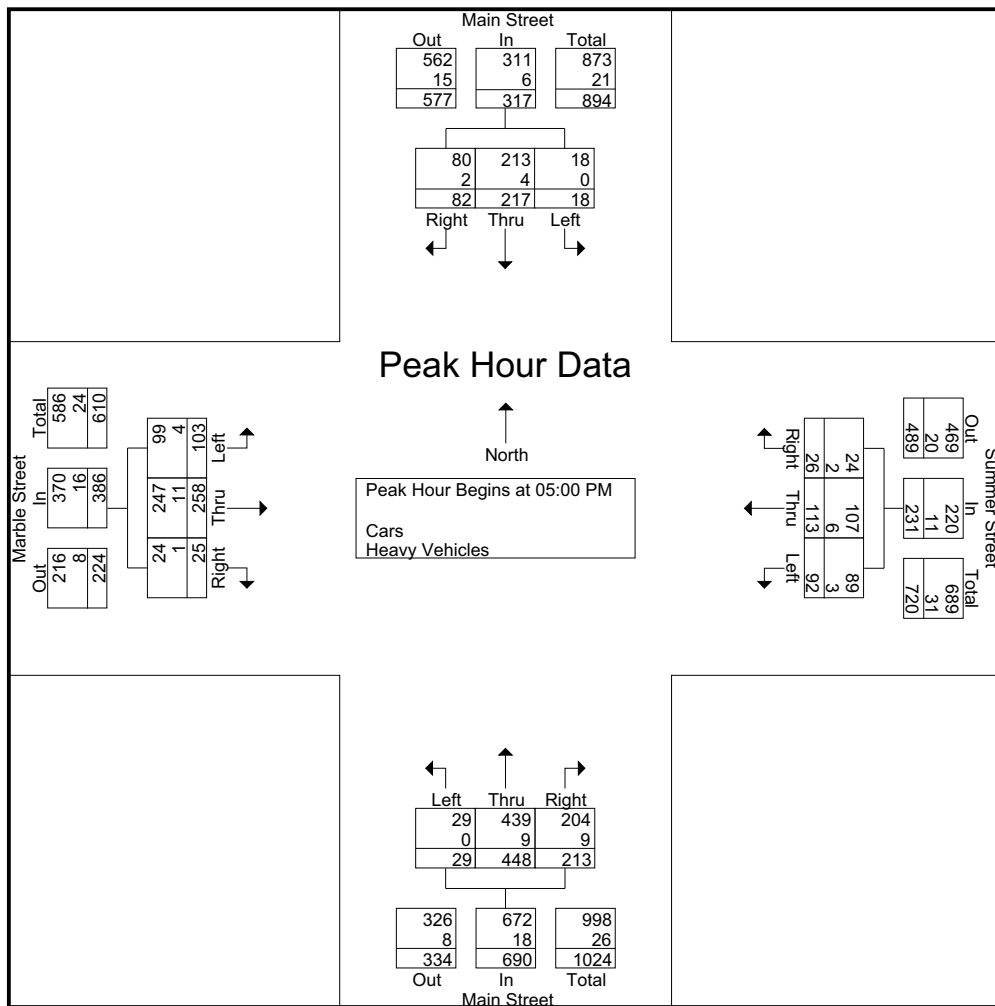
GPI Project #:
Stoneham, MA
Client: John DeBarros



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Start Date : 9/19/2013
Page No : 2 of 4

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	5	134	48	187	4	44	19	67	29	68	4	101	28	30	7	65	420
05:15 PM	7	119	56	182	7	58	26	91	27	57	3	87	29	31	6	66	426
05:30 PM	10	98	65	173	1	68	22	91	25	61	7	93	15	27	3	45	402
05:45 PM	7	97	44	148	6	47	15	68	22	72	11	105	20	25	10	55	376
Total Volume	29	448	213	690	18	217	82	317	103	258	25	386	92	113	26	231	1624
% App. Total	4.2	64.9	30.9		5.7	68.5	25.9		26.7	66.8	6.5		39.8	48.9	11.3		
PHF	.725	.836	.819	.922	.643	.798	.788	.871	.888	.896	.568	.919	.793	.911	.650	.875	.953
Cars	29	439	204	672	18	213	80	311	99	247	24	370	89	107	24	220	1573
% Cars	100	98.0	95.8	97.4	100	98.2	97.6	98.1	96.1	95.7	96.0	95.9	96.7	94.7	92.3	95.2	96.9
Heavy Vehicles	0	9	9	18	0	4	2	6	4	11	1	16	3	6	2	11	51
% Heavy Vehicles	0	2.0	4.2	2.6	0	1.8	2.4	1.9	3.9	4.3	4.0	4.1	3.3	5.3	7.7	4.8	3.1



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Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	4	67	44	115	4	44	7	55	23	65	5	93	20	11	4	35	298
04:15 PM	9	88	48	145	4	36	11	51	17	67	2	86	16	15	2	33	315
04:30 PM	6	91	48	145	3	48	9	60	22	64	4	90	16	14	2	32	327
04:45 PM	8	112	50	170	6	50	15	71	26	56	2	84	19	15	3	37	362
Total	27	358	190	575	17	178	42	237	88	252	13	353	71	55	11	137	1302
05:00 PM	5	129	47	181	4	44	19	67	29	65	4	98	27	28	6	61	407
05:15 PM	7	116	50	173	7	57	25	89	26	54	3	83	28	31	6	65	410
05:30 PM	10	98	63	171	1	67	22	90	22	61	6	89	15	24	3	42	392
05:45 PM	7	96	44	147	6	45	14	65	22	67	11	100	19	24	9	52	364
Total	29	439	204	672	18	213	80	311	99	247	24	370	89	107	24	220	1573
Grand Total	56	797	394	1247	35	391	122	548	187	499	37	723	160	162	35	357	2875
Apprch %	4.5	63.9	31.6		6.4	71.4	22.3		25.9	69	5.1		44.8	45.4	9.8		
Total %	1.9	27.7	13.7	43.4	1.2	13.6	4.2	19.1	6.5	17.4	1.3	25.1	5.6	5.6	1.2	12.4	

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	5	129	47	181	4	44	19	67	29	65	4	98	27	28	6	61	407
05:15 PM	7	116	50	173	7	57	25	89	26	54	3	83	28	31	6	65	410
05:30 PM	10	98	63	171	1	67	22	90	22	61	6	89	15	24	3	42	392
05:45 PM	7	96	44	147	6	45	14	65	22	67	11	100	19	24	9	52	364
Total Volume	29	439	204	672	18	213	80	311	99	247	24	370	89	107	24	220	1573
% App. Total	4.3	65.3	30.4		5.8	68.5	25.7		26.8	66.8	6.5		40.5	48.6	10.9		
PHF	.725	.851	.810	.928	.643	.795	.800	.864	.853	.922	.545	.925	.795	.863	.667	.846	.959

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				05:00 PM				05:00 PM			
+0 mins.	8	112	50	170	6	50	15	71	29	65	4	98	27	28	6	61
+15 mins.	5	129	47	181	4	44	19	67	26	54	3	83	28	31	6	65
+30 mins.	7	116	50	173	7	57	25	89	22	61	6	89	15	24	3	42
+45 mins.	10	98	63	171	1	67	22	90	22	67	11	100	19	24	9	52
Total Volume	30	455	210	695	18	218	81	317	99	247	24	370	89	107	24	220
% App. Total	4.3	65.5	30.2		5.7	68.8	25.6		26.8	66.8	6.5		40.5	48.6	10.9	
PHF	.750	.882	.833	.960	.643	.813	.810	.881	.853	.922	.545	.925	.795	.863	.667	.846

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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File Name : Mainsum PM
Site Code : 4
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	3	0	3	0	1	0	1	0	1	0	1	2	0	0	2	7
04:15 PM	0	2	0	2	0	3	0	3	0	1	0	1	0	1	0	1	7
04:30 PM	0	2	0	2	0	1	0	1	0	0	0	0	1	0	0	1	4
04:45 PM	0	1	1	2	0	1	1	2	0	1	0	1	2	1	0	3	8
Total	0	8	1	9	0	6	1	7	0	3	0	3	5	2	0	7	26
05:00 PM	0	5	1	6	0	0	0	0	0	3	0	3	1	2	1	4	13
05:15 PM	0	3	6	9	0	1	1	2	1	3	0	4	1	0	0	1	16
05:30 PM	0	0	2	2	0	1	0	1	3	0	1	4	0	3	0	3	10
05:45 PM	0	1	0	1	0	2	1	3	0	5	0	5	1	1	1	3	12
Total	0	9	9	18	0	4	2	6	4	11	1	16	3	6	2	11	51
Grand Total	0	17	10	27	0	10	3	13	4	14	1	19	8	8	2	18	77
Apprch %	0	63	37		0	76.9	23.1		21.1	73.7	5.3		44.4	44.4	11.1		
Total %	0	22.1	13	35.1	0	13	3.9	16.9	5.2	18.2	1.3	24.7	10.4	10.4	2.6	23.4	

	Main Street Northbound				Main Street Southbound				Marble Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	5	1	6	0	0	0	0	0	3	0	3	1	2	1	4	13
05:15 PM	0	3	6	9	0	1	1	2	1	3	0	4	1	0	0	1	16
05:30 PM	0	0	2	2	0	1	0	1	3	0	1	4	0	3	0	3	10
05:45 PM	0	1	0	1	0	2	1	3	0	5	0	5	1	1	1	3	12
Total Volume	0	9	9	18	0	4	2	6	4	11	1	16	3	6	2	11	51
% App. Total	0	50	50		0	66.7	33.3		25	68.8	6.2		27.3	54.5	18.2		
PHF	.000	.450	.375	.500	.000	.500	.500	.500	.333	.550	.250	.800	.750	.500	.500	.688	.797

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:30 PM				04:00 PM				05:00 PM				04:45 PM			
+0 mins.	0	2	0	2	0	1	0	1	0	3	0	3	2	1	0	3
+15 mins.	0	1	1	2	0	3	0	3	1	3	0	4	1	2	1	4
+30 mins.	0	5	1	6	0	1	0	1	3	0	1	4	1	0	0	1
+45 mins.	0	3	6	9	0	1	1	2	0	5	0	5	0	3	0	3
Total Volume	0	11	8	19	0	6	1	7	4	11	1	16	4	6	1	11
% App. Total	0	57.9	42.1		0	85.7	14.3		25	68.8	6.2		36.4	54.5	9.1	
PHF	.000	.550	.333	.528	.000	.500	.250	.583	.333	.550	.250	.800	.500	.500	.250	.688

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Summer St / Marble St
City/State : Stoneham, MA
Weather : Clear

File Name : 16470009
Site Code : 16470009
Start Date : 4/10/2014
Page No : 14

Groups Printed- Bikes Peds

	Main St From North				Summer St From East				Main St From South				Marble St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
05:00 PM	0	0	0	1	0	0	0	1	0	0	0	2	0	0	0	1	5	0	5
05:15 PM	0	0	0	2	0	0	0	2	0	0	0	1	0	0	0	2	7	0	7
05:30 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
05:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
Total	0	0	1	4	0	0	0	4	0	0	0	3	0	0	0	3	14	1	15
Grand Total	0	0	1	4	0	0	0	4	0	0	0	3	0	0	0	3	14	1	15
Apprch %	0	0	100		0	0	0		0	0	0		0	0	0				
Total %	0	0	100		0	0	0		0	0	0		0	0	0		93.3	6.7	

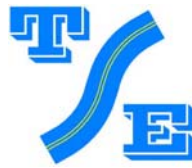
	Main St From North				Summer St From East				Main St From South				Marble St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:45 AM to 08:30 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:45 AM				07:45 AM				07:45 AM				07:45 AM				
+0 mins.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	1
% App. Total	0	0	0	0	0	100	0	100	0	0	0	0	0	100	0	100	100
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250	.250

Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

[illegible]

GPI Project #:
Stoneham, MA
Client: John DeBarros

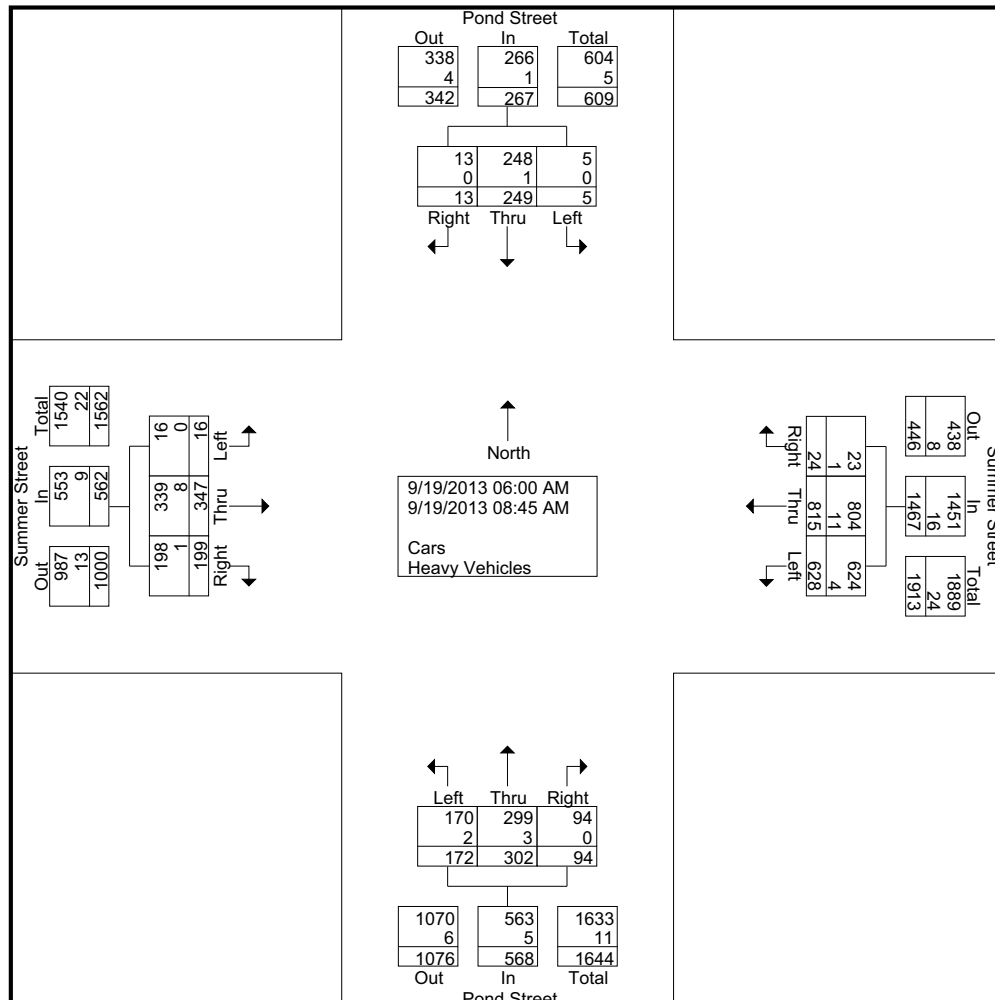


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File Name : Sumpod AM
Site Code : 3
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

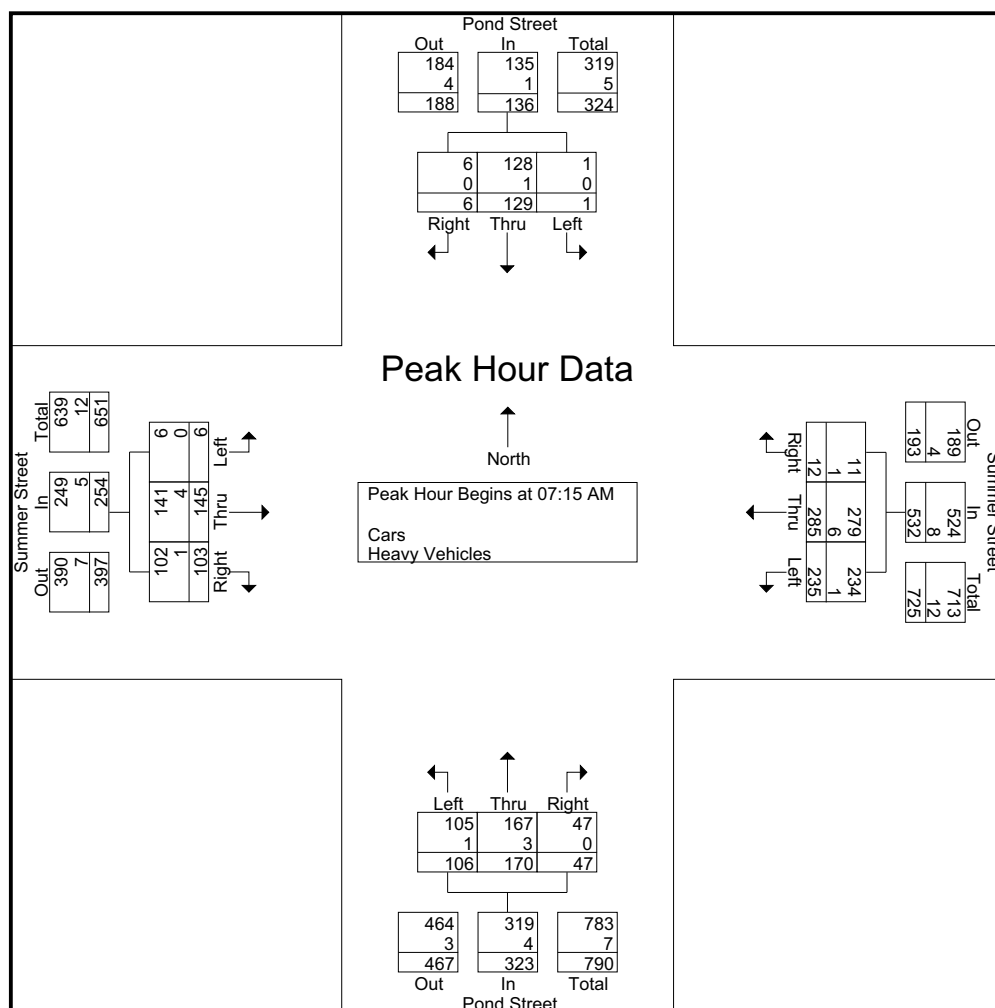
	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	3	8	2	13	2	12	1	15	2	10	4	16	33	40	2	75	119
06:15 AM	5	7	2	14	0	10	1	11	0	9	7	16	44	60	2	106	147
06:30 AM	7	9	2	18	1	12	0	13	0	7	10	17	59	72	0	131	179
06:45 AM	9	16	4	29	0	13	1	14	0	21	8	29	58	77	2	137	209
Total	24	40	10	74	3	47	3	53	2	47	29	78	194	249	6	449	654
07:00 AM	4	18	8	30	0	18	1	19	2	32	17	51	66	104	1	171	271
07:15 AM	20	27	7	54	1	27	0	28	1	41	16	58	57	80	1	138	278
07:30 AM	28	49	21	98	0	33	4	37	2	43	32	77	57	65	2	124	336
07:45 AM	36	56	13	105	0	32	0	32	1	29	28	58	56	75	5	136	331
Total	88	150	49	287	1	110	5	116	6	145	93	244	236	324	9	569	1216
08:00 AM	22	38	6	66	0	37	2	39	2	32	27	61	65	65	4	134	300
08:15 AM	16	29	8	53	1	17	0	18	5	41	26	72	53	58	3	114	257
08:30 AM	14	25	13	52	0	17	2	19	1	45	14	60	30	56	2	88	219
08:45 AM	8	20	8	36	0	21	1	22	0	37	10	47	50	63	0	113	218
Total	60	112	35	207	1	92	5	98	8	155	77	240	198	242	9	449	994
Grand Total	172	302	94	568	5	249	13	267	16	347	199	562	628	815	24	1467	2864
Apprch %	30.3	53.2	16.5		1.9	93.3	4.9		2.8	61.7	35.4		42.8	55.6	1.6		
Total %	6	10.5	3.3	19.8	0.2	8.7	0.5	9.3	0.6	12.1	6.9	19.6	21.9	28.5	0.8	51.2	
Cars	170	299	94	563	5	248	13	266	16	339	198	553	624	804	23	1451	5666
% Cars	98.8	99	100	99.1	100	99.6	100	99.6	100	97.7	99.5	98.4	99.4	98.7	95.8	98.9	
Heavy Vehicles	2	3	0	5	0	1	0	1	0	8	1	9	4	11	1	16	62
% Heavy Vehicles	1.2	1	0	0.9	0	0.4	0	0.4	0	2.3	0.5	1.6	0.6	1.3	4.2	1.1	





File Name : Sumpond AM
Site Code : 3
Start Date : 9/19/2013
Page No : 2 of 4

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	20	27	7	54	1	27	0	28	1	41	16	58	57	80	1	138	278
07:30 AM	28	49	21	98	0	33	4	37	2	43	32	77	57	65	2	124	336
07:45 AM	36	56	13	105	0	32	0	32	1	29	28	58	56	75	5	136	331
08:00 AM	22	38	6	66	0	37	2	39	2	32	27	61	65	65	4	134	300
Total Volume	106	170	47	323	1	129	6	136	6	145	103	254	235	285	12	532	1245
% App. Total	32.8	52.6	14.6		0.7	94.9	4.4		2.4	57.1	40.6		44.2	53.6	2.3		
PHF	.736	.759	.560	.769	.250	.872	.375	.872	.750	.843	.805	.825	.904	.891	.600	.964	.926
Cars	105	167	47	319	1	128	6	135	6	141	102	249	234	279	11	524	1227
% Cars	99.1	98.2	100	98.8	100	99.2	100	99.3	100	97.2	99.0	98.0	99.6	97.9	91.7	98.5	98.6
Heavy Vehicles	1	3	0	4	0	1	0	1	0	4	1	5	1	6	1	8	18
% Heavy Vehicles	0.9	1.8	0	1.2	0	0.8	0	0.7	0	2.8	1.0	2.0	0.4	2.1	8.3	1.5	1.4



GPI Project #:
Stoneham, MA
Client: John DeBarros



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File Name : Sumpond AM
Site Code : 3
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	3	8	2	13	2	12	1	15	2	10	4	16	33	40	2	75	119
06:15 AM	5	7	2	14	0	10	1	11	0	9	7	16	44	59	2	105	146
06:30 AM	7	9	2	18	1	12	0	13	0	7	10	17	59	72	0	131	179
06:45 AM	9	16	4	29	0	13	1	14	0	21	8	29	57	77	2	136	208
Total	24	40	10	74	3	47	3	53	2	47	29	78	193	248	6	447	652
07:00 AM	4	18	8	30	0	18	1	19	2	30	17	49	64	103	1	168	266
07:15 AM	20	27	7	54	1	26	0	27	1	41	16	58	57	80	1	138	277
07:30 AM	28	48	21	97	0	33	4	37	2	41	31	74	56	63	2	121	329
07:45 AM	36	55	13	104	0	32	0	32	1	27	28	56	56	73	4	133	325
Total	88	148	49	285	1	109	5	115	6	139	92	237	233	319	8	560	1197
08:00 AM	21	37	6	64	0	37	2	39	2	32	27	61	65	63	4	132	296
08:15 AM	15	29	8	52	1	17	0	18	5	41	26	72	53	57	3	113	255
08:30 AM	14	25	13	52	0	17	2	19	1	44	14	59	30	55	2	87	217
08:45 AM	8	20	8	36	0	21	1	22	0	36	10	46	50	62	0	112	216
Total	58	111	35	204	1	92	5	98	8	153	77	238	198	237	9	444	984
Grand Total	170	299	94	563	5	248	13	266	16	339	198	553	624	804	23	1451	2833
Apprch %	30.2	53.1	16.7		1.9	93.2	4.9		2.9	61.3	35.8		43	55.4	1.6		
Total %	6	10.6	3.3	19.9	0.2	8.8	0.5	9.4	0.6	12	7	19.5	22	28.4	0.8	51.2	

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	20	27	7	54	1	26	0	27	1	41	16	58	57	80	1	138	277
07:30 AM	28	48	21	97	0	33	4	37	2	41	31	74	56	63	2	121	329
07:45 AM	36	55	13	104	0	32	0	32	1	27	28	56	56	73	4	133	325
08:00 AM	21	37	6	64	0	37	2	39	2	32	27	61	65	63	4	132	296
Total Volume	105	167	47	319	1	128	6	135	6	141	102	249	234	279	11	524	1227
% App. Total	32.9	52.4	14.7		0.7	94.8	4.4		2.4	56.6	41		44.7	53.2	2.1		
PHF	.729	.759	.560	.767	.250	.865	.375	.865	.750	.860	.823	.841	.900	.872	.688	.949	.932

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:45 AM				08:00 AM			
+0 mins.	20	27	7	54	1	26	0	27	2	41	31	74	59	72	0	131
+15 mins.	28	48	21	97	0	33	4	37	1	27	28	56	57	77	2	136
+30 mins.	36	55	13	104	0	32	0	32	2	32	27	61	64	103	1	168
+45 mins.	21	37	6	64	0	37	2	39	5	41	26	72	57	80	1	138
Total Volume	105	167	47	319	1	128	6	135	10	141	112	263	237	332	4	573
% App. Total	32.9	52.4	14.7		0.7	94.8	4.4		3.8	53.6	42.6		41.4	57.9	0.7	
PHF	.729	.759	.560	.767	.250	.865	.375	.865	.500	.860	.903	.889	.926	.806	.500	.853

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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File Name : Sumpond AM
Site Code : 3
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
07:00 AM	0	0	0	0	0	0	0	0	0	2	0	2	2	1	0	3	5
07:15 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
07:30 AM	0	1	0	1	0	0	0	0	0	2	1	3	1	2	0	3	7
07:45 AM	0	1	0	1	0	0	0	0	0	2	0	2	0	2	1	3	6
Total	0	2	0	2	0	1	0	1	0	6	1	7	3	5	1	9	19
08:00 AM	1	1	0	2	0	0	0	0	0	0	0	0	0	2	0	2	4
08:15 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2
08:30 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
08:45 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
Total	2	1	0	3	0	0	0	0	0	2	0	2	0	5	0	5	10
Grand Total	2	3	0	5	0	1	0	1	0	8	1	9	4	11	1	16	31
Apprch %	40	60	0		0	100	0		0	88.9	11.1		25	68.8	6.2		
Total %	6.5	9.7	0	16.1	0	3.2	0	3.2	0	25.8	3.2	29	12.9	35.5	3.2	51.6	

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	2	0	2	2	1	0	3	5
07:15 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
07:30 AM	0	1	0	1	0	0	0	0	0	2	1	3	1	2	0	3	7
07:45 AM	0	1	0	1	0	0	0	0	0	2	0	2	0	2	1	3	6
Total Volume	0	2	0	2	0	1	0	1	0	6	1	7	3	5	1	9	19
% App. Total	0	100	0		0	100	0		0	85.7	14.3		33.3	55.6	11.1		
PHF	.000	.500	.000	.500	.000	.250	.000	.250	.000	.750	.250	.583	.375	.625	.250	.750	.679

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				06:30 AM				07:00 AM				07:00 AM				
+0 mins.	0	1	0	1	0	0	0	0	0	2	0	2	2	1	0	3	
+15 mins.	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	1	1	0	2	0	0	0	0	0	2	1	3	1	2	0	3	
+45 mins.	1	0	0	1	0	1	0	1	0	2	0	2	0	2	1	3	
Total Volume	2	3	0	5	0	1	0	1	0	6	1	7	3	5	1	9	
% App. Total	40	60	0		0	100	0		0	85.7	14.3		33.3	55.6	11.1		
PHF	.500	.750	.000	.625	.000	.250	.000	.250	.000	.750	.250	.583	.375	.625	.250	.750	

Accurate Counts

978-664-2565

N/S Street : Pond Street
 E/W Street : Summer Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470010
 Site Code : 16470010
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Pond St From North				Summer St From East				Pond St From South				Summer St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
07:15 AM	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	1	6	0	6
07:30 AM	0	1	0	2	0	0	0	1	0	0	0	0	0	0	0	0	3	1	4
07:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	1	4
Total	0	1	0	2	0	0	0	5	0	1	0	1	0	0	0	4	12	2	14
08:00 AM	0	0	0	2	0	0	0	10	0	0	0	2	0	0	0	4	18	0	18
Grand Total	0	1	0	4	0	0	0	15	0	1	0	3	0	0	0	8	30	2	32
Apprch %	0	100	0		0	0	0		0	100	0		0	0	0				
Total %	0	50	0		0	0	0		0	50	0		0	0	0		93.8	6.2	

	Pond St From North				Summer St From East				Pond St From South				Summer St From West				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.500

GPI Project #:
Stoneham, MA
Client: John DeBarros

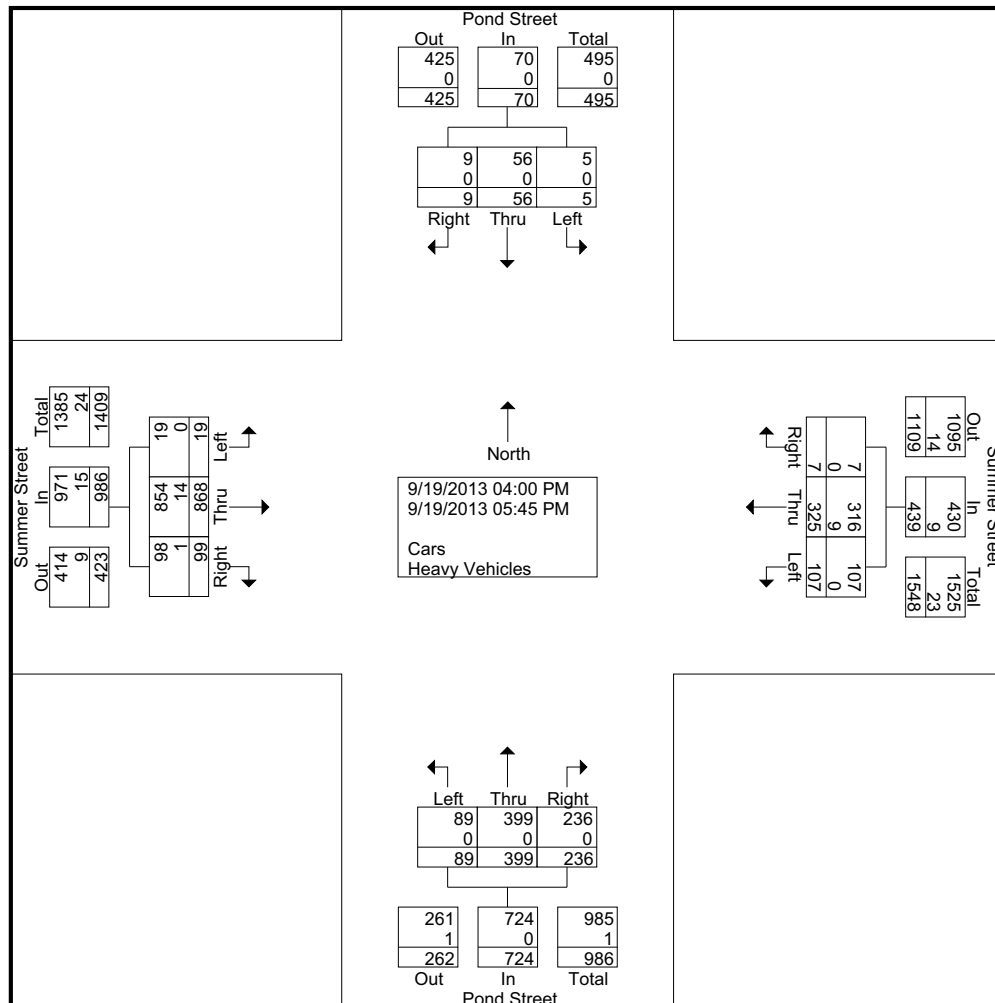


Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-448-5686
F: 617-801-8300
www.tsetraffic.com

File Name : Sumpond PM
Site Code : 3
Start Date : 9/19/2013
Page No : 1 of 4

Groups Printed- Cars - Heavy Vehicles

Start Time	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	6	39	30	75	1	3	0	4	3	91	12	106	14	36	2	52	237
04:15 PM	10	44	33	87	0	1	1	2	1	105	10	116	11	32	1	44	249
04:30 PM	9	50	28	87	2	6	1	9	2	119	10	131	13	40	0	53	280
04:45 PM	12	56	26	94	0	6	2	8	3	126	11	140	14	50	1	65	307
Total	37	189	117	343	3	16	4	23	9	441	43	493	52	158	4	214	1073
05:00 PM	7	54	26	87	1	5	3	9	4	107	13	124	12	46	0	58	278
05:15 PM	16	52	30	98	0	14	1	15	1	106	22	129	12	47	0	59	301
05:30 PM	13	62	30	105	0	10	1	11	1	112	12	125	15	37	0	52	293
05:45 PM	16	42	33	91	1	11	0	12	4	102	9	115	16	37	3	56	274
Total	52	210	119	381	2	40	5	47	10	427	56	493	55	167	3	225	1146
Grand Total	89	399	236	724	5	56	9	70	19	868	99	986	107	325	7	439	2219
Apprch %	12.3	55.1	32.6		7.1	80	12.9		1.9	88	10		24.4	74	1.6		
Total %	4	18	10.6	32.6	0.2	2.5	0.4	3.2	0.9	39.1	4.5	44.4	4.8	14.6	0.3	19.8	
Cars	89	399	236	724	5	56	9	70	19	854	98	971	107	316	7	430	4390
% Cars	100	100	100	100	100	100	100	100	100	98.4	99	98.5	100	97.2	100	97.9	
Heavy Vehicles	0	0	0	0	0	0	0	0	0	14	1	15	0	9	0	9	48
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	1.6	1	1.5	0	2.8	0	2.1	1.1



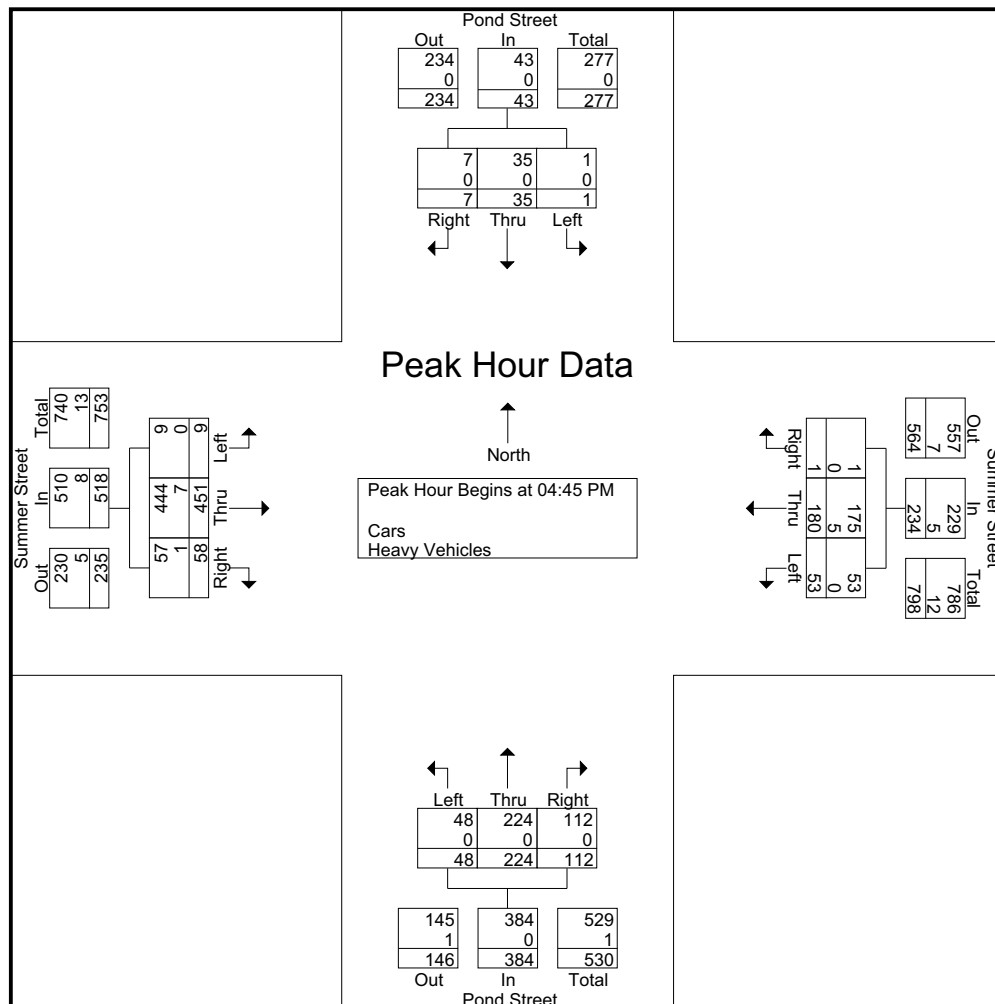
GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
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File Name : Sumpond PM
Site Code : 3
Start Date : 9/19/2013
Page No : 2 of 4

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	12	56	26	94	0	6	2	8	3	126	11	140	14	50	1	65	307
05:00 PM	7	54	26	87	1	5	3	9	4	107	13	124	12	46	0	58	278
05:15 PM	16	52	30	98	0	14	1	15	1	106	22	129	12	47	0	59	301
05:30 PM	13	62	30	105	0	10	1	11	1	112	12	125	15	37	0	52	293
Total Volume	48	224	112	384	1	35	7	43	9	451	58	518	53	180	1	234	1179
% App. Total	12.5	58.3	29.2		2.3	81.4	16.3		1.7	87.1	11.2		22.6	76.9	0.4		
PHF	.750	.903	.933	.914	.250	.625	.583	.717	.563	.895	.659	.925	.883	.900	.250	.900	.960
Cars	48	224	112	384	1	35	7	43	9	444	57	510	53	175	1	229	1166
% Cars	100	100	100	100	100	100	100	100	100	98.4	98.3	98.5	100	97.2	100	97.9	98.9
Heavy Vehicles	0	0	0	0	0	0	0	0	0	7	1	8	0	5	0	5	13
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	1.6	1.7	1.5	0	2.8	0	2.1	1.1



GPI Project #:
Stoneham, MA
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File Name : Sumpond PM
Site Code : 3
Start Date : 9/19/2013
Page No : 3 of 4

Groups Printed- Cars

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	6	39	30	75	1	3	0	4	3	90	12	105	14	35	2	51	235
04:15 PM	10	44	33	87	0	1	1	2	1	103	10	114	11	31	1	43	246
04:30 PM	9	50	28	87	2	6	1	9	2	118	10	130	13	40	0	53	279
04:45 PM	12	56	26	94	0	6	2	8	3	125	11	139	14	48	1	63	304
Total	37	189	117	343	3	16	4	23	9	436	43	488	52	154	4	210	1064
05:00 PM	7	54	26	87	1	5	3	9	4	105	13	122	12	45	0	57	275
05:15 PM	16	52	30	98	0	14	1	15	1	105	21	127	12	47	0	59	299
05:30 PM	13	62	30	105	0	10	1	11	1	109	12	122	15	35	0	50	288
05:45 PM	16	42	33	91	1	11	0	12	4	99	9	112	16	35	3	54	269
Total	52	210	119	381	2	40	5	47	10	418	55	483	55	162	3	220	1131
Grand Total	89	399	236	724	5	56	9	70	19	854	98	971	107	316	7	430	2195
Apprch %	12.3	55.1	32.6		7.1	80	12.9		2	88	10.1		24.9	73.5	1.6		
Total %	4.1	18.2	10.8	33	0.2	2.6	0.4	3.2	0.9	38.9	4.5	44.2	4.9	14.4	0.3	19.6	

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	12	56	26	94	0	6	2	8	3	125	11	139	14	48	1	63	304
05:00 PM	7	54	26	87	1	5	3	9	4	105	13	122	12	45	0	57	275
05:15 PM	16	52	30	98	0	14	1	15	1	105	21	127	12	47	0	59	299
05:30 PM	13	62	30	105	0	10	1	11	1	109	12	122	15	35	0	50	288
Total Volume	48	224	112	384	1	35	7	43	9	444	57	510	53	175	1	229	1166
% App. Total	12.5	58.3	29.2		2.3	81.4	16.3		1.8	87.1	11.2		23.1	76.4	0.4		
PHF	.750	.903	.933	.914	.250	.625	.583	.717	.563	.888	.679	.917	.883	.911	.250	.909	.959

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				04:30 PM				04:30 PM			
+0 mins.	12	56	26	94	1	5	3	9	2	118	10	130	13	40	0	53
+15 mins.	7	54	26	87	0	14	1	15	3	125	11	139	14	48	1	63
+30 mins.	16	52	30	98	0	10	1	11	4	105	13	122	12	45	0	57
+45 mins.	13	62	30	105	1	11	0	12	1	105	21	127	12	47	0	59
Total Volume	48	224	112	384	2	40	5	47	10	453	55	518	51	180	1	232
% App. Total	12.5	58.3	29.2		4.3	85.1	10.6		1.9	87.5	10.6		22	77.6	0.4	
PHF	.750	.903	.933	.914	.500	.714	.417	.783	.625	.906	.655	.932	.911	.938	.250	.921

GPI Project #:
Stoneham, MA
Client: John DeBarros



Traffic Survey Expedition
106 Sharon Road
N. Quincy, MA 02171
P: 617-443-5636
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www.tsetraffic.com

File Name : Sumpond PM
Site Code : 3
Start Date : 9/19/2013
Page No : 4 of 4

Groups Printed- Heavy Vehicles

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
04:15 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
04:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
Total	0	0	0	0	0	0	0	0	0	5	0	5	0	4	0	4	9
05:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
05:15 PM	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
05:45 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
Total	0	0	0	0	0	0	0	0	0	9	1	10	0	5	0	5	15
Grand Total	0	0	0	0	0	0	0	0	0	14	1	15	0	9	0	9	24
Apprch %	0	0	0		0	0	0		0	93.3	6.7		0	100	0		
Total %	0	0	0		0	0	0		0	58.3	4.2	62.5	0	37.5	0	37.5	

	Pond Street Northbound				Pond Street Southbound				Summer Street Eastbound				Summer Street Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
05:15 PM	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
05:45 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5
Total Volume	0	0	0	0	0	0	0	0	0	9	1	10	0	5	0	5	15
% App. Total	0	0	0		0	0	0		0	90	10		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.250	.833	.000	.625	.000	.625	.750

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				05:00 PM				04:45 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2	
+15 mins.	0	0	0	0	0	0	0	0	0	1	1	2	0	1	0	1	
+30 mins.	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	
Total Volume	0	0	0	0	0	0	0	0	0	9	1	10	0	5	0	5	
% App. Total	0	0	0		0	0	0		0	90	10		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.250	.833	.000	.625	.000	.625	

Accurate Counts

978-664-2565

N/S Street : Pond Street
 E/W Street : Summer Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470010
 Site Code : 16470010
 Start Date : 4/10/2014
 Page No : 13

Groups Printed- Bikes Peds

	Pond St From North				Summer St From East				Pond St From South				Summer St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	2	3
Total	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	2	3
05:00 PM	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	1	0	0	0	1	0	1	0	2	0	1	0	1	5	2	7
Apprch %	0	0	0		0	0	0		0	100	0		0	100	0				
Total %	0	0	0		0	0	0		0	50	0		0	50	0		71.4	28.6	

	Pond St From North				Summer St From East				Pond St From South				Summer St From West				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:45 PM to 05:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
% App. Total	0	0	0		0	0	0		0	100	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.250	.000	.250	.250

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 1

Groups Printed- Cars - Trucks

Start Time	Weiss Farm From North		Franklin St From East		Franklin St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
06:00 AM	0	0	88	0	0	37	125
06:15 AM	0	0	95	0	0	51	146
06:30 AM	0	0	155	0	0	79	234
06:45 AM	0	0	178	1	1	91	271
Total	0	0	516	1	1	258	776
07:00 AM	0	1	231	0	0	114	346
07:15 AM	0	0	225	1	0	135	361
07:30 AM	0	0	179	0	0	97	276
07:45 AM	1	0	161	0	1	161	324
Total	1	1	796	1	1	507	1307
08:00 AM	0	0	200	0	0	139	339
08:15 AM	0	3	237	3	2	157	402
08:30 AM	1	0	173	2	1	124	301
08:45 AM	2	1	188	2	2	127	322
Total	3	4	798	7	5	547	1364
Grand Total	4	5	2110	9	7	1312	3447
Apprch %	44.4	55.6	99.6	0.4	0.5	99.5	
Total %	0.1	0.1	61.2	0.3	0.2	38.1	
Cars	1	4	2089	7	6	1280	3387
% Cars	25	80	99	77.8	85.7	97.6	98.3
Trucks	3	1	21	2	1	32	60
% Trucks	75	20	1	22.2	14.3	2.4	1.7

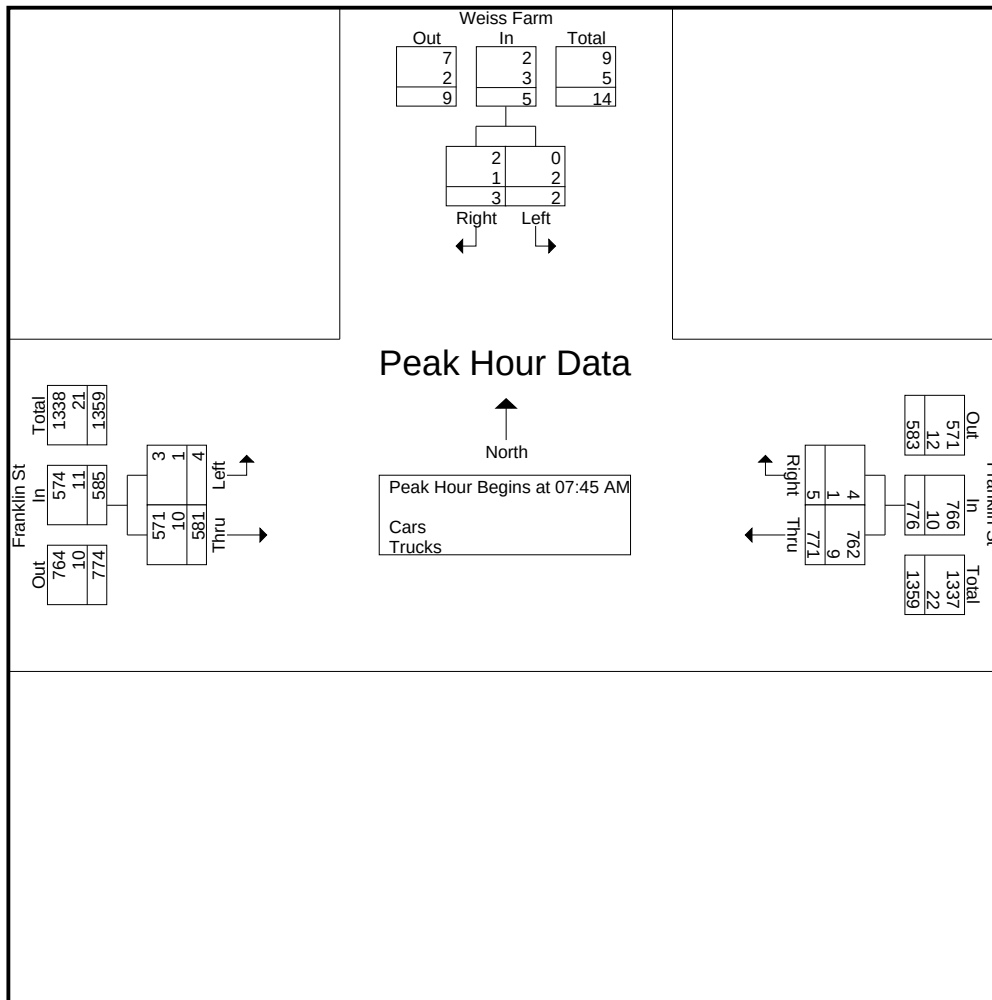
	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	1	0	1	161	0	161	1	161	162	324
08:00 AM	0	0	0	200	0	200	0	139	139	339
08:15 AM	0	3	3	237	3	240	2	157	159	402
08:30 AM	1	0	1	173	2	175	1	124	125	301
Total Volume	2	3	5	771	5	776	4	581	585	1366
% App. Total	40	60		99.4	0.6		0.7	99.3		
PHF	.500	.250	.417	.813	.417	.808	.500	.902	.903	.850
Cars	0	2	2	762	4	766	3	571	574	1342
% Cars	0	66.7	40.0	98.8	80.0	98.7	75.0	98.3	98.1	98.2
Trucks	2	1	3	9	1	10	1	10	11	24
% Trucks	100	33.3	60.0	1.2	20.0	1.3	25.0	1.7	1.9	1.8

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 2



Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

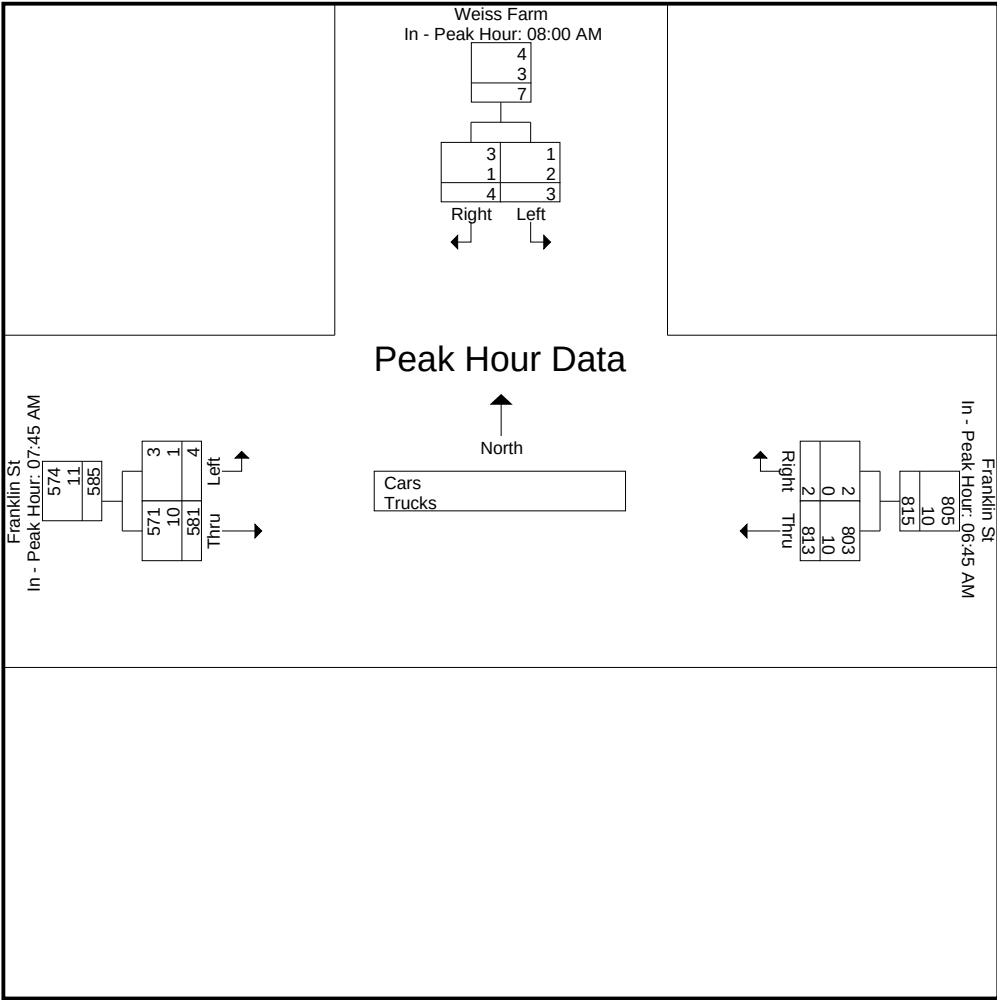
Peak Hour for Each Approach Begins at:

	08:00 AM			06:45 AM			07:45 AM		
+0 mins.	0	0	0	178	1	179	1	161	162
+15 mins.	0	3	3	231	0	231	0	139	139
+30 mins.	1	0	1	225	1	226	2	157	159
+45 mins.	2	1	3	179	0	179	1	124	125
Total Volume	3	4	7	813	2	815	4	581	585
% App. Total	42.9	57.1		99.8	0.2		0.7	99.3	
PHF	.375	.333	.583	.880	.500	.882	.500	.902	.903
Cars	1	3	4	803	2	805	3	571	574
% Cars	33.3	75	57.1	98.8	100	98.8	75	98.3	98.1
Trucks	2	1	3	10	0	10	1	10	11
% Trucks	66.7	25	42.9	1.2	0	1.2	25	1.7	1.9

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 4

Groups Printed- Cars

	Weiss Farm From North		Franklin St From East		Franklin St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
06:00 AM	0	0	88	0	0	35	123
06:15 AM	0	0	95	0	0	49	144
06:30 AM	0	0	154	0	0	74	228
06:45 AM	0	0	177	1	1	89	268
Total	0	0	514	1	1	247	763
07:00 AM	0	1	227	0	0	109	337
07:15 AM	0	0	221	1	0	132	354
07:30 AM	0	0	178	0	0	97	275
07:45 AM	0	0	159	0	1	159	319
Total	0	1	785	1	1	497	1285
08:00 AM	0	0	196	0	0	137	333
08:15 AM	0	2	235	3	2	155	397
08:30 AM	0	0	172	1	0	120	293
08:45 AM	1	1	187	1	2	124	316
Total	1	3	790	5	4	536	1339
Grand Total	1	4	2089	7	6	1280	3387
Apprch %	20	80	99.7	0.3	0.5	99.5	
Total %	0	0.1	61.7	0.2	0.2	37.8	

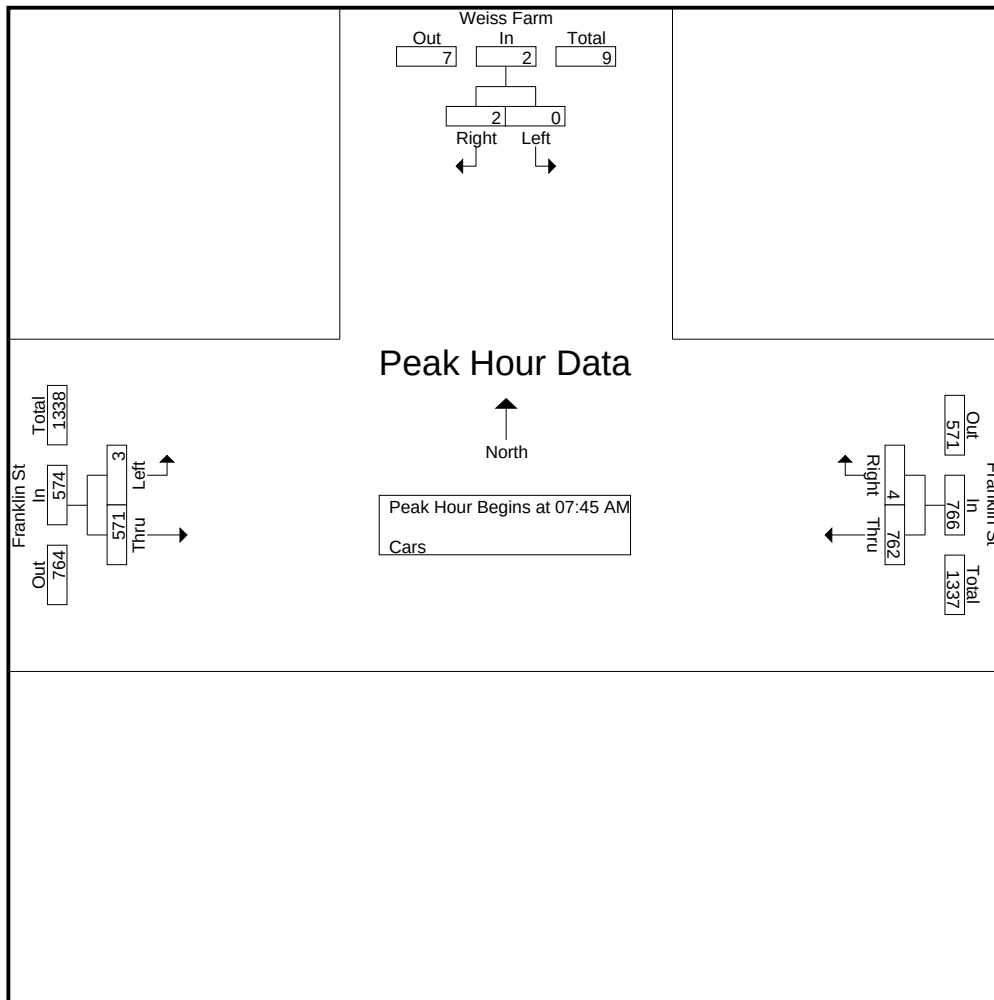
	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	0	0	0	159	0	159	1	159	160	319
08:00 AM	0	0	0	196	0	196	0	137	137	333
08:15 AM	0	2	2	235	3	238	2	155	157	397
08:30 AM	0	0	0	172	1	173	0	120	120	293
Total Volume	0	2	2	762	4	766	3	571	574	1342
% App. Total	0	100		99.5	0.5		0.5	99.5		
PHF	.000	.250	.250	.811	.333	.805	.375	.898	.897	.845

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 5



Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

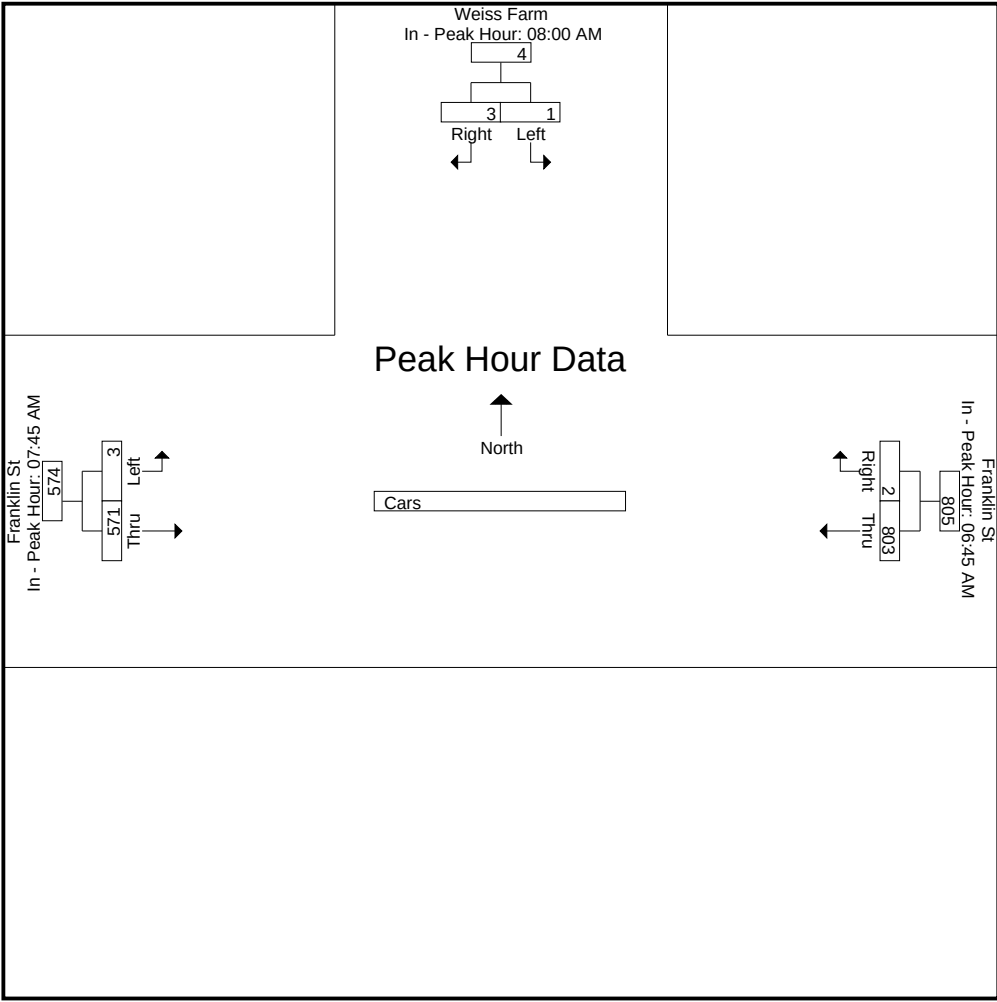
Peak Hour for Each Approach Begins at:

	08:00 AM			06:45 AM			07:45 AM		
+0 mins.	0	0	0	177	1	178	1	159	160
+15 mins.	0	2	2	227	0	227	0	137	137
+30 mins.	0	0	0	221	1	222	2	155	157
+45 mins.	1	1	2	178	0	178	0	120	120
Total Volume	1	3	4	803	2	805	3	571	574
% App. Total	25	75		99.8	0.2		0.5	99.5	
PHF	.250	.375	.500	.884	.500	.887	.375	.898	.897

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 7

Groups Printed- Trucks

	Weiss Farm From North		Franklin St From East		Franklin St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
06:00 AM	0	0	0	0	0	2	2
06:15 AM	0	0	0	0	0	2	2
06:30 AM	0	0	1	0	0	5	6
06:45 AM	0	0	1	0	0	2	3
Total	0	0	2	0	0	11	13
07:00 AM	0	0	4	0	0	5	9
07:15 AM	0	0	4	0	0	3	7
07:30 AM	0	0	1	0	0	0	1
07:45 AM	1	0	2	0	0	2	5
Total	1	0	11	0	0	10	22
08:00 AM	0	0	4	0	0	2	6
08:15 AM	0	1	2	0	0	2	5
08:30 AM	1	0	1	1	1	4	8
08:45 AM	1	0	1	1	0	3	6
Total	2	1	8	2	1	11	25
Grand Total	3	1	21	2	1	32	60
Apprch %	75	25	91.3	8.7	3	97	
Total %	5	1.7	35	3.3	1.7	53.3	

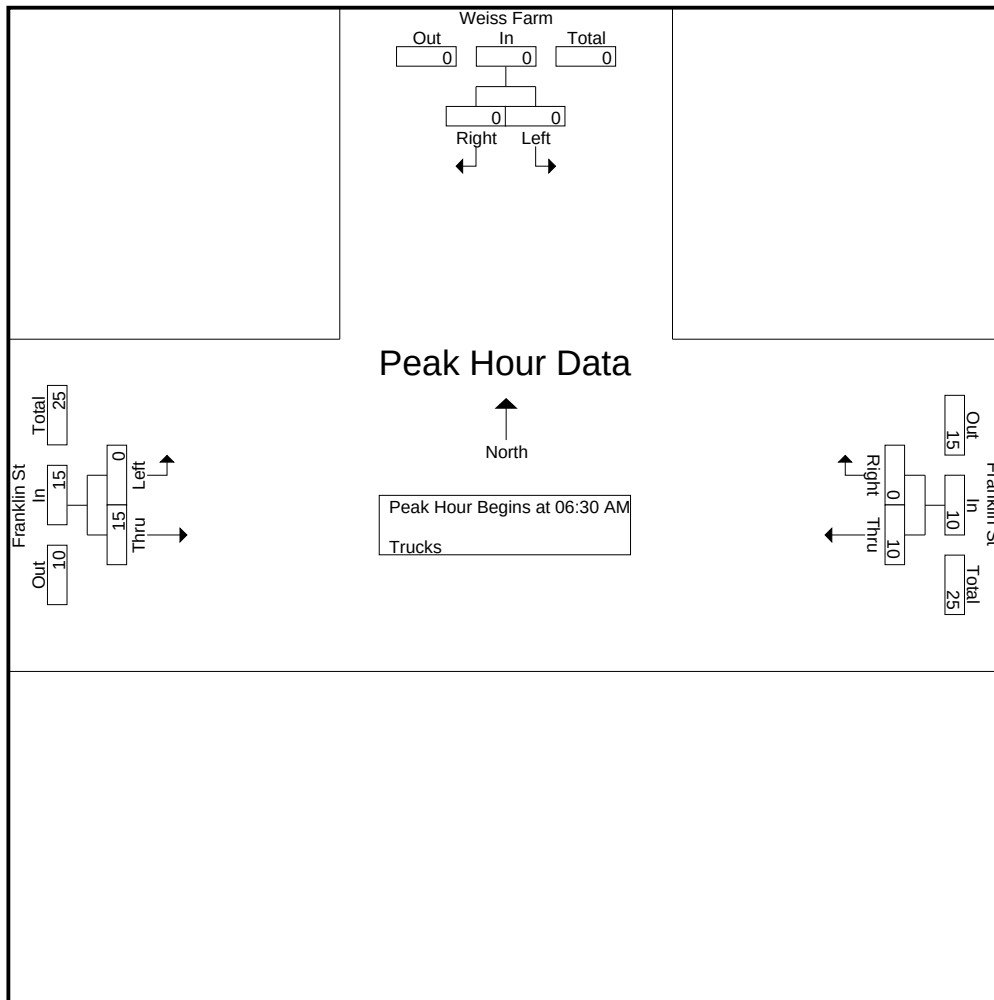
	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 06:30 AM										
06:30 AM	0	0	0	1	0	1	0	5	5	6
06:45 AM	0	0	0	1	0	1	0	2	2	3
07:00 AM	0	0	0	4	0	4	0	5	5	9
07:15 AM	0	0	0	4	0	4	0	3	3	7
Total Volume	0	0	0	10	0	10	0	15	15	25
% App. Total	0	0		100	0		0	100		
PHF	.000	.000	.000	.625	.000	.625	.000	.750	.750	.694

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 8



Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

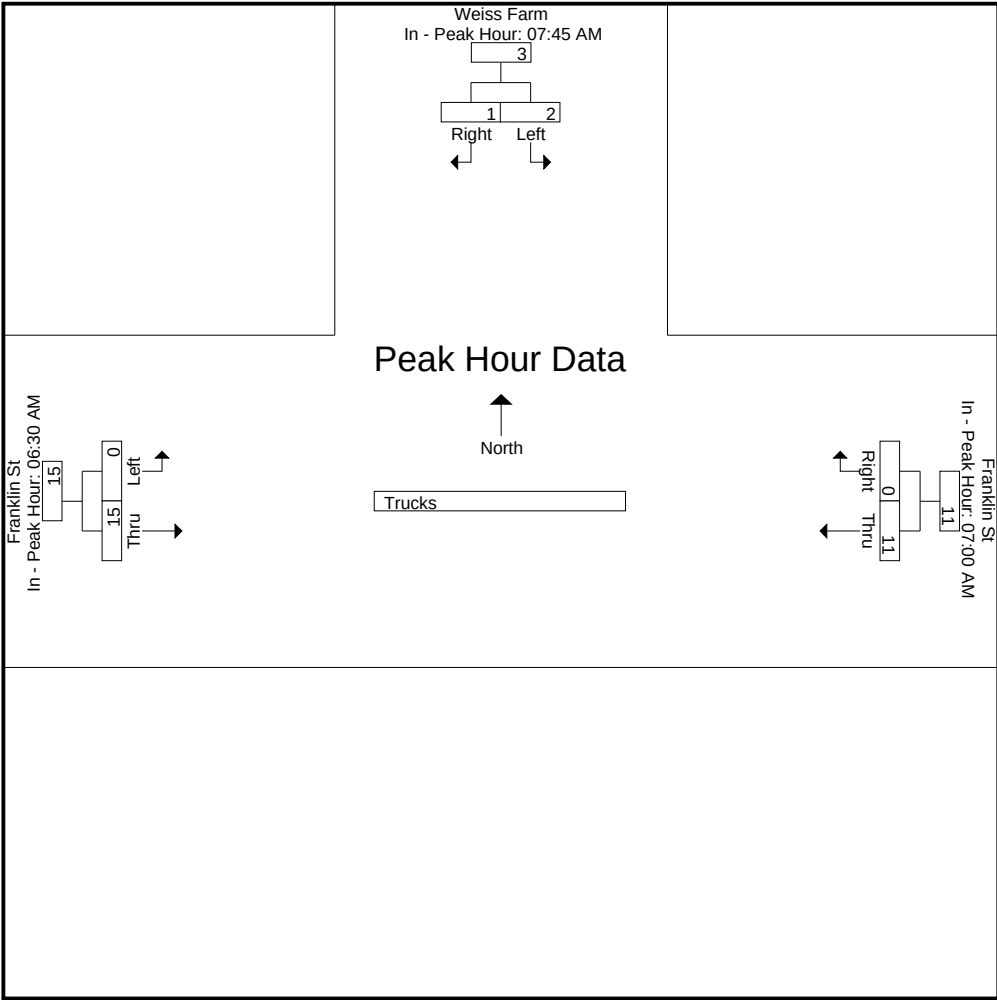
Peak Hour for Each Approach Begins at:

	07:45 AM			07:00 AM			06:30 AM		
+0 mins.	1	0	1	4	0	4	0	5	5
+15 mins.	0	0	0	4	0	4	0	2	2
+30 mins.	0	1	1	1	0	1	0	5	5
+45 mins.	1	0	1	2	0	2	0	3	3
Total Volume	2	1	3	11	0	11	0	15	15
% App. Total	66.7	33.3		100	0		0	100	
PHF	.500	.250	.750	.688	.000	.688	.000	.750	.750

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 10

Groups Printed- Bikes Peds

	Weiss Farm From North			Franklin St From East			Franklin St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	1	1	0	0	0	0	0	1	1	2
06:30 AM	0	0	1	0	0	0	0	0	0	1	0	1
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	2	1	0	0	0	0	0	2	1	3
07:00 AM	0	0	0	1	0	0	0	0	0	0	1	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	2	0	0	0	0	0	0	2	2
07:45 AM	0	0	1	0	0	0	0	0	0	1	0	1
Total	0	0	1	3	0	0	0	0	0	1	3	4
08:00 AM	0	0	0	1	0	0	0	0	0	0	1	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	0	0	0	1	1
Grand Total	0	0	3	5	0	0	0	0	0	3	5	8
Apprch %	0	0		100	0		0	0				
Total %	0	0		100	0		0	0		37.5	62.5	

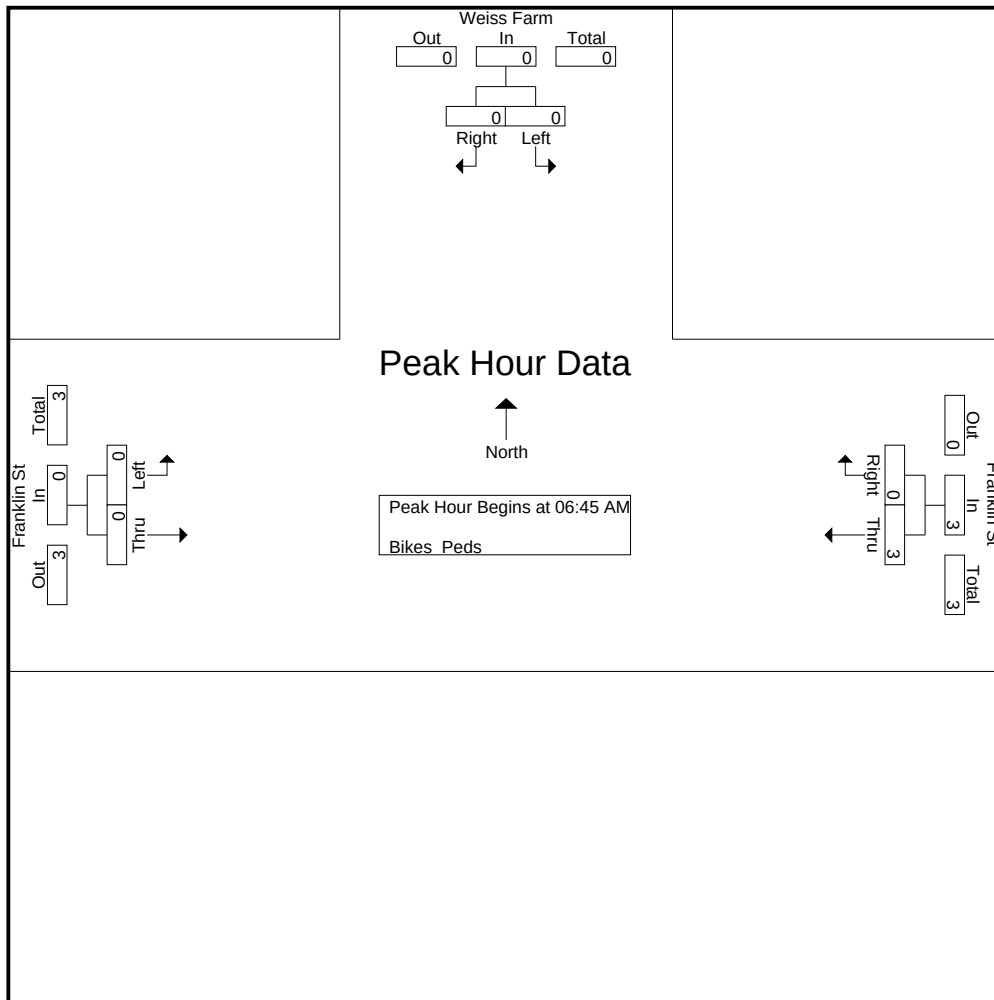
	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 06:45 AM										
06:45 AM	0	0	0	0	0	0	0	0	0	0
07:00 AM	0	0	0	1	0	1	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	2	0	2	0	0	0	2
Total Volume	0	0	0	3	0	3	0	0	0	3
% App. Total	0	0		100	0		0	0		
PHF	.000	.000	.000	.375	.000	.375	.000	.000	.000	.375

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 11



Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

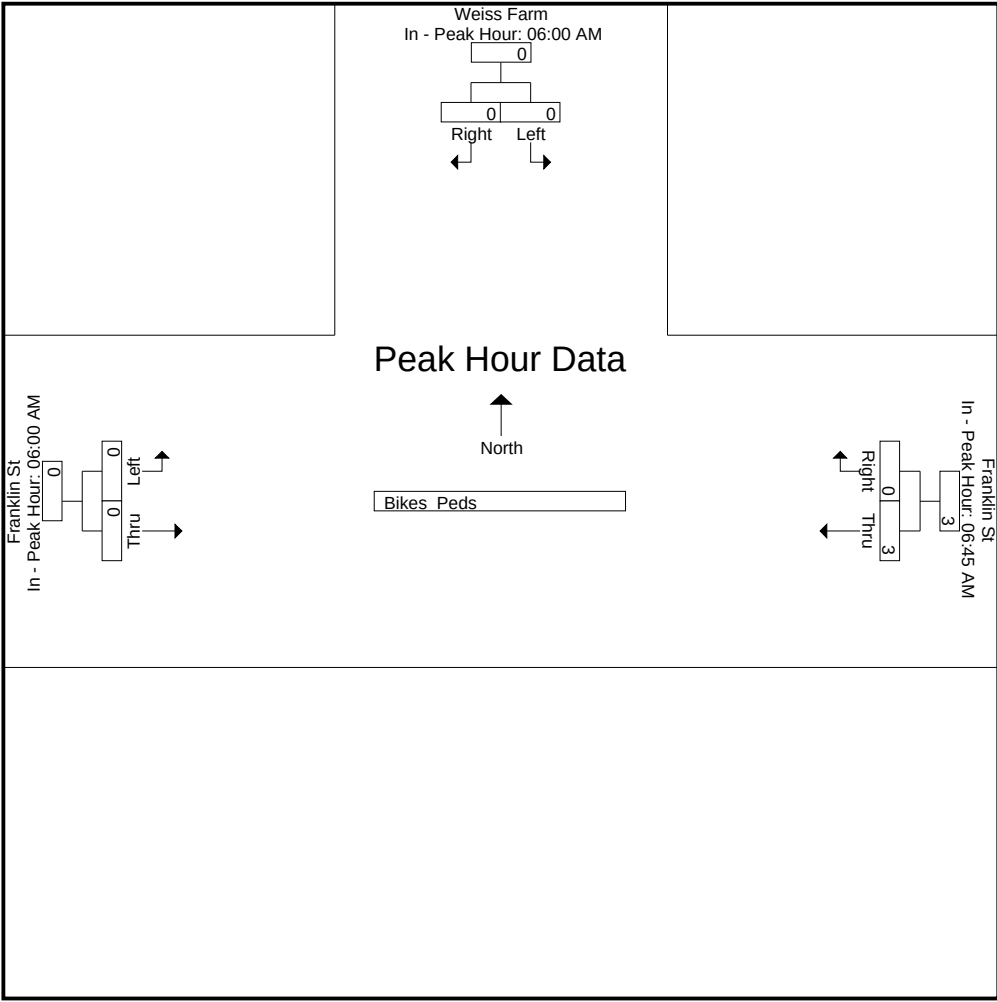
Peak Hour for Each Approach Begins at:

	06:00 AM			06:45 AM			06:00 AM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	1	0	1	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	2	0	2	0	0	0
Total Volume	0	0	0	3	0	3	0	0	0
% App. Total	0	0		100	0		0	0	
PHF	.000	.000	.000	.375	.000	.375	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
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Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 1

Groups Printed- Cars - Trucks

	Weiss Farm From North		Franklin St From East		Franklin St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	3	2	156	0	1	205	367
04:15 PM	0	1	133	0	0	218	352
04:30 PM	0	0	143	0	0	212	355
04:45 PM	1	1	166	0	1	232	401
Total	4	4	598	0	2	867	1475
05:00 PM	0	0	144	0	0	232	376
05:15 PM	0	0	159	0	1	221	381
05:30 PM	1	0	155	2	1	234	393
05:45 PM	2	0	165	1	0	209	377
Total	3	0	623	3	2	896	1527
Grand Total	7	4	1221	3	4	1763	3002
Apprch %	63.6	36.4	99.8	0.2	0.2	99.8	
Total %	0.2	0.1	40.7	0.1	0.1	58.7	
Cars	7	4	1207	3	4	1756	2981
% Cars	100	100	98.9	100	100	99.6	99.3
Trucks	0	0	14	0	0	7	21
% Trucks	0	0	1.1	0	0	0.4	0.7

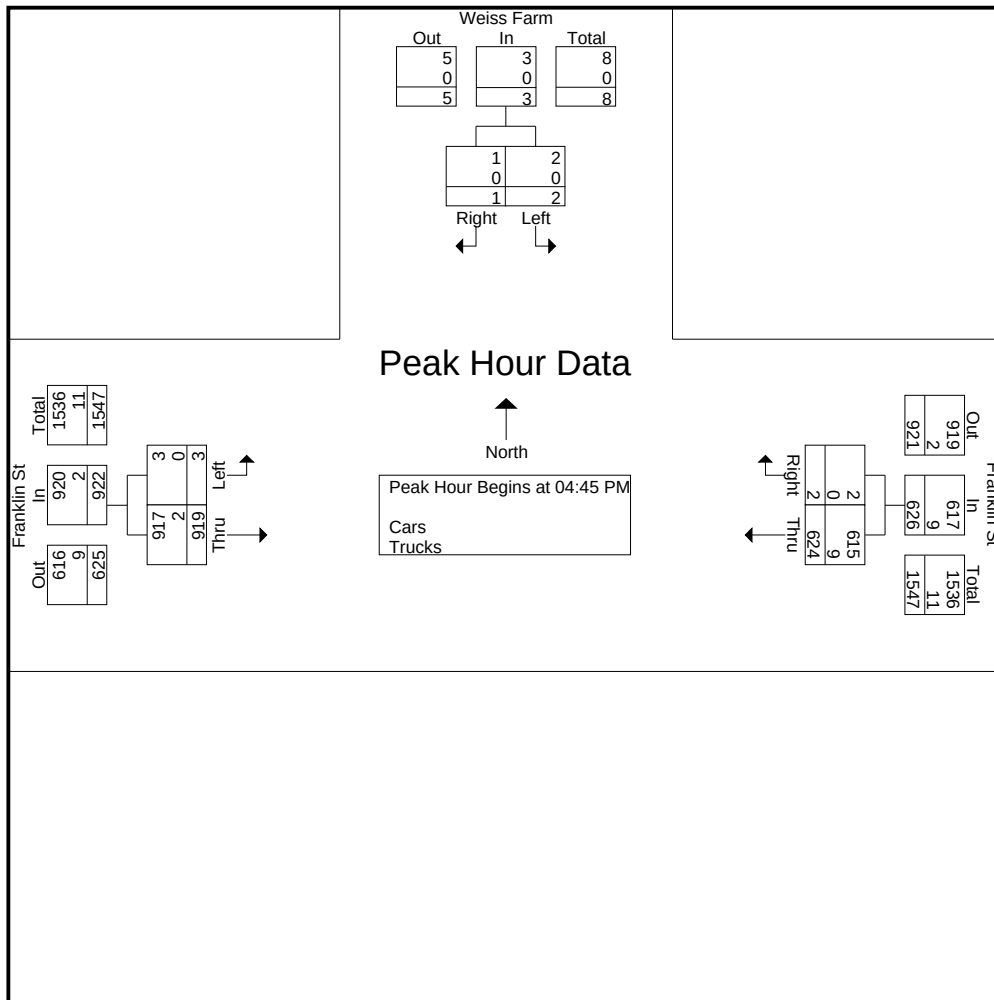
	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	1	1	2	166	0	166	1	232	233	401
05:00 PM	0	0	0	144	0	144	0	232	232	376
05:15 PM	0	0	0	159	0	159	1	221	222	381
05:30 PM	1	0	1	155	2	157	1	234	235	393
Total Volume	2	1	3	624	2	626	3	919	922	1551
% App. Total	66.7	33.3		99.7	0.3		0.3	99.7		
PHF	.500	.250	.375	.940	.250	.943	.750	.982	.981	.967
Cars	2	1	3	615	2	617	3	917	920	1540
% Cars	100	100	100	98.6	100	98.6	100	99.8	99.8	99.3
Trucks	0	0	0	9	0	9	0	2	2	11
% Trucks	0	0	0	1.4	0	1.4	0	0.2	0.2	0.7

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

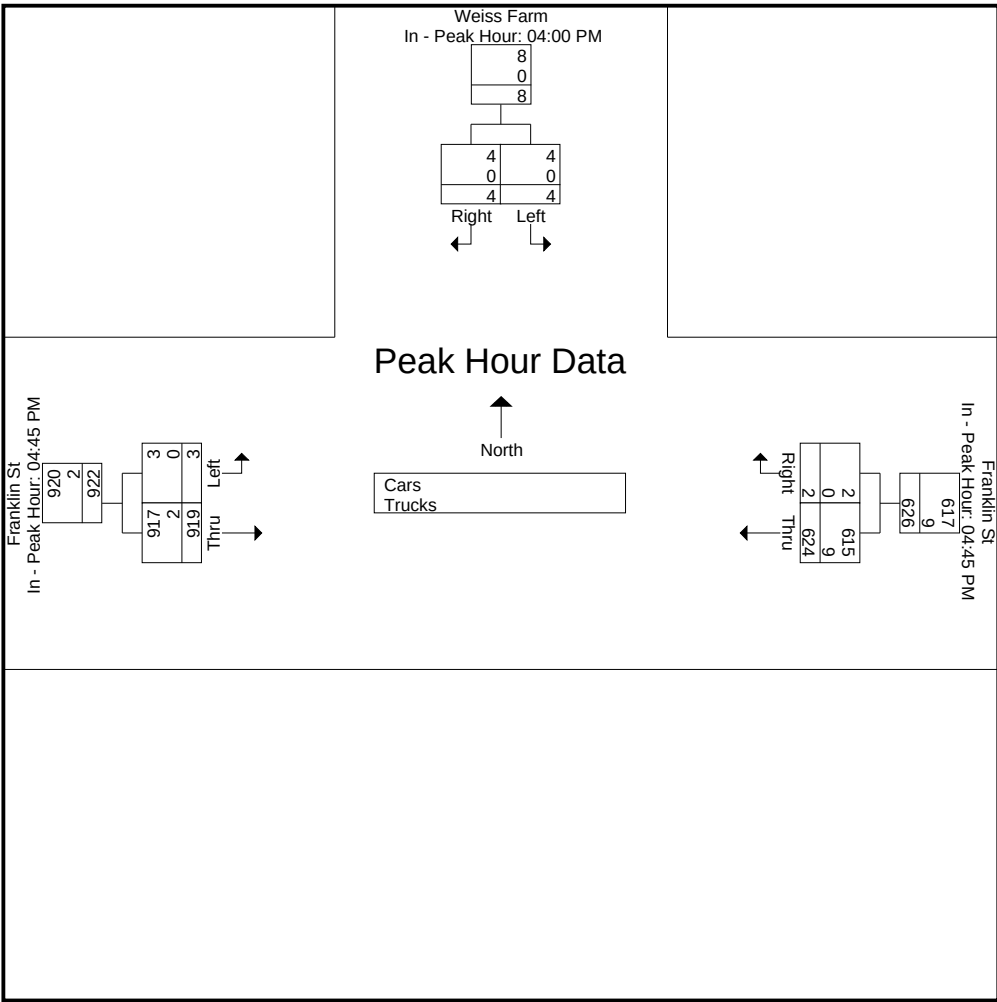
Peak Hour for Each Approach Begins at:

	04:00 PM			04:45 PM			04:45 PM		
+0 mins.	3	2	5	166	0	166	1	232	233
+15 mins.	0	1	1	144	0	144	0	232	232
+30 mins.	0	0	0	159	0	159	1	221	222
+45 mins.	1	1	2	155	2	157	1	234	235
Total Volume	4	4	8	624	2	626	3	919	922
% App. Total	50	50		99.7	0.3		0.3	99.7	
PHF	.333	.500	.400	.940	.250	.943	.750	.982	.981
Cars	4	4	8	615	2	617	3	917	920
% Cars	100	100	100	98.6	100	98.6	100	99.8	99.8
Trucks	0	0	0	9	0	9	0	2	2
% Trucks	0	0	0	1.4	0	1.4	0	0.2	0.2

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 4

Groups Printed- Cars

	Weiss Farm From North		Franklin St From East		Franklin St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	3	2	154	0	1	202	362
04:15 PM	0	1	131	0	0	217	349
04:30 PM	0	0	142	0	0	211	353
04:45 PM	1	1	163	0	1	230	396
Total	4	4	590	0	2	860	1460
05:00 PM	0	0	140	0	0	232	372
05:15 PM	0	0	159	0	1	221	381
05:30 PM	1	0	153	2	1	234	391
05:45 PM	2	0	165	1	0	209	377
Total	3	0	617	3	2	896	1521
Grand Total	7	4	1207	3	4	1756	2981
Apprch %	63.6	36.4	99.8	0.2	0.2	99.8	
Total %	0.2	0.1	40.5	0.1	0.1	58.9	

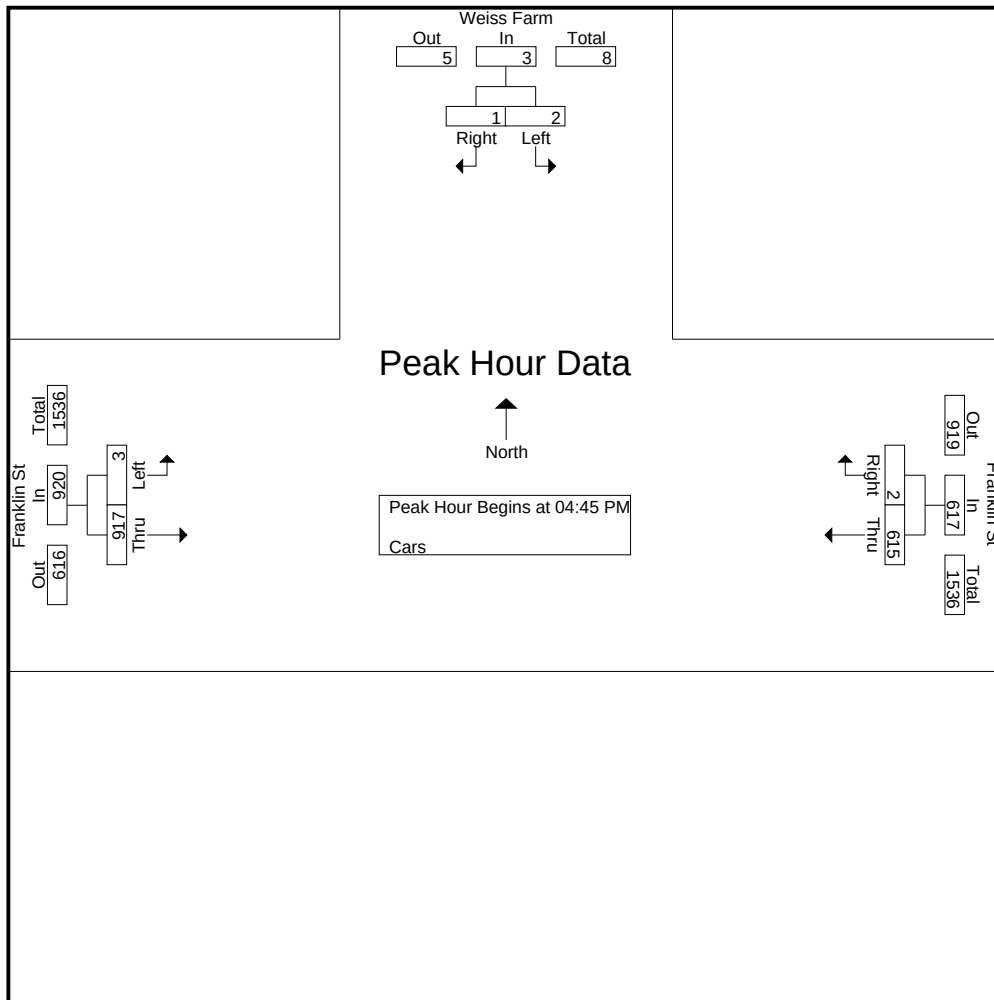
	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	1	1	2	163	0	163	1	230	231	396
05:00 PM	0	0	0	140	0	140	0	232	232	372
05:15 PM	0	0	0	159	0	159	1	221	222	381
05:30 PM	1	0	1	153	2	155	1	234	235	391
Total Volume	2	1	3	615	2	617	3	917	920	1540
% App. Total	66.7	33.3		99.7	0.3		0.3	99.7		
PHF	.500	.250	.375	.943	.250	.946	.750	.980	.979	.972

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 5



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

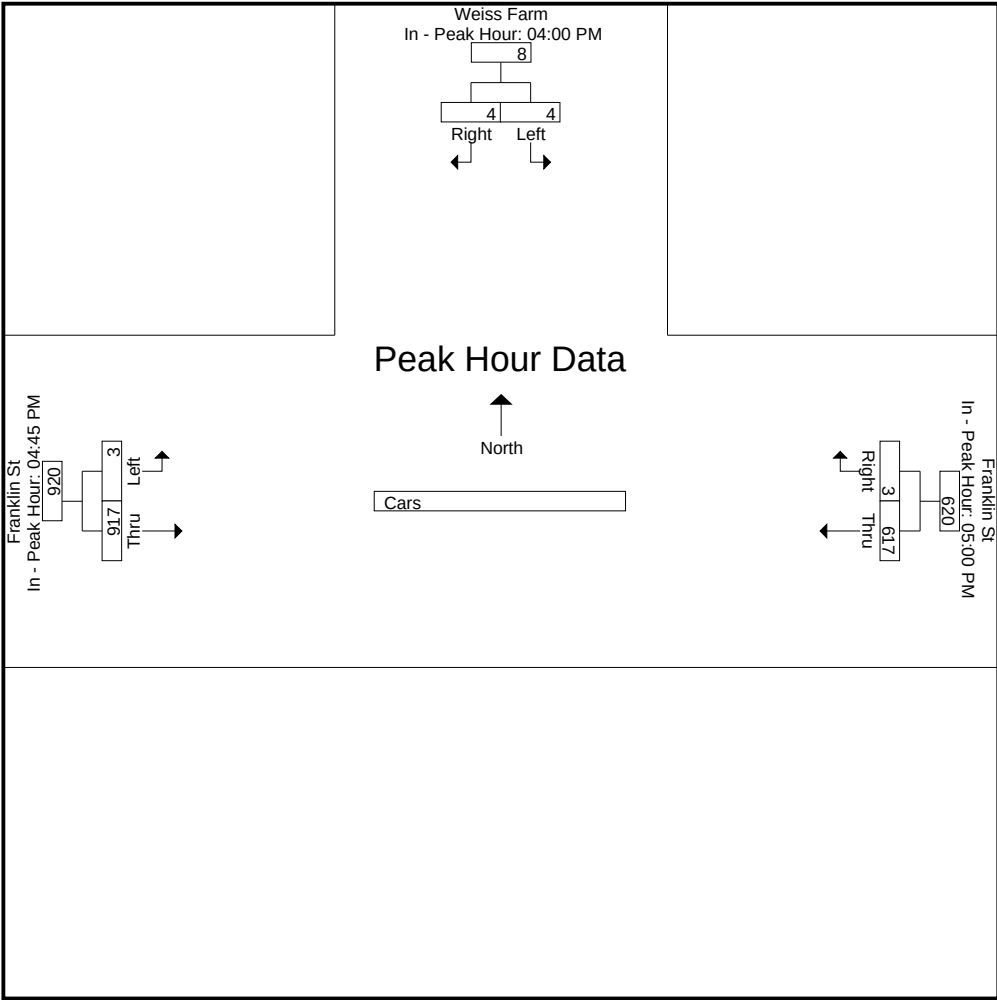
Peak Hour for Each Approach Begins at:

	04:00 PM			05:00 PM			04:45 PM		
+0 mins.	3	2	5	140	0	140	1	230	231
+15 mins.	0	1	1	159	0	159	0	232	232
+30 mins.	0	0	0	153	2	155	1	221	222
+45 mins.	1	1	2	165	1	166	1	234	235
Total Volume	4	4	8	617	3	620	3	917	920
% App. Total	50	50		99.5	0.5		0.3	99.7	
PHF	.333	.500	.400	.935	.375	.934	.750	.980	.979

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 7

Groups Printed- Trucks

	Weiss Farm From North		Franklin St From East		Franklin St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	0	0	2	0	0	3	5
04:15 PM	0	0	2	0	0	1	3
04:30 PM	0	0	1	0	0	1	2
04:45 PM	0	0	3	0	0	2	5
Total	0	0	8	0	0	7	15
05:00 PM	0	0	4	0	0	0	4
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	0	2	0	0	0	2
05:45 PM	0	0	0	0	0	0	0
Total	0	0	6	0	0	0	6
Grand Total	0	0	14	0	0	7	21
Apprch %	0	0	100	0	0	100	
Total %	0	0	66.7	0	0	33.3	

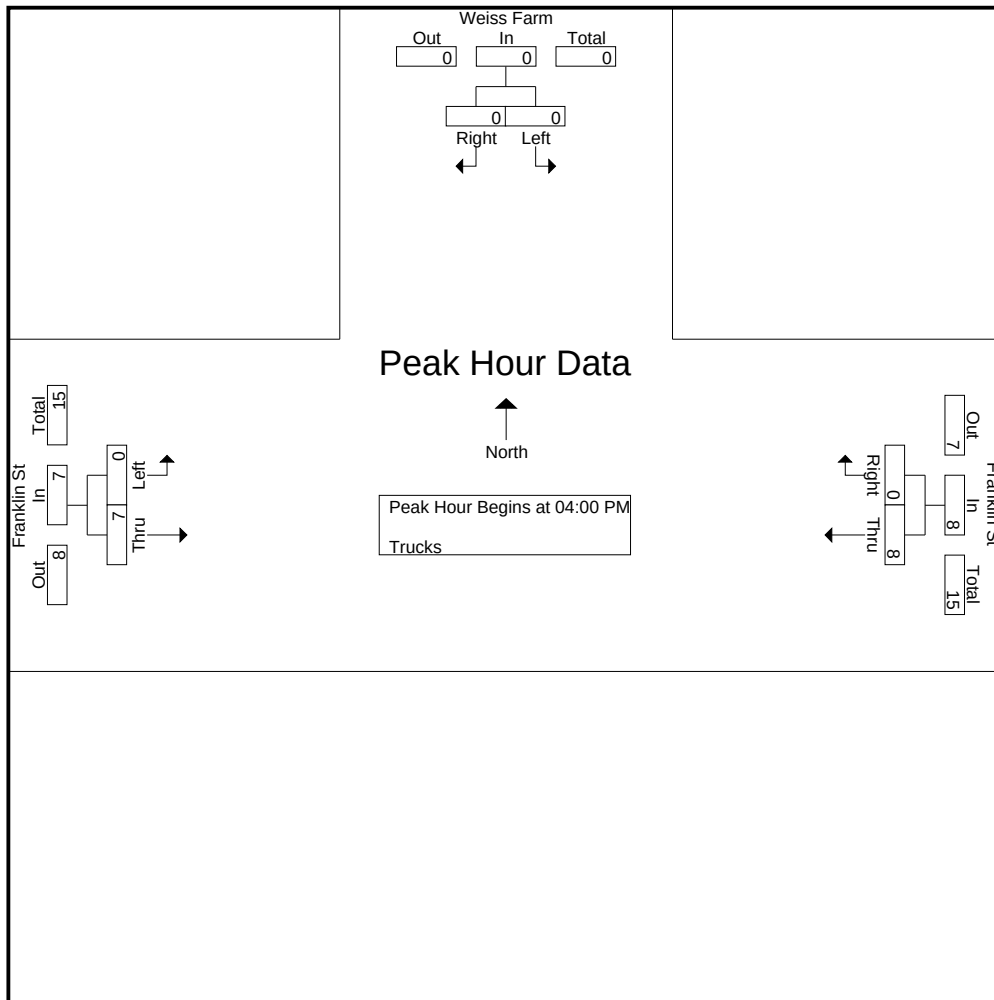
	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	2	0	2	0	3	3	5
04:15 PM	0	0	0	2	0	2	0	1	1	3
04:30 PM	0	0	0	1	0	1	0	1	1	2
04:45 PM	0	0	0	3	0	3	0	2	2	5
Total Volume	0	0	0	8	0	8	0	7	7	15
% App. Total	0	0		100	0		0	100		
PHF	.000	.000	.000	.667	.000	.667	.000	.583	.583	.750

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 8



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

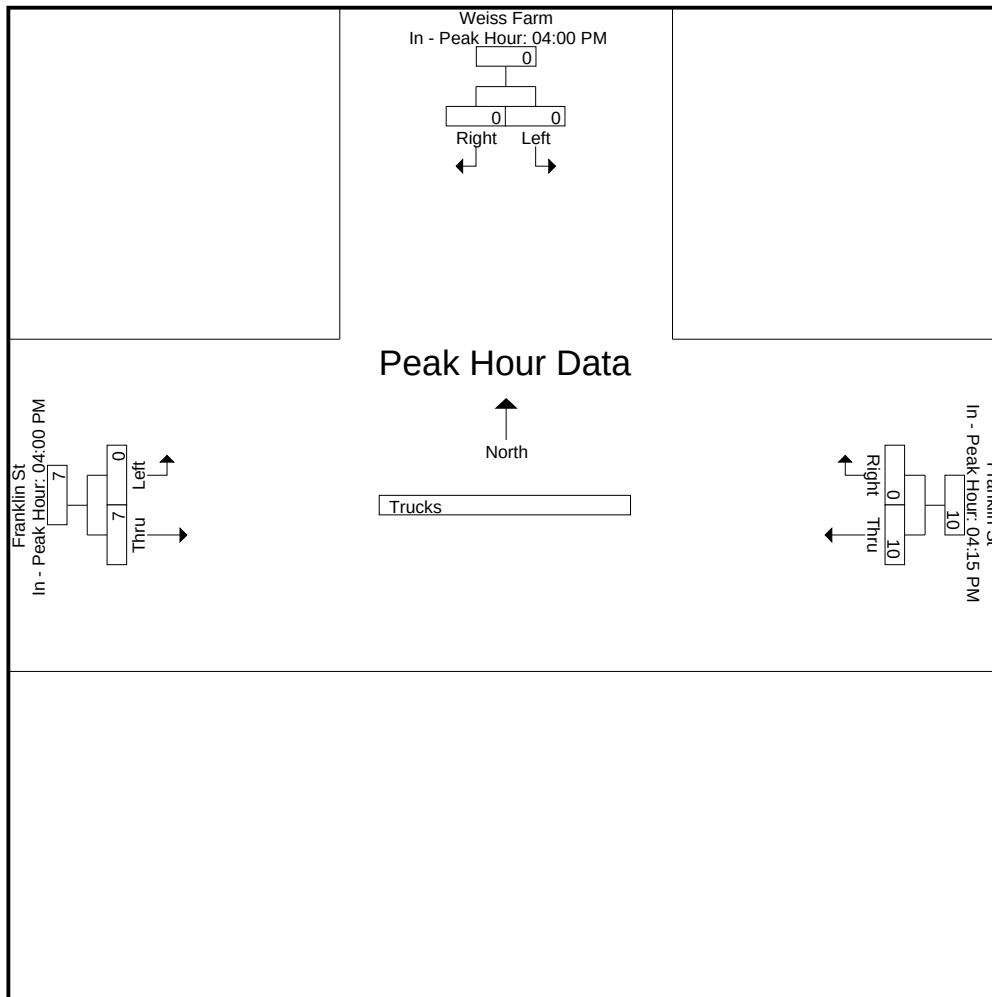
	04:00 PM			04:15 PM			04:00 PM		
+0 mins.	0	0	0	2	0	2	0	3	3
+15 mins.	0	0	0	1	0	1	0	1	1
+30 mins.	0	0	0	3	0	3	0	1	1
+45 mins.	0	0	0	4	0	4	0	2	2
Total Volume	0	0	0	10	0	10	0	7	7
% App. Total	0	0		100	0		0	100	
PHF	.000	.000	.000	.625	.000	.625	.000	.583	.583

Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Weiss Farm Driveway
 E/W Street : Franklin Street
 City/State : Stoneham, MA
 Weather : Clear

File Name : 16470002
 Site Code : 16470002
 Start Date : 4/10/2014
 Page No : 10

Groups Printed- Bikes Peds

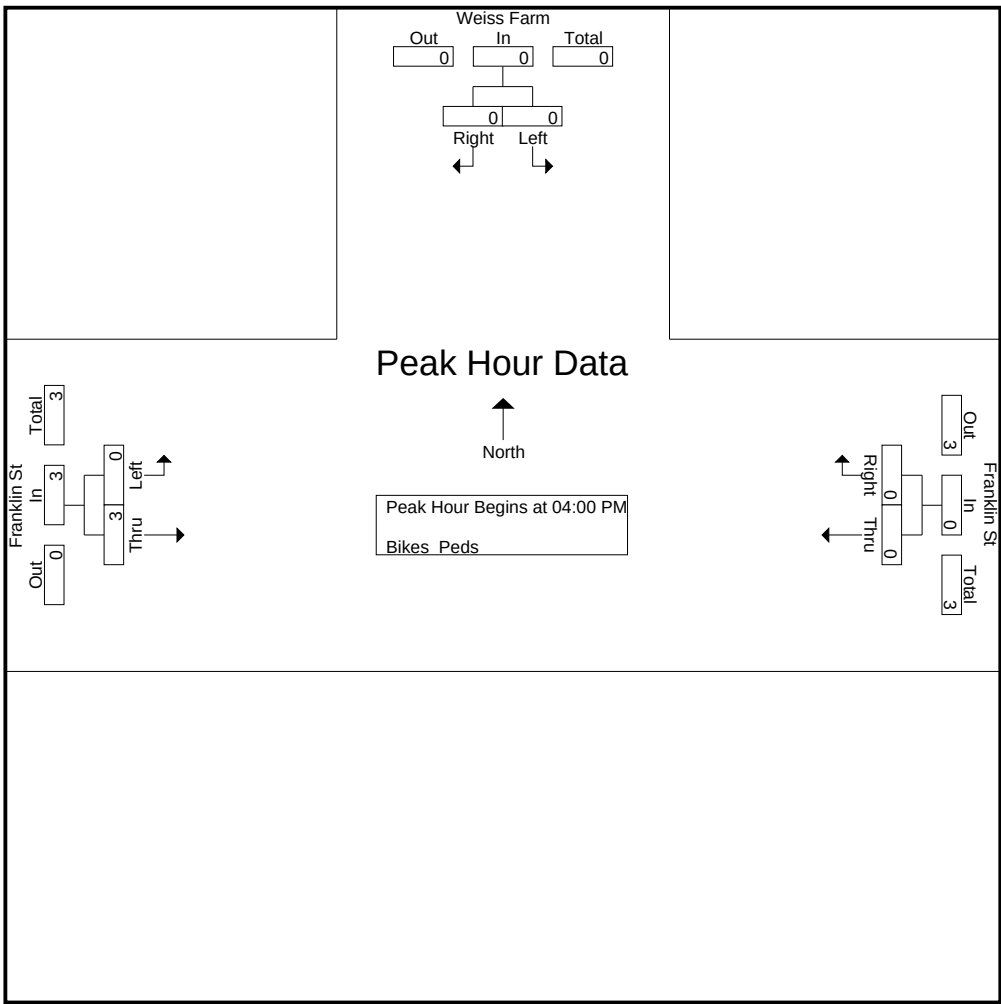
	Weiss Farm From North			Franklin St From East			Franklin St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	2	0	0	0	0	1	0	2	1	3
04:15 PM	0	0	2	0	0	0	0	1	0	2	1	3
04:30 PM	0	0	1	0	0	0	0	0	0	1	0	1
04:45 PM	0	0	2	0	0	0	0	1	0	2	1	3
Total	0	0	7	0	0	0	0	3	0	7	3	10
05:00 PM	0	0	3	0	0	0	0	0	0	3	0	3
05:15 PM	0	0	2	0	0	0	0	0	0	2	0	2
05:30 PM	0	0	1	0	0	0	0	0	0	1	0	1
05:45 PM	0	0	1	0	0	0	0	1	0	1	1	2
Total	0	0	7	0	0	0	0	1	0	7	1	8
Grand Total	0	0	14	0	0	0	0	4	0	14	4	18
Apprch %	0	0		0	0		0	100				
Total %	0	0		0	0		0	100		77.8	22.2	

	Weiss Farm From North			Franklin St From East			Franklin St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	0	1	1	1
04:15 PM	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	1	1	1
Total Volume	0	0	0	0	0	0	0	3	3	3
% App. Total	0	0		0	0		0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.750	.750	.750

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 11



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

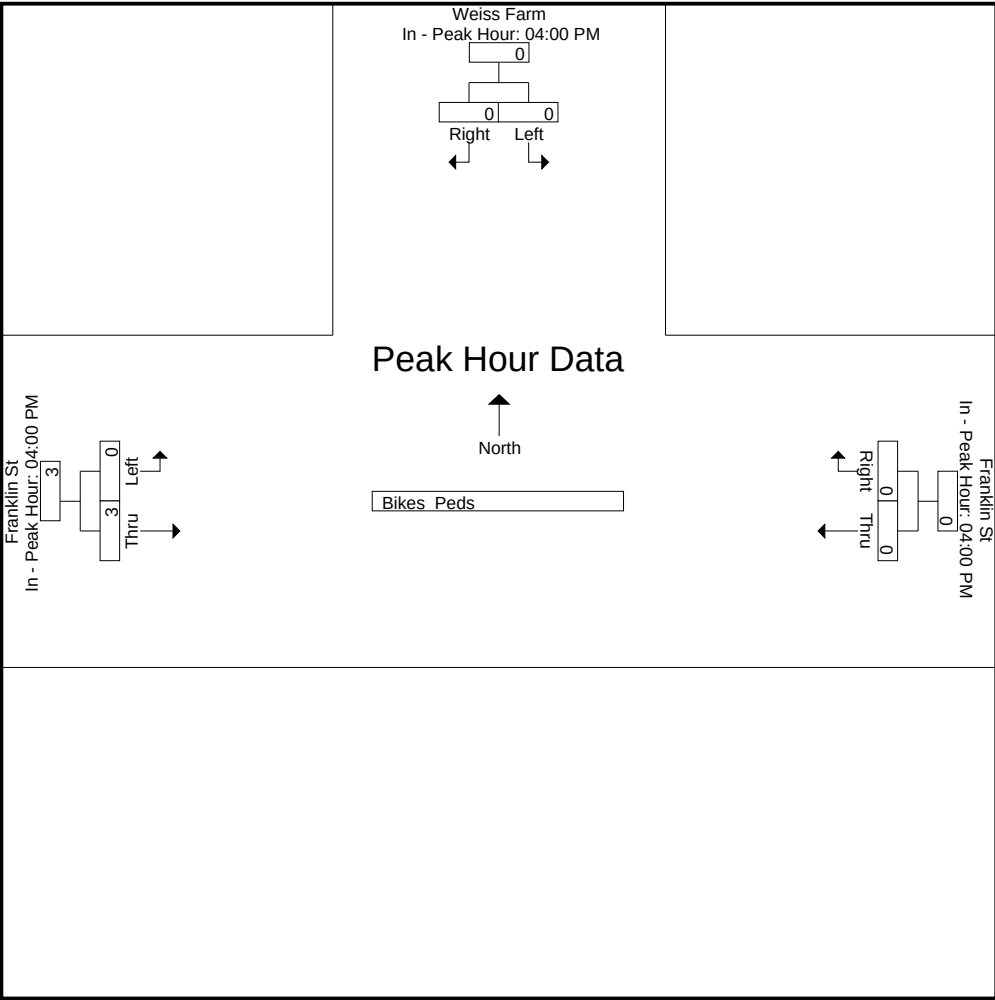
Peak Hour for Each Approach Begins at:

[illegible]

Accurate Counts
978-664-2565

N/S Street : Weiss Farm Driveway
E/W Street : Franklin Street
City/State : Stoneham, MA
Weather : Clear

File Name : 16470002
Site Code : 16470002
Start Date : 4/10/2014
Page No : 12



TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

TRAFFIC-VOLUME ADJUSTMENT DATA

MassHighway Traffic Volumes

Permanent Count Station 407^a

Stoneham - Route 28 South of the Reading Town Line

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	AADT ^b
1993	26,106	25,914	26,282	28,459	29,078	30,168	29,529	30,480	29,908	29,795	28,748	30,011	28,707
	-0.60%	2.77%	9.02%	4.08%	3.19%	2.69%	3.00%	-3.28%	5.29%	0.23%	0.41%	0.85%	2.25%
1994	25,949	26,631	28,653	29,621	30,006	30,979	30,416	29,481	31,490	29,863	28,866	30,266	29,352
	1.45%	1.05%	-0.79%	2.30%	7.73%	7.13%	4.81%	0.16%	-3.43%	-1.29%	-0.18%	-0.93%	1.58%
1996	26,708	27,195	28,200	31,000	34,826	35,554	33,414	29,575	29,365	29,100	28,765	29,704	30,284
	6.65%	2.52%	-0.81%	-7.93%	-14.50%	-13.36%	-13.78%	-1.83%	-0.45%	-0.93%	-1.69%	-7.70%	-5.05%
1997	28,485	27,879	27,971	28,543	29,775	30,805	28,809	29,034	29,232	28,829	28,279	27,418	28,755
	-0.81%	-2.78%	-1.49%	1.08%	-1.20%	-2.58%	1.29%	-0.86%	-1.94%	0.55%	-0.87%	9.02%	-0.10%
1998	28,255	27,103	27,554	28,852	29,418	30,009	29,180	28,785	28,664	28,987	28,033	29,891	28,728
	-3.02%	-1.57%	-0.67%	-0.61%	-0.13%	-0.03%	-0.92%	-0.52%	0.39%	0.30%	1.12%	0.36%	-0.42%
2001	25,773	25,847	27,000	28,330	29,302	29,982	28,380	28,336	29,000	29,253	28,984	30,212	28,367
	1.00%	1.58%	-0.74%	0.89%	0.67%	-1.49%	5.73%	2.90%	-1.37%	-2.75%	-5.35%	-7.32%	-0.60%
2002	26,031	26,256	26,800	28,581	29,498	29,534	30,007	29,158	28,604	28,450	27,434	28,000	28,196
	-1.74%	-1.56%	-1.57%	-2.62%	-2.43%	-1.67%	-3.42%	-2.76%	-2.12%	-2.39%	-2.06%	-2.14%	-2.22%
2005	24,692	25,048	25,554	26,393	27,399	28,075	27,036	26,807	26,827	26,455	25,775	26,238	26,358
	-12.25%	-7.86%	-5.96%	-9.30%	-7.70%	-7.87%	-12.90%	-6.20%	-4.75%	-7.73%	-7.14%	-8.09%	-8.16%
2006	24,794	24,974	25,912	26,170	27,152	27,647	25,416	27,000	27,303	26,745	26,032	27,473	26,385
	-5.56%	-6.87%	-6.97%	-9.96%	-7.31%	-8.76%	-10.29%	-7.04%	-11.11%	-11.58%	-12.57%	-15.84%	-9.59%
2007	24,339	24,072	25,117	25,508	27,159	27,355	25,461	26,342	25,778	25,865	25,342	25,426	25,647
	-8.20%	-8.98%	-11.53%	-15.93%	-22.39%	-12.74%	-14.46%	-16.13%	-14.68%	-12.12%	-7.78%	-9.64%	-13.83%
2008	23,897	23,897	23,709	24,028	22,893	25,770	25,669	24,456	24,404	25,003	25,300	25,300	24,296
	-12.85%	-14.09%	-8.61%	-10.76%	-9.39%	-10.88%	-5.06%	-6.89%	-7.04%	-6.81%	-2.19%	-3.92%	-5.18%
2009	21,518	21,518	23,353	23,554	24,826	25,021	25,667	24,960	24,938	24,654	25,210	25,210	24,994

Seasonal Adj. ^c	7.7%	7.7%	4.4%	0.3%	-3.3%	-5.9%	-2.6%	-1.3%	-1.6%	-0.9%	1.0%	-1.5%	0.0%
Annual Growth ^d	-0.98%	-1.09%	-0.97%	-1.41%	-1.58%	-1.57%	-1.21%	-1.24%	-1.32%	-1.20%	-0.94%	-1.13%	-1.13%

^a Based upon historical data. Source: MassHighway 2009 Traffic Volumes.

^b Average Annual Daily Traffic.

^c Seasonal adjustment to yearly average.

^d Compounded Annual Growth Rate.

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

MASSDOT CRASH RATE WORKSHEETS

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

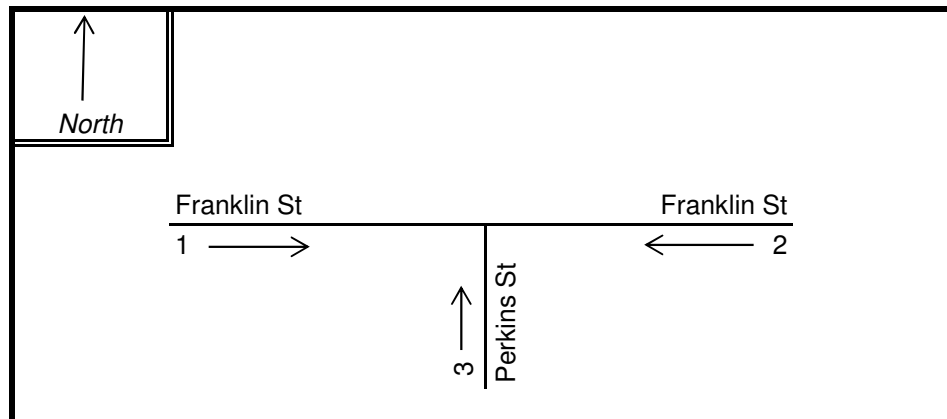
DISTRICT : 4 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Perkins Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/PM):	926	447	213			1,586

"K" FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

15,250

TOTAL # OF CRASHES :

4

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

1.33

CRASH RATE CALCULATION :

0.24

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

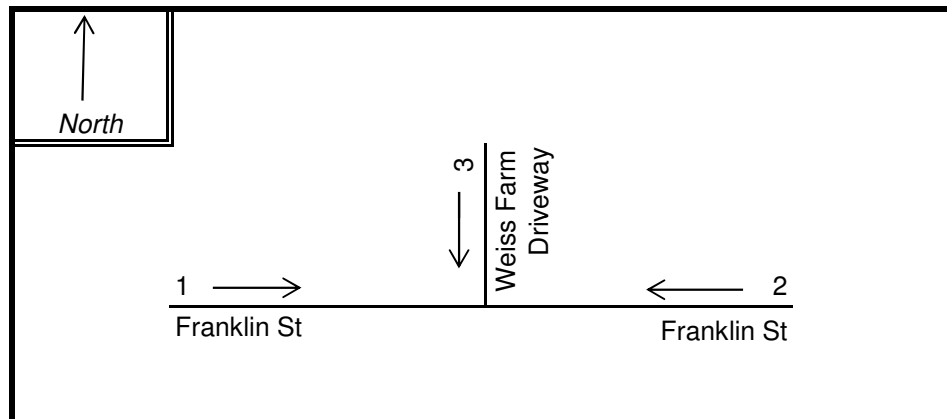
DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Weiss Farm Driveway (170 Franklin Street)

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM/PM):	1,085	743	0			1,828

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

17,577

TOTAL # OF CRASHES :

1

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

0.33

CRASH RATE CALCULATION :

0.05

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

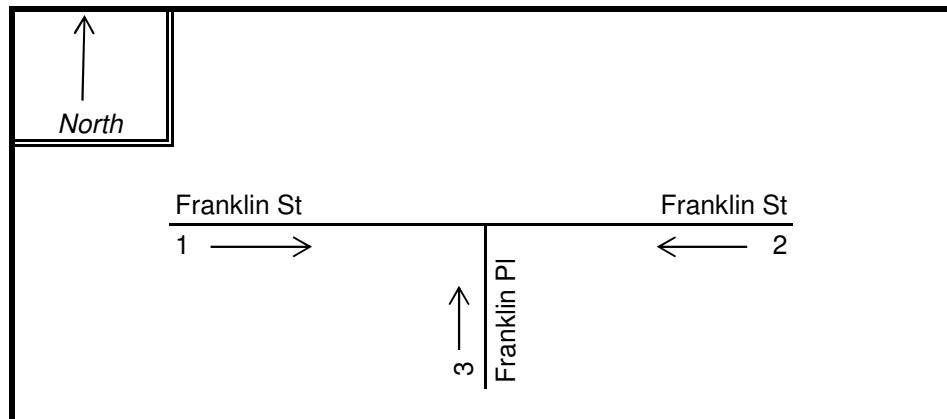
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Franklin Place (Stoneham High School Access Road)

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/PM):	1,109	743	138			1,990

"K" FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

19,135

TOTAL # OF CRASHES :

2

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

0.67

CRASH RATE CALCULATION :

0.10

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

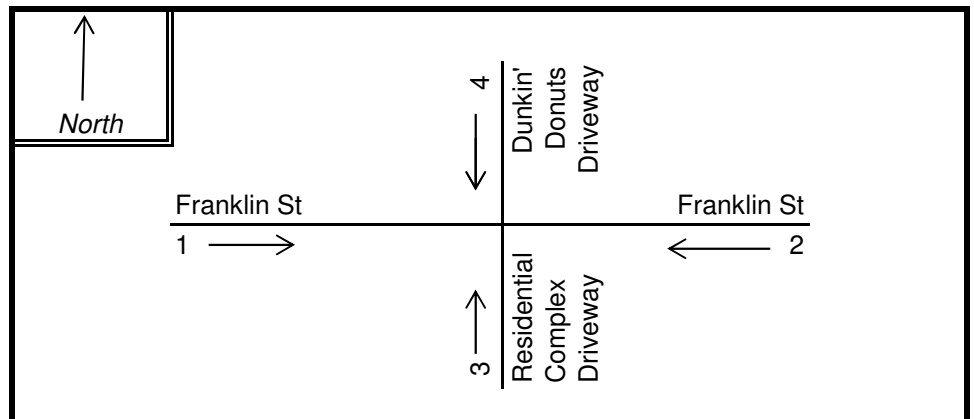
DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Dunkin Donuts Driveway (128 Franklin Street) & Residential Complex

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	1,127	842	9	32		2,010

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

19,327

TOTAL # OF CRASHES :

5

OF YEARS :

3

AVERAGE # OF
CRASHES PER YEAR (A) :

1.67

CRASH RATE CALCULATION :

0.24

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

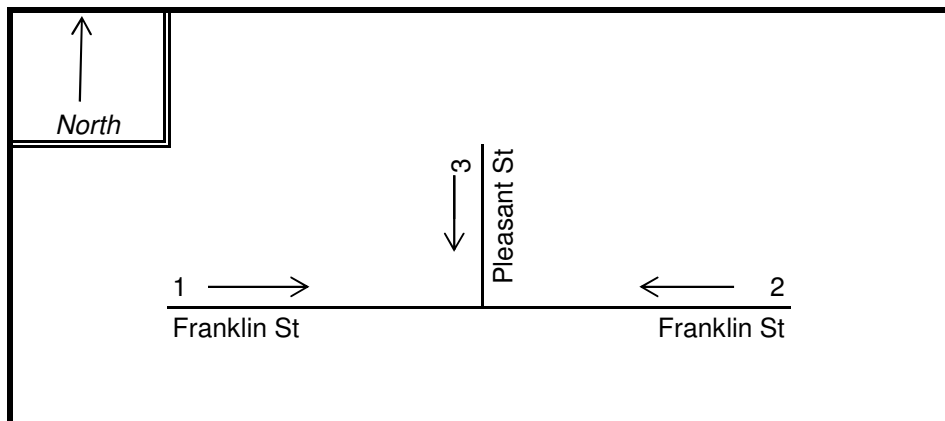
DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Pleasant Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM/PM):	816	711	272			1,799

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

17,298

TOTAL # OF CRASHES :

0

OF
YEARS :

3

AVERAGE # OF
CRASHES PER YEAR (A) :

0.00

CRASH RATE CALCULATION :

0.00

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

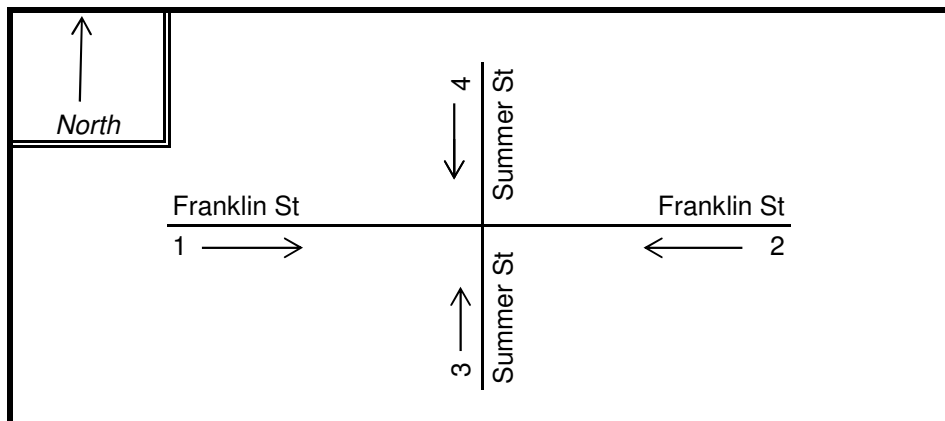
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Summer Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	548	464	600	215		1,827

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

17,567

TOTAL # OF CRASHES :

4

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

1.33

CRASH RATE CALCULATION :

0.21

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

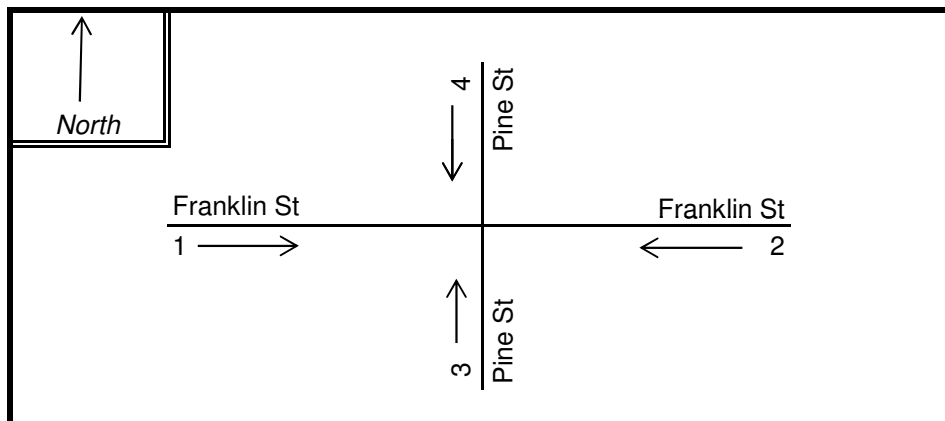
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Pine Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	302	470	150	266		1,188

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

11,423

TOTAL # OF CRASHES :

6

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

2.00

CRASH RATE CALCULATION :

0.48

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

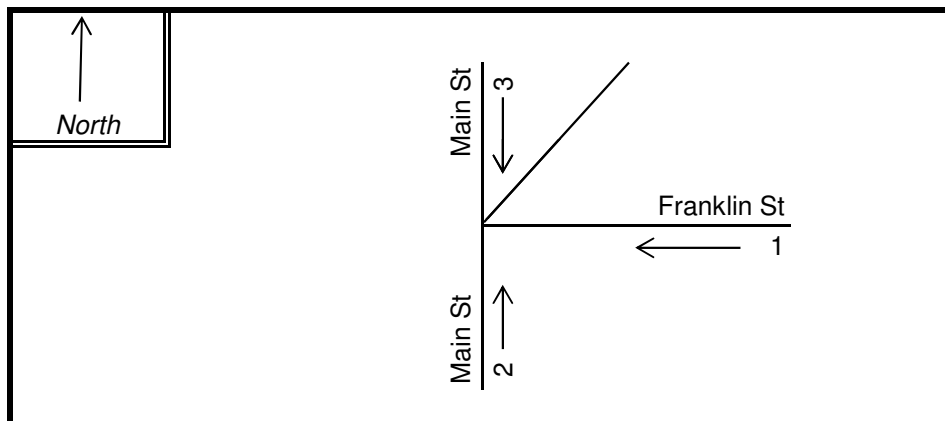
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Main Street

MINOR STREET(S) : Franklin Street & Central Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	WB	NB	SB			
PEAK HOURLY VOLUMES (AM/PM):	278	683	458			1,419

"K" FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

15,767

TOTAL # OF CRASHES :

4

OF
YEARS :

3

AVERAGE # OF
CRASHES PER YEAR (A) :

1.33

CRASH RATE CALCULATION :

0.23

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

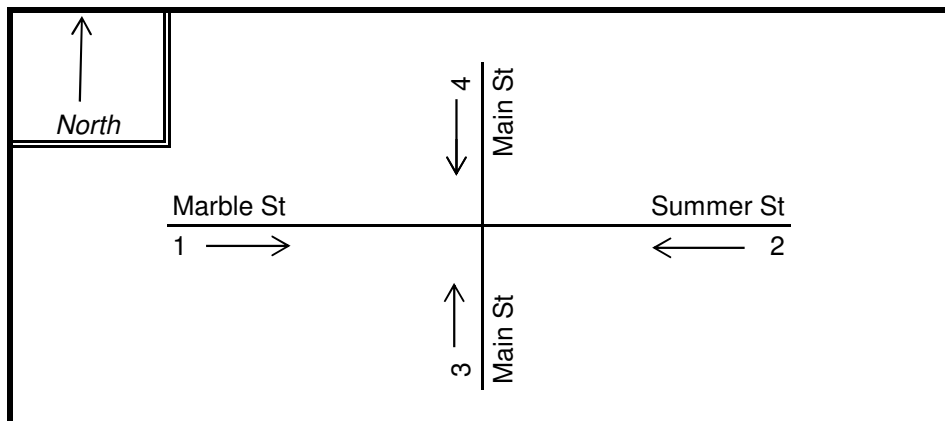
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Main Street

MINOR STREET(S) : Summer Street & Marble Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	386	231	690	317		1,624

" K " FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

18,044

TOTAL # OF CRASHES :

2

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

0.67

CRASH RATE CALCULATION :

0.10

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

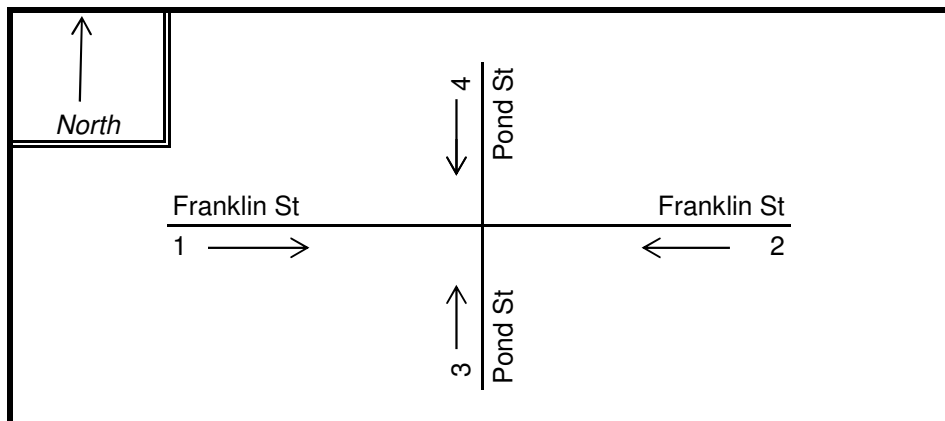
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Summer Street

MINOR STREET(S) : Pond Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



APPROACH :

DIRECTION :

PEAK HOURLY
VOLUMES (AM/PM):

1	2	3	4	5	Total Peak Hourly Approach Volume
EB	WB	NB	SB		
518	234	384	43		1,179

" K " FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

13,100

TOTAL # OF CRASHES :

2

OF
YEARS :

3

AVERAGE # OF
CRASHES PER YEAR (A) :

0.67

CRASH RATE CALCULATION :

0.14

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

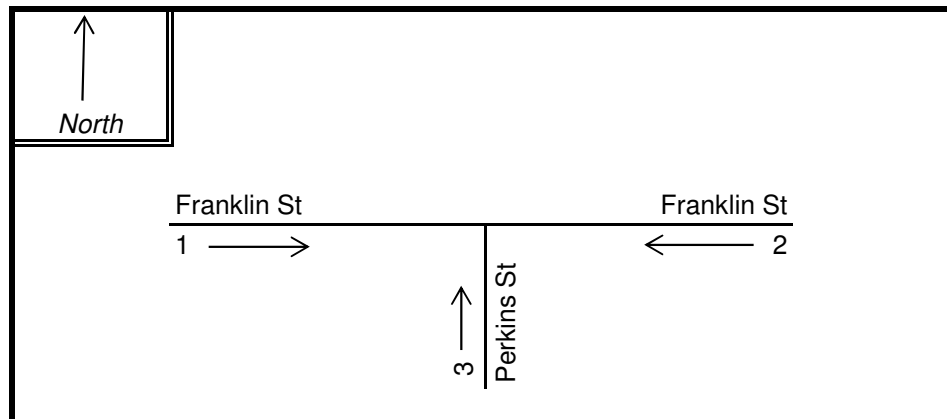
DISTRICT : 4 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Perkins Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/PM):	926	447	213			1,586

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

15,250

TOTAL # OF CRASHES :

4

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

1.33

CRASH RATE CALCULATION :

0.24

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

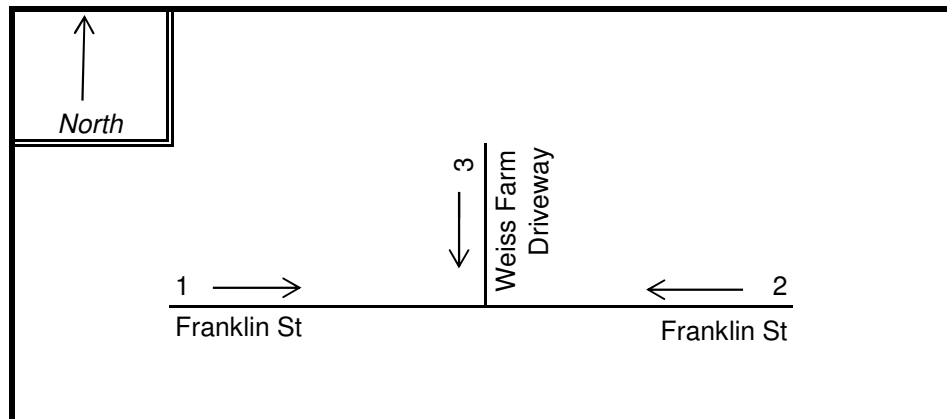
DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Weiss Farm Driveway (170 Franklin Street)

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM/PM):	1,085	743	0			1,828

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

17,577

TOTAL # OF CRASHES :

1

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

0.33

CRASH RATE CALCULATION :

0.05

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

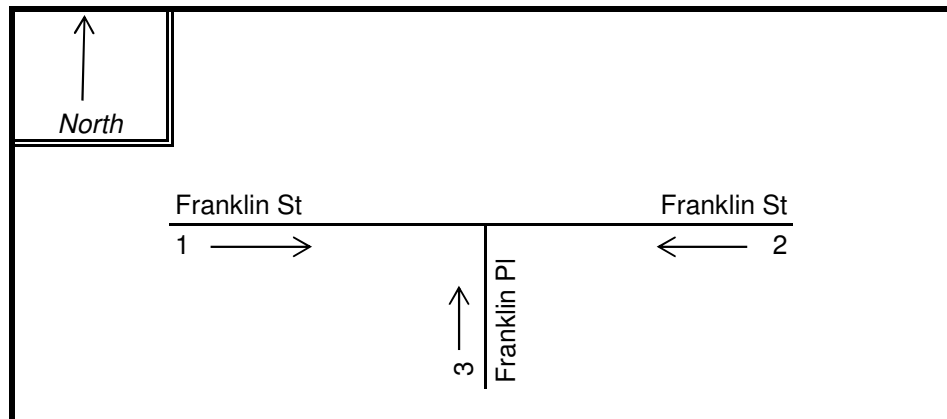
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Franklin Place (Stoneham High School Access Road)

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/PM):	1,109	743	138			1,990

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

19,135

TOTAL # OF CRASHES :

0

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

0.00

CRASH RATE CALCULATION :

0.00

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

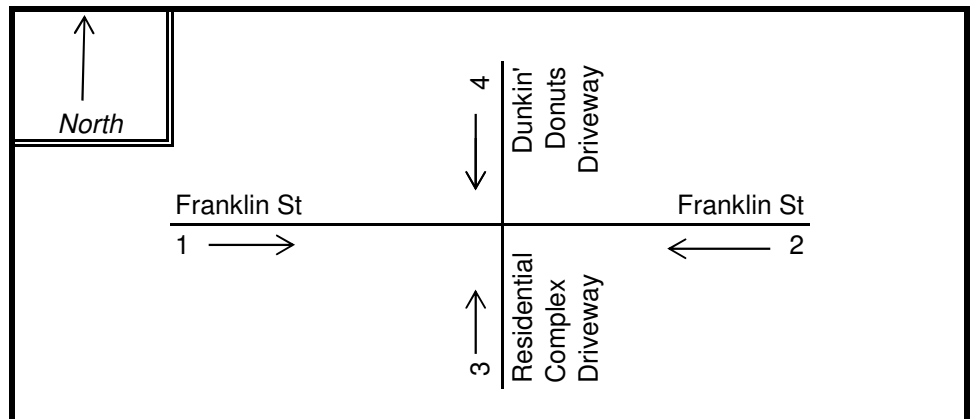
DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Dunkin Donuts Driveway (128 Franklin Street) & Residential Complex

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	1,127	842	9	32		2,010

"K" FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

19,327

TOTAL # OF CRASHES :

4

OF YEARS :

3

AVERAGE # OF
CRASHES PER YEAR (A) :

1.33

CRASH RATE CALCULATION :

0.19

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

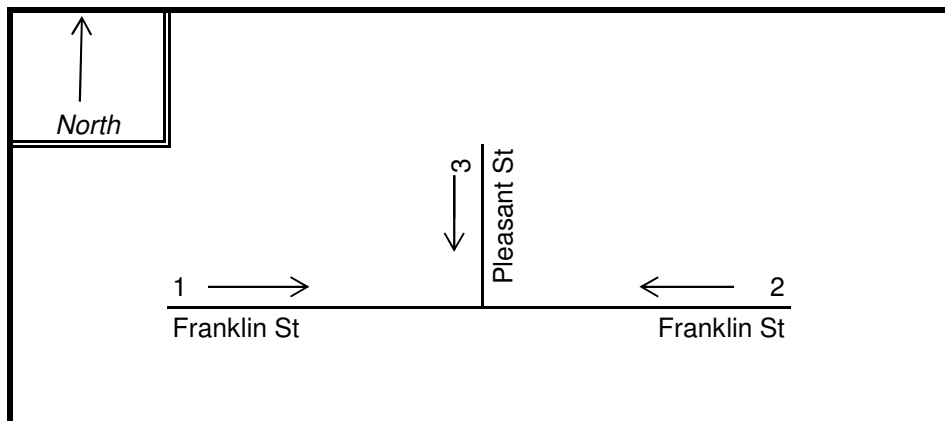
DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Pleasant Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM/PM):	816	711	272			1,799

"K" FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

17,298

TOTAL # OF CRASHES :

3

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

1.00

CRASH RATE CALCULATION :

0.16

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

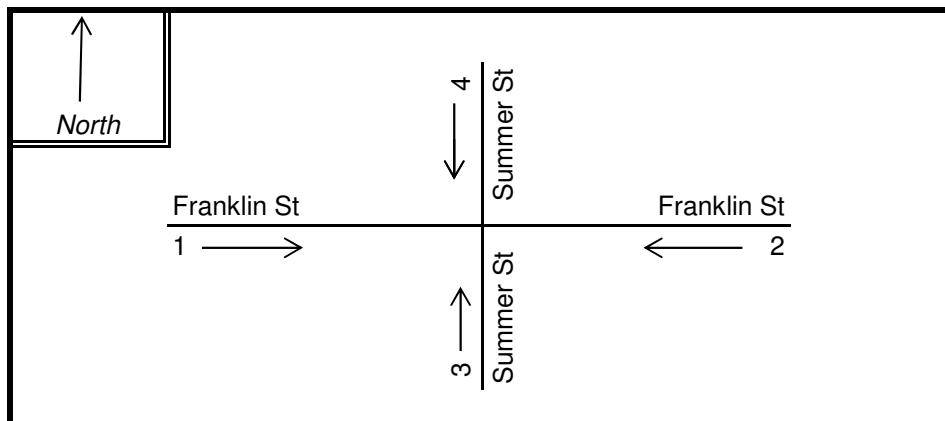
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Summer Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	548	464	600	215		1,827

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

17,567

TOTAL # OF CRASHES :

4

OF
YEARS :

3

AVERAGE # OF
CRASHES PER YEAR (A) :

1.33

CRASH RATE CALCULATION :

0.21

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

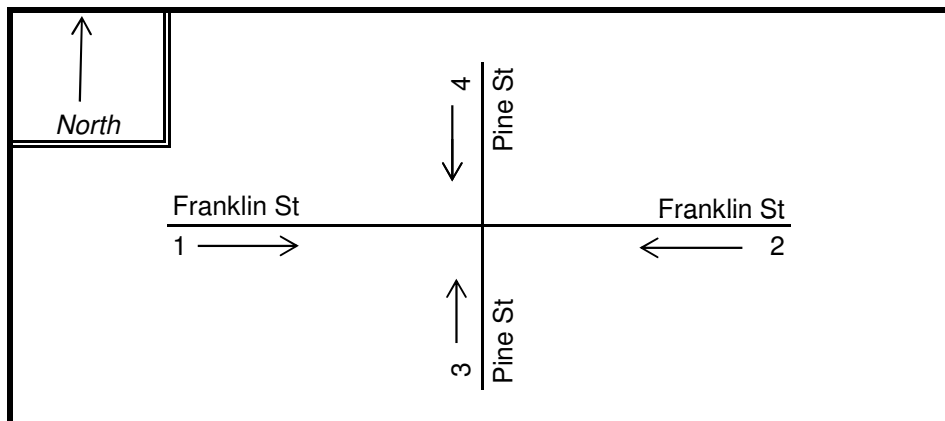
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Franklin Street

MINOR STREET(S) : Pine Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	302	470	150	266		1,188

" K " FACTOR :

0.104

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

11,423

TOTAL # OF CRASHES :

6

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

2.00

CRASH RATE CALCULATION :

0.48

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

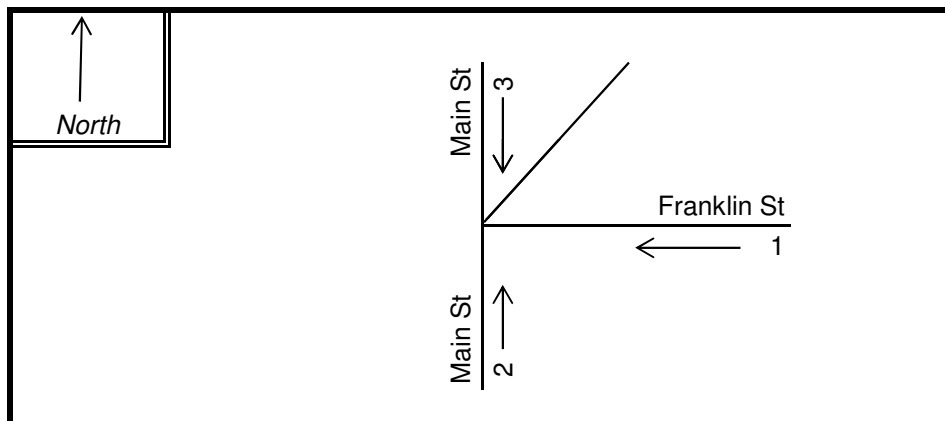
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Main Street

MINOR STREET(S) : Franklin Street & Central Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	WB	NB	SB			
PEAK HOURLY VOLUMES (AM/PM):	278	683	458			1,419

" K " FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

15,767

TOTAL # OF CRASHES :

19

OF
YEARS :

3

AVERAGE # OF
CRASHES PER YEAR (A) :

6.33

CRASH RATE CALCULATION :

1.10

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

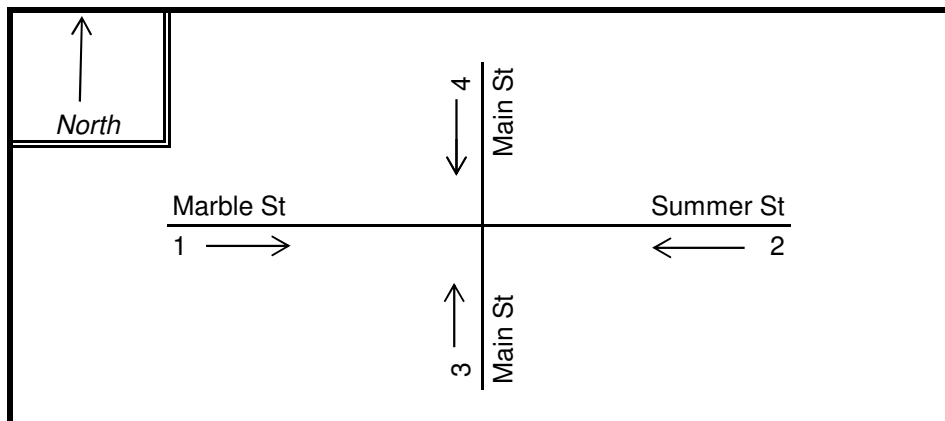
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Main Street

MINOR STREET(S) : Summer Street & Marble Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	386	231	690	317		1,624

" K " FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

18,044

TOTAL # OF CRASHES :

5

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

1.67

CRASH RATE CALCULATION :

0.25

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Stoneham COUNT DATE : Sep-13

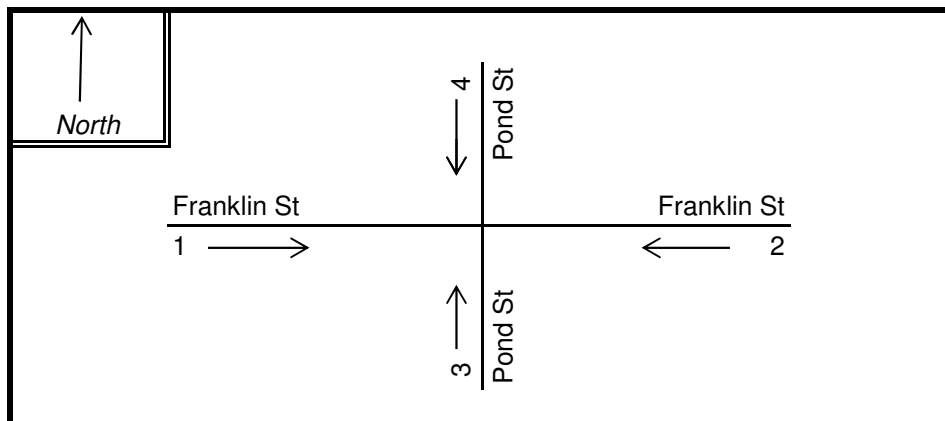
DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Summer Street

MINOR STREET(S) : Pond Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM/PM):	518	234	384	43		1,179

" K " FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

13,100

TOTAL # OF CRASHES :

8

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

2.67

CRASH RATE CALCULATION :

0.56

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

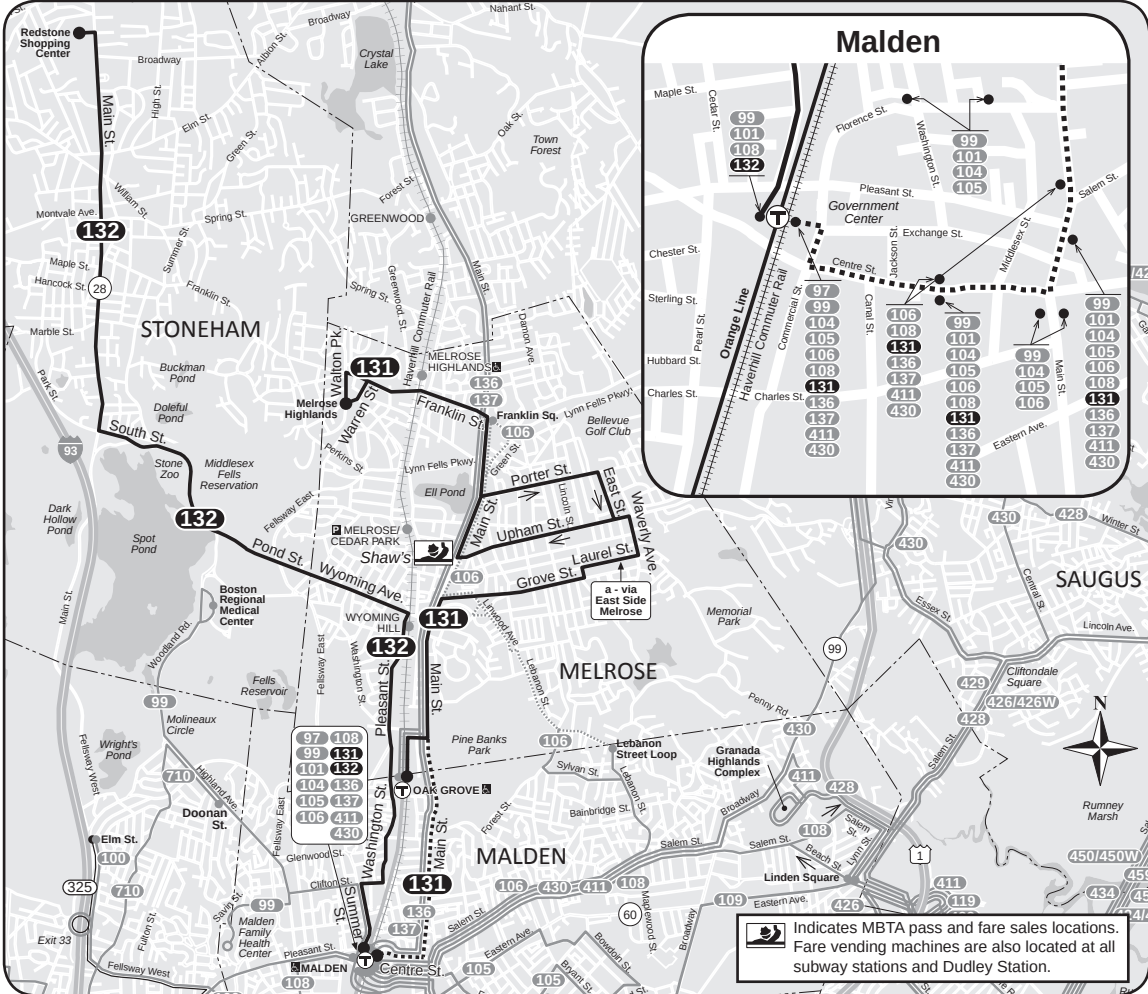
Project Title & Date: Proposed Residential Development

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

PUBLIC TRANSPORTATION SCHEDULES

Route 131 Melrose Highlands - Malden Center Station
Route 132 Redstone Shopping Center - Malden Center Station



131•132

Winter December 28, 2013 – March 21, 2014

131 Melrose Highlands-Malden Station
132 Redstone Shopping Center-Malden Station

- Serving**
- Wyoming Square
 - Melrose East Side
 - Oak Grove Station
 - Malden Square
 - Orange Line
 - Haverhill Commuter Rail



Massachusetts Bay Transportation Authority *massDOT*
Massachusetts Department of Transportation
Information 617-222-3200 • 1-800-392-6100
(TTY) 617-222-5146 • www.mbta.com

131			Weekday		
Inbound			Outbound		
Leave Franklin at Warren	Arrive Oak Grove Station	Arrive Malden Station	Leave Malden Station	Lv/Arrive Oak Grove Station	Arrive Franklin at Warren
a 6:25A	6:44A	.....	6:00A	.....	6:20A
a 6:45	7:04	.....	6:20	.....	6:40
a 7:05	7:25	.....	.....	6:48A	7:00
a 7:25	7:45	.....	.....	a 7:05	7:23
a 7:45	8:05	.....	.....	7:28	7:42
a 8:05	8:25	.....	.....	7:48	8:02
a 8:25	8:43	.....	.....	8:08	8:22
a 8:45	9:03	.....	.....	8:28	8:42
a 9:05	9:23	.....	.....	8:48	9:02
a 9:45	10:02	.....	.....	a 9:25	9:43
			a 11:45	11:53	12:14P
a12:15P	.....	12:37P	a 12:45P	12:53P	1:12P
a 1:15	.....	1:36	a 1:45	1:53	2:13
a 2:15	.....	2:38	a 2:45	2:54	3:15
3:15	3:28P	.....	.....	a 3:45	4:03
4:15	4:27	.....	.....	a 4:15	4:36
4:38	4:50	.....	.....	a 4:35	4:57
4:58	5:10	.....	.....	a 4:55	5:17
5:18	5:30	.....	.....	a 5:15	5:37
5:38	5:50	.....	.....	a 5:35	5:58
5:58	6:10	.....	.....	a 5:55	6:18
6:18	6:30	.....	.....	a 6:15	6:38
6:38	6:50	.....	.....	a 6:35	6:57
6:57	.....	7:14	.....	a 6:55	7:17
7:17	.....	7:34			

a- Via East Side Melrose

No Route 131 service on
Saturday or Sunday

Route 131
Melrose Highlands-Malden Ctr. Station

132			Weekday		
Inbound			Outbound		
Leave Redstone Shopping Center	Arrive Wyoming Square	Arrive Malden Station	Leave Malden Station	Arrive Wyoming Square	Arrive Redstone Shopping Center
6:00A	6:13A	6:25A	5:30A	5:35A	5:48A
6:30	6:43	6:55	6:00	6:05	6:18
6:55	7:12	7:25	6:52	6:57	7:12
7:15	7:33	7:46	7:30	7:36	7:55
7:35	7:53	8:06	8:30	8:36	8:52
8:00	8:18	8:31	9:30	9:36	9:52
8:30	8:45	8:56	10:30	10:36	10:52
9:00	9:14	9:25	11:30	11:36	11:52
10:00	10:13	10:24			
11:00	11:13	11:24			
			12:30P	12:36P	12:52P
12:00N	12:13P	12:24P	1:30	1:36	1:52
1:00	1:15	1:26	2:30	2:36	2:55
2:00	2:15	2:26	3:15	3:21	3:37
3:00	3:15	3:26	4:00	4:07	4:25
3:45	3:58	4:09	4:45	4:52	5:10
4:30	4:45	4:54	5:20	5:27	5:44
5:15	5:30	5:39	5:50	6:00	6:16
6:05	6:20	6:29	6:20	6:27	6:43
7:00	7:12	7:19	7:00	7:07	7:23

132			Saturday		
Inbound			Outbound		
Leave Redstone Shopping Center	Arrive Wyoming Square	Arrive Malden Station	Leave Malden Station	Arrive Wyoming Square	Arrive Redstone Shopping Center
8:00A	8:05A	8:20A	8:30A	8:36A	8:55A
9:00	9:05	9:20	9:30	9:36	9:56
10:00	10:13	10:27	10:30	10:36	10:56
11:00	11:13	11:27	11:30	11:36	11:56
12:00N	12:13P	12:27P	12:30P	12:36P	12:56P
1:00	1:13	1:27	1:30	1:36	1:56
2:00	2:13	2:30	2:30	2:36	2:56
3:00	3:13	3:30	3:30	3:36	3:53
4:00	4:13	4:30	4:30	4:36	4:53
5:00	5:13	5:28	5:30	5:36	5:53
6:00	6:13	6:26	7:00	7:06	7:22
7:30	7:43	7:49			

Route 132
Redstone Shopping Ctr.- Malden Ctr. Station

No route 132
service on Sunday

NOTE: All Route 132 trips travel via Oak Grove Station (West Side)

 All buses are accessible to persons with disabilities

				
Fare	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	\$1.50	\$1.50	\$2.00	\$2.00
CharlieTicket	\$2.00	\$2.00	\$2.50	\$4.50
Cash-on-Board	\$2.00	\$4.00	\$2.50	\$4.50
Student CharliCard*	\$0.75	\$0.75	\$1.00	\$1.00
Senior/TAP CharliCard**	\$0.75	\$0.75	\$1.00	\$1.00

VALID PASSES: LinkPass (\$70/mo.); Monthly Local Bus (\$48/mo.); *StudentPass (\$25/mo. M-F only or \$28 mo. 7 days); **Senior/TAP Pass(\$28/mo.); and express bus, commuter rail, and boat passes.
FREE FARES: Children under 12 ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.
* Requires Student CharlieCard, available to students through participating middle schools and high schools.
** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

Winter 2014 Holidays
January 1: see Sunday—January 20, February 17: see Saturday

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

OTHER DEVELOPMENT DATA

Institute of Transportation Engineers (ITE)
Land Use Code (LUC) 254 - Assisted Living

Average Vehicle Trips Ends vs: Occupied Beds
Independent Variable (X): 88

AVERAGE WEEKDAY DAILY

$T = 2.74 * (X)$
 $T = 2.74 * 88$
 $T = 241.12$
 $T = 242$ vehicle trips
with 50% (121 vpd) entering and 50% (121 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.18 * (X)$
 $T = 0.18 * 88$
 $T = 15.84$
 $T = 16$ vehicle trips
with 68% (11 vph) entering and 32% (5 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.29 * (X)$
 $T = 0.29 * 88$
 $T = 25.52$
 $T = 26$ vehicle trips
with 50% (13 vph) entering and 48% (13 vph) exiting.

SATURDAY DAILY

$T = 2.20 * (X)$
 $T = 2.20 * 88$
 $T = 193.60$
 $T = 194$ vehicle trips
with 50% (97 vpd) entering and 50% (97 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$\ln T = 0.72 \ln (X) + 0.32$
 $\ln T = 0.72 \ln 88 + (0.32)$
 $\ln T = 3.54$
 $T = 34.59$
 $T = 35$
with 51% (18 vph) entering and 49% (17 vph) exiting.

SUNDAY DAILY

$T = 2.44 * (X)$
 $T = 2.44 * 88$
 $T = 214.72$
 $T = 214$ vehicle trips
with 50% (107 vpd) entering and 50% (107 vpd) exiting.

SUNDAY PEAK HOUR OF GENERATOR

$T = 0.39 * (X) + 3.36$
 $T = 0.39 * 88 + 3.36$
 $T = 37.68$
 $T = 38$ vehicle trips
with 43% (16 vph) entering and 57% (22 vph) exiting.

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

TRIP-GENERATION CALCULATIONS

Institute of Transportation Engineers (ITE)
Land Use Code (LUC) 220 - Apartment

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 250

AVERAGE WEEKDAY DAILY

$$T = 6.06 * (X) + 123.56$$

$$T = 6.06 * 250 + (123.56)$$

$$T = 1638.56$$

$$T = 1,638 \text{ vehicle trips}$$

with 50% (819 vpd) entering and 50% (819 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.49 * (X) + 3.73$$

$$T = 0.49 * 250 + (3.73)$$

$$T = 126.23$$

$$T = 126 \text{ vehicle trips}$$

with 20% (25 vph) entering and 80% (101 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.55 * (X) + 17.65$$

$$T = 0.55 * 250 + (17.65)$$

$$T = 155.15$$

$$T = 155 \text{ vehicle trips}$$

with 65% (101 vph) entering and 35% (54 vph) exiting.

Institute of Transportation Engineers (ITE)
Land Use Code (LUC) 224 - Rental Townhouse

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 15

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.70 (X)$$

$$T = 0.7 \quad 15$$

$$T = 10.50$$

$$T = 11 \quad \text{vehicle trips}$$

with 33% (4 vpd) entering and 67% (7 vpd) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.72 (X)$$

$$T = 0.72 \quad 15$$

$$T = 10.80$$

$$T = 11 \quad \text{vehicle trips}$$

with 51% (6 vph) entering and 49% (5 vph) exiting.

Institute of Transportation Engineers (ITE)

Land Use Code (LUC) 826 - Specialty Retail Center

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Leasable Area
Independent Variable (X): 1.000

AVERAGE WEEKDAY DAILY

$$T = 44.32 * (X)$$

$$T = 44.32 * 1.000$$

$$T = 44.32$$

$$T = 44 \text{ vehicle trips}$$

with 50% (22 vpd) entering and 50% (22 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$\frac{\text{ITE LUC 820 Weekday Morning Trip Rate}}{\text{ITE LUC 820 Weekday Evening Trip Rate}} = \frac{\text{ITE LUC 826 Weekday Morning Trip Rate}}{\text{ITE LUC 826 Weekday Evening Trip Rate}}$$

$$\frac{1.00}{3.73} = \frac{(Y)}{2.71} \quad Y = 0.72654155$$

$$T = Y * 1.000$$

$$T = 0.727$$

$$T = 1 \text{ vehicle trips}$$

with 61% (0 vph) entering and 39% (1 vph) exiting.

(same distribution split as ITE LUC 820 during the weekday morning peak hour of adjacent street traffic)

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 2.40 * (X) + 21.48$$

$$T = 2.40 * 1.000 + (21.48)$$

$$T = 23.88$$

$$T = 24 \text{ vehicle trips}$$

with 44% (11 vph) entering and 56% (13 vph) exiting.

Institute of Transportation Engineers (ITE)
Land Use Code (LUC) 220 - Apartment

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 265

AVERAGE WEEKDAY DAILY

$$T = 6.06 * (X) + 123.56$$

$$T = 6.06 * 265 + (123.56)$$

$$T = 1729.46$$

T = 1,730 vehicle trips
with 50% (865 vpd) entering and 50% (865 vpd) exiting.

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

CAPACITY ANALYSIS METHODOLOGY

CAPACITY ANALYSIS METHODOLOGY

A primary result of capacity analysis is the assignment of levels of service to traffic facilities under various traffic flow conditions. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM).⁸ The concept of level of service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst. Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year. A description of the operating condition under each level of service is provided below:

- *LOS A* describes conditions with little to no delay to motorists.
- *LOS B* represents a desirable level with relatively low delay to motorists.
- *LOS C* describes conditions with average delays to motorists.
- *LOS D* describes operations where the influence of congestion becomes more noticeable. Delays are still within an acceptable range.
- *LOS E* represents operating conditions with high delay values. This level is considered by many agencies to be the limit of acceptable delay.
- *LOS F* is considered to be unacceptable to most drivers with high delay values that often occur, when arrival flow rates exceed the capacity of the intersection.

Unsignalized Intersections

Levels of service for unsignalized intersections are calculated using the operational analysis methodology of the HCM. The procedure accounts for lane configuration on both the minor and major street approaches, conflicting traffic stream volumes, and the type of intersection control

⁸ *Highway Capacity Manual 2000*, Transportation Research Board; Washington, D.C.; 2000.

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(STOP, YIELD, or all-way STOP control). The definition of level of service for unsignalized intersections is a function of average *control* delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The level-of-service criteria for unsignalized intersections are shown in Table A-1.

Signalized Intersections

Levels of service for signalized intersections are also calculated using the operational analysis methodology of the HCM. The methodology for signalized intersections assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on average *control* delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Table A-1 summarizes the relationship between level of service and average control delay.

Table A-1
LEVEL-OF-SERVICE CRITERIA FOR INTERSECTIONS

Level of Service	Unsignalized Intersection Criteria	Signalized Intersection Criteria
	Average Control Delay (Seconds per Vehicle)	Average Control Delay (Seconds per Vehicle)
A	≤10	≤10
B	>10 and ≤15	>10 and ≤20
C	>15 and ≤25	>20 and ≤35
D	>25 and ≤35	>35 and ≤55
E	>35 and ≤50	>55 and ≤80
F	>50	>80

Source: *Highway Capacity Manual 2000*, Transportation Research Board; Washington, D.C.; 2000.
Pages 10-16 and 17-2.

For signalized intersections, this delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to the entire intersection. For unsignalized intersections, this delay criterion may be applied in assigning level-of-service designations to individual lane groups or to individual intersection approaches.

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CAPACITY AND QUEUE ANALYSIS WORKSHEETS

1: Perkins St & Franklin St
HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	👉			👈	👈	
Volume (veh/h)	378	193	35	584	123	23
Sign Control	Free			Free	Stop	
Grade	0%			1%	0%	
Peak Hour Factor	0.92	0.92	0.81	0.81	0.78	0.78
Hourly flow rate (vph)	411	210	43	721	158	29
Pedestrians	1				1	
Lane Width (ft)	12.0				15.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			622		1325	517
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			622		1325	517
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		4	95
cM capacity (veh/h)			968		164	562
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	621	764	187			
Volume Left	0	43	158			
Volume Right	210	0	29			
cSH	1700	968	184			
Volume to Capacity	0.37	0.04	1.02			
Queue Length 95th (ft)	0	4	214			
Control Delay (s)	0.0	1.2	122.5			
Lane LOS		A	F			
Approach Delay (s)	0.0	1.2	122.5			
Approach LOS			F			
Intersection Summary						
Average Delay			15.1			
Intersection Capacity Utilization			74.3%	ICU Level of Service		D
Analysis Period (min)			15			

2: Franklin PI & Franklin St Queues

2013 Existing
Timing Plan: Weekday AM

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	560	700	68	967	617	121
v/c Ratio	0.68	0.49	0.20	0.91	1.06	0.16
Control Delay	22.4	1.3	8.5	29.2	86.2	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	1.3	8.5	29.2	86.2	0.4
Queue Length 50th (ft)	225	0	14	401	~353	0
Queue Length 95th (ft)	246	0	26	436	248	0
Internal Link Dist (ft)	639			672		
Turn Bay Length (ft)		135	145			
Base Capacity (vph)	1128	1438	413	1521	582	764
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	0.50	0.49	0.16	0.64	1.06	0.16

Intersection Summary

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

2: Franklin PI & Franklin St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	409	511	54	764	0	290	0	57	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	13	12	13	12	12	12
Grade (%)		-1%			0%			0%			0%	
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0		5.0			
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		0.97			
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00			
Frt		1.00	0.85	1.00	1.00		1.00		0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1792	1569	1768	1881		1865		1593			
Flt Permitted		1.00	1.00	0.24	1.00		0.95		1.00			
Satd. Flow (perm)		1792	1569	440	1881		1865		1593			
Peak-hour factor, PHF	0.73	0.73	0.73	0.79	0.79	0.79	0.47	0.47	0.47	0.25	0.25	0.25
Adj. Flow (vph)	0	560	700	68	967	0	617	0	121	0	0	0
RTOR Reduction (vph)	0	0	124	0	0	0	0	0	84	0	0	0
Lane Group Flow (vph)	0	560	576	68	967	0	617	0	37	0	0	0
Confl. Peds. (#/hr)			4	16			16		4			
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	2%	1%	0%	0%	0%	2%	0%	0%	0%
Turn Type		NA	pt+ov	pm+pt	NA		Prot		Perm			
Protected Phases		2	2 3	1	6		3	8				
Permitted Phases				6					8			
Actuated Green, G (s)		37.7	68.3	47.4	47.4		25.6		25.6			
Effective Green, g (s)		37.7	68.3	47.4	47.4		25.6		25.6			
Actuated g/C Ratio		0.45	0.82	0.57	0.57		0.31		0.31			
Clearance Time (s)		5.0		5.0	5.0		5.0		5.0			
Vehicle Extension (s)		2.0		2.0	2.0		2.0		2.0			
Lane Grp Cap (vph)		813	1291	326	1074		575		491			
v/s Ratio Prot		0.31	0.37	0.01	c0.51		c0.33					
v/s Ratio Perm				0.11					0.02			
v/c Ratio		0.69	0.45	0.21	0.90		1.07		0.08			
Uniform Delay, d1		18.0	2.1	10.7	15.7		28.7		20.3			
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Incremental Delay, d2		2.0	0.1	0.1	10.1		58.6		0.0			
Delay (s)		19.9	2.1	10.8	25.8		87.3		20.3			
Level of Service		B	A	B	C		F		C			
Approach Delay (s)		10.1			24.9			76.4			0.0	
Approach LOS		B			C			E			A	
Intersection Summary												
HCM 2000 Control Delay			31.2			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			1.03									
Actuated Cycle Length (s)			83.0			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			64.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

2: Franklin PI & Franklin St
Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday AM

					
Phase Number	1	2	3	6	8
Movement	WBL	EBT	NBL	WBTL	NBT
Lead/Lag	Lead	Lag			
Lead-Lag Optimize					
Recall Mode	None	Min	None	Min	None
Maximum Split (s)	15	55	30	70	30
Maximum Split (%)	15.0%	55.0%	30.0%	70.0%	30.0%
Minimum Split (s)	10	10	10	10	10
Yellow Time (s)	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					
Flash Dont Walk (s)					
Dual Entry	No	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	70	0	70
End Time (s)	15	70	0	70	0
Yield/Force Off (s)	10	65	95	65	95
Yield/Force Off 170(s)	10	65	95	65	95
Local Start Time (s)	85	0	55	85	55
Local Yield (s)	95	50	80	50	80
Local Yield 170(s)	95	50	80	50	80

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	90

Splits and Phases: 2: Franklin PI & Franklin St

 $\phi 1$	 $\phi 2$	 $\phi 3$
15 s	55 s	30 s
 $\phi 6$		 $\phi 8$
70 s		30 s

3: Res Complex/Dunkins & Franklin St HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	914	0	1	941	52	6	0	10	19	1	64
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			0%			0%			0%	
Peak Hour Factor	0.72	0.72	0.72	0.95	0.95	0.95	0.67	0.67	0.67	0.75	0.75	0.75
Hourly flow rate (vph)	36	1269	0	1	991	55	9	0	15	25	1	85
Pedestrians		12			12			3			12	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1025			719							
pX, platoon unblocked	0.62			0.85			0.69	0.69	0.85	0.69	0.69	0.62
vC, conflicting volume	1057			1272			2463	2404	1284	2401	2377	1042
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	781			1233			2411	2326	1247	2321	2286	756
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			2	100	92	0	95	65
cM capacity (veh/h)	504			486			9	24	180	15	25	245
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	1306	1046	24	112								
Volume Left	36	1	9	25								
Volume Right	0	55	15	85								
cSH	504	486	23	55								
Volume to Capacity	0.07	0.00	1.06	2.04								
Queue Length 95th (ft)	6	0	77	274								
Control Delay (s)	3.8	0.1	455.4	643.8								
Lane LOS	A	A	F	F								
Approach Delay (s)	3.8	0.1	455.4	643.8								
Approach LOS			F	F								
Intersection Summary												
Average Delay			35.4									
Intersection Capacity Utilization			84.0%		ICU Level of Service				E			
Analysis Period (min)			15									

4: Franklin St & Pleasant St HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	529	653	315	174	11
Sign Control		Free	Free		Stop	
Grade		4%	0%		-4%	
Peak Hour Factor	0.88	0.88	0.90	0.90	0.89	0.89
Hourly flow rate (vph)	3	601	726	350	196	12
Pedestrians			1		1	
Lane Width (ft)			13.0		14.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		482	1262			
pX, platoon unblocked	0.72				0.81	0.72
vC, conflicting volume	1077				1511	902
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	908				1009	664
tC, single (s)	4.8				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.8				3.5	3.3
p0 queue free %	99				8	96
cM capacity (veh/h)	384				212	332
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	3	601	1076	208		
Volume Left	3	0	0	196		
Volume Right	0	0	350	12		
cSH	384	1700	1700	216		
Volume to Capacity	0.01	0.35	0.63	0.96		
Queue Length 95th (ft)	1	0	0	208		
Control Delay (s)	14.4	0.0	0.0	98.1		
Lane LOS	B			F		
Approach Delay (s)	0.1		0.0	98.1		
Approach LOS				F		
Intersection Summary						
Average Delay			10.8			
Intersection Capacity Utilization			70.6%		ICU Level of Service	C
Analysis Period (min)			15			

5: Summer St & Franklin St Queues

2013 Existing
Timing Plan: Weekday AM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	22	392	171	592	280	459
v/c Ratio	0.07	0.74	0.41	0.73	0.40	0.76
Control Delay	10.6	30.4	13.0	24.6	10.6	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	30.4	13.0	24.6	10.6	28.3
Queue Length 50th (ft)	4	129	32	152	36	146
Queue Length 95th (ft)	15	229	90	#499	102	298
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	430	888	455	940	1155	1097
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	0.05	0.44	0.38	0.63	0.24	0.42

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	294	8	154	531	2	12	68	166	29	329	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.91			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1718	1760		1718	1836			1815			1825	
Flt Permitted	0.29	1.00		0.31	1.00			0.97			0.96	
Satd. Flow (perm)	533	1760		554	1836			1772			1758	
Peak-hour factor, PHF	0.77	0.77	0.77	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Adj. Flow (vph)	22	382	10	171	590	2	14	77	189	33	370	56
RTOR Reduction (vph)	0	1	0	0	0	0	0	94	0	0	6	0
Lane Group Flow (vph)	22	391	0	171	592	0	0	186	0	0	453	0
Confl. Peds. (#/hr)	1		2	2		1	2		2	1		1
Confl. Bikes (#/hr)			1			3						
Heavy Vehicles (%)	0%	6%	0%	1%	3%	0%	0%	0%	1%	0%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	24.2	22.4		34.2	28.4			21.8			21.8	
Effective Green, g (s)	24.2	22.4		34.2	28.4			21.8			21.8	
Actuated g/C Ratio	0.37	0.34		0.52	0.43			0.33			0.33	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	227	597		424	790			585			580	
v/s Ratio Prot	0.00	0.22		c0.05	c0.32							
v/s Ratio Perm	0.03			0.16				0.10			c0.26	
v/c Ratio	0.10	0.65		0.40	0.75			0.32			0.78	
Uniform Delay, d1	13.8	18.5		9.7	15.8			16.5			19.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	2.0		0.2	3.4			0.1			6.2	
Delay (s)	13.9	20.5		9.9	19.2			16.6			26.2	
Level of Service	B	C		A	B			B			C	
Approach Delay (s)		20.1			17.1			16.6			26.2	
Approach LOS		C			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			19.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			66.0			Sum of lost time (s)		14.0				
Intersection Capacity Utilization			74.6%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

5: Summer St & Franklin St
Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday AM

						
Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	13	35	42	13	35	42
Maximum Split (%)	14.4%	38.9%	46.7%	14.4%	38.9%	46.7%
Minimum Split (s)	9	10	10	9	10	10
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	0	1	1	0	1	1
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)						
Flash Dont Walk (s)						
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	13	48	0	13	48
End Time (s)	13	48	0	13	48	0
Yield/Force Off (s)	9	43	85	9	43	85
Yield/Force Off 170(s)	9	43	85	9	43	85
Local Start Time (s)	77	0	35	77	0	35
Local Yield (s)	86	30	72	86	30	72
Local Yield 170(s)	86	30	72	86	30	72

Intersection Summary

Cycle Length	90
Control Type	Actuated-Uncoordinated
Natural Cycle	60

Splits and Phases: 5: Summer St & Franklin St

 ø1	 ø2	 ø4
13 s	35 s	42 s
 ø5	 ø6	 ø8
13 s	35 s	42 s

6: Pine St & Franklin St
Queues

2013 Existing
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	236	751	108	514
v/c Ratio	0.31	0.84	0.14	0.79
Control Delay	11.8	24.5	14.5	31.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.8	24.5	14.5	31.1
Queue Length 50th (ft)	55	234	22	162
Queue Length 95th (ft)	76	358	51	#445
Internal Link Dist (ft)	727	984	947	646
Turn Bay Length (ft)				
Base Capacity (vph)	1318	1536	753	647
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.49	0.14	0.79

Intersection Summary

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

6: Pine St & Franklin St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	171	3	36	499	141	7	54	15	208	180	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	15	15	15	15	15	15
Grade (%)		2%			-3%			5%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.97			0.97			0.98	
Flt Protected		1.00			1.00			1.00			0.98	
Satd. Flow (prot)		1728			2014			1963			1967	
Flt Permitted		0.98			0.97			0.95			0.80	
Satd. Flow (perm)		1694			1966			1875			1617	
Peak-hour factor, PHF	0.76	0.76	0.76	0.90	0.90	0.90	0.70	0.70	0.70	0.90	0.90	0.90
Adj. Flow (vph)	7	225	4	40	554	157	10	77	21	231	200	83
RTOR Reduction (vph)	0	1	0	0	15	0	0	9	0	0	7	0
Lane Group Flow (vph)	0	235	0	0	736	0	0	99	0	0	507	0
Confl. Peds. (#/hr)	5		6	8		7	6		8	7		5
Heavy Vehicles (%)	20%	12%	0%	0%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		28.5			28.5			25.5			25.5	
Effective Green, g (s)		28.5			28.5			25.5			25.5	
Actuated g/C Ratio		0.45			0.45			0.40			0.40	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		754			875			747			644	
v/s Ratio Prot												
v/s Ratio Perm		0.14			c0.37			0.05			c0.31	
v/c Ratio		0.31			0.84			0.13			0.79	
Uniform Delay, d1		11.4			15.7			12.2			16.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			7.1			0.0			5.8	
Delay (s)		11.5			22.8			12.3			22.7	
Level of Service		B			C			B			C	
Approach Delay (s)		11.5			22.8			12.3			22.7	
Approach LOS		B			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			20.4			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			64.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			91.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

6: Pine St & Franklin St
Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday AM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	54	30	54	30
Maximum Split (%)	64.3%	35.7%	64.3%	35.7%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	54	0	54
End Time (s)	54	0	54	0
Yield/Force Off (s)	49	79	49	79
Yield/Force Off 170(s)	49	79	49	79
Local Start Time (s)	0	54	0	54
Local Yield (s)	49	79	49	79
Local Yield 170(s)	49	79	49	79
Intersection Summary				
Cycle Length	84			
Control Type	Actuated-Uncoordinated			
Natural Cycle	60			

Splits and Phases: 6: Pine St & Franklin St

 ø2		 ø4
54 s		30 s
 ø6		 ø8
54 s		30 s

7: Main St & Franklin St & Central St Queues

2013 Existing
Timing Plan: Weekday AM

				
Lane Group	WBL	NBT	NBR	SBT
Lane Group Flow (vph)	588	386	260	749
v/c Ratio	0.90	0.42	0.33	0.92
Control Delay	41.8	16.1	12.2	40.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	41.8	16.1	12.2	40.2
Queue Length 50th (ft)	276	123	60	351
Queue Length 95th (ft)	409	187	106	#662
Internal Link Dist (ft)	727	1542		692
Turn Bay Length (ft)			50	
Base Capacity (vph)	818	918	778	812
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.72	0.42	0.33	0.92

Intersection Summary

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

7: Main St & Franklin St & Central St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

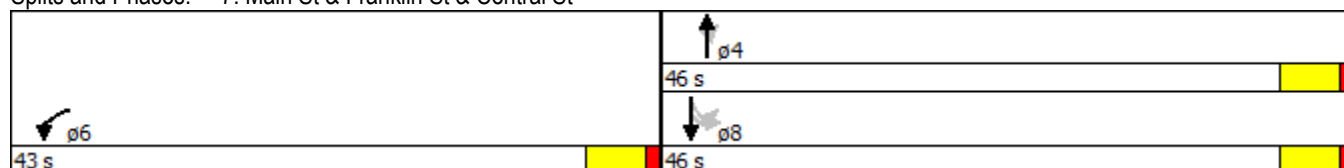
												
Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL	SWR	
Lane Configurations												
Volume (vph)	317	200	6	309	120	88	2	94	579	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	14	14	14	13	12	12	14	14	14	12	12	
Grade (%)	4%			3%					1%	0%		
Total Lost time (s)	5.0			5.0	5.0				5.0			
Lane Util. Factor	1.00			1.00	1.00				1.00			
Frpb, ped/bikes	0.99			1.00	0.97				1.00			
Flpb, ped/bikes	1.00			1.00	1.00				1.00			
Frt	0.95			1.00	0.85				1.00			
Flt Protected	0.97			1.00	1.00				0.99			
Satd. Flow (prot)	1752			1824	1493				1899			
Flt Permitted	0.97			1.00	1.00				0.84			
Satd. Flow (perm)	1752			1824	1493				1614			
Peak-hour factor, PHF	0.89	0.89	0.89	0.80	0.80	0.80	0.90	0.90	0.90	0.25	0.25	
Adj. Flow (vph)	356	225	7	386	150	110	2	104	643	0	0	
RTOR Reduction (vph)	0	0	0	0	27	0	0	0	0	0	0	
Lane Group Flow (vph)	588	0	0	386	233	0	0	0	749	0	0	
Confl. Peds. (#/hr)	3	7	4		3	3	7	7				
Heavy Vehicles (%)	2%	4%	0%	6%	0%	9%	0%	20%	3%	0%	0%	
Turn Type	Prot			NA	Perm		Perm	Perm	NA			
Protected Phases	6			4					8			
Permitted Phases	6			4	4		8	8				
Actuated Green, G (s)	30.7			41.3	41.3				41.3			
Effective Green, g (s)	30.7			41.3	41.3				41.3			
Actuated g/C Ratio	0.37			0.50	0.50				0.50			
Clearance Time (s)	5.0			5.0	5.0				5.0			
Vehicle Extension (s)	2.0			2.0	2.0				2.0			
Lane Grp Cap (vph)	655			918	751				812			
v/s Ratio Prot	c0.34			0.21								
v/s Ratio Perm					0.16				c0.46			
v/c Ratio	0.90			0.42	0.31				0.92			
Uniform Delay, d1	24.2			12.8	12.0				18.9			
Progression Factor	1.00			1.00	1.00				1.00			
Incremental Delay, d2	14.7			0.1	0.1				15.6			
Delay (s)	38.8			12.9	12.1				34.5			
Level of Service	D			B	B				C			
Approach Delay (s)	38.8			12.6					34.5	0.0		
Approach LOS	D			B					C	A		
Intersection Summary												
HCM 2000 Control Delay			28.6		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			82.0		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			95.0%		ICU Level of Service				F			
Analysis Period (min)			15									
c Critical Lane Group												

7: Main St & Franklin St & Central St Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday AM

			
Phase Number	4	6	8
Movement	NBT	WBL	SBTL
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	None	None	None
Maximum Split (s)	46	43	46
Maximum Split (%)	51.7%	48.3%	51.7%
Minimum Split (s)	10	10	10
Yellow Time (s)	4	4	4
All-Red Time (s)	1	1	1
Minimum Initial (s)	5	5	5
Vehicle Extension (s)	2	2	2
Minimum Gap (s)	2	2	2
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)			
Flash Dont Walk (s)			
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	43	0	43
End Time (s)	0	43	0
Yield/Force Off (s)	84	38	84
Yield/Force Off 170(s)	84	38	84
Local Start Time (s)	43	0	43
Local Yield (s)	84	38	84
Local Yield 170(s)	84	38	84
Intersection Summary			
Cycle Length	89		
Control Type	Actuated-Uncoordinated		
Natural Cycle	75		

Splits and Phases: 7: Main St & Franklin St & Central St



8: Main St & Marble St/Summer St Queues

2013 Existing
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	333	322	589	971
v/c Ratio	0.80	0.81	0.68	0.81
Control Delay	47.1	51.0	25.8	28.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	47.1	51.0	25.8	28.7
Queue Length 50th (ft)	162	169	141	249
Queue Length 95th (ft)	#333	#358	194	317
Internal Link Dist (ft)	821	965	1441	57
Turn Bay Length (ft)				
Base Capacity (vph)	498	447	1242	1727
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.67	0.72	0.47	0.56

Intersection Summary

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

8: Main St & Marble St/Summer St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	132	107	85	199	13	62	381	76	32	697	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	12	12	12	11	12	13
Grade (%)		1%			2%			0%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.95			0.99			0.98			0.98	
Flt Protected		0.99			0.99			0.99			1.00	
Satd. Flow (prot)		1939			1805			3414			3387	
Flt Permitted		0.99			0.99			0.65			0.91	
Satd. Flow (perm)		1939			1805			2224			3095	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	76	142	115	92	216	14	70	433	86	36	792	143
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	314	0	0	322	0	0	589	0	0	971	0
Confl. Peds. (#/hr)	25		21	29		33	21		29	33		25
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	10%	0%	1%	2%	2%	0%	0%	2%	3%	0%	2%	7%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	8	8		4	4			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		17.0			18.4			32.5			32.5	
Effective Green, g (s)		17.0			18.4			32.5			32.5	
Actuated g/C Ratio		0.21			0.22			0.39			0.39	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		397			400			871			1213	
v/s Ratio Prot		c0.16			c0.18							
v/s Ratio Perm								0.26			c0.31	
v/c Ratio		0.79			0.81			0.68			0.80	
Uniform Delay, d1		31.3			30.6			20.8			22.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		9.6			10.6			1.6			3.7	
Delay (s)		40.9			41.2			22.5			26.0	
Level of Service		D			D			C			C	
Approach Delay (s)		40.9			41.2			22.5			26.0	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			29.5			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			82.9			Sum of lost time (s)		15.0				
Intersection Capacity Utilization			75.6%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

8: Main St & Marble St/Summer St Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday AM



Phase Number	2	4	6	8
Movement	NBTL	WBTL	SBTL	EBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	50	25	50	25
Maximum Split (%)	50.0%	25.0%	50.0%	25.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	50	0	75
End Time (s)	50	75	50	0
Yield/Force Off (s)	45	70	45	95
Yield/Force Off 170(s)	45	70	45	95
Local Start Time (s)	0	50	0	75
Local Yield (s)	45	70	45	95
Local Yield 170(s)	45	70	45	95

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	65

Splits and Phases: 8: Main St & Marble St/Summer St

 2	 4	 8
50 s	25 s	25 s
 6		
50 s		

9: Pond St & Summer St Queues

2013 Existing
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	306	554	420	156
v/c Ratio	0.37	0.81	0.77	0.24
Control Delay	12.7	26.4	27.6	14.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.7	26.4	27.6	14.5
Queue Length 50th (ft)	63	151	136	40
Queue Length 95th (ft)	132	#398	179	73
Internal Link Dist (ft)	965	569	871	731
Turn Bay Length (ft)				
Base Capacity (vph)	982	808	852	1023
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.31	0.69	0.49	0.15

Intersection Summary

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

9: Pond St & Summer St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	145	103	235	285	12	106	170	47	1	129	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	12	12	12	12	12	12
Grade (%)		-2%			1%			-1%			0%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			1.00			0.98			0.99	
Flt Protected		1.00			0.98			0.98			1.00	
Satd. Flow (prot)		1810			1992			1798			1867	
Flt Permitted		0.99			0.72			0.85			1.00	
Satd. Flow (perm)		1790			1474			1552			1863	
Peak-hour factor, PHF	0.83	0.83	0.83	0.96	0.96	0.96	0.77	0.77	0.77	0.87	0.87	0.87
Adj. Flow (vph)	7	175	124	245	297	12	138	221	61	1	148	7
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	306	0	0	554	0	0	420	0	0	156	0
Confl. Peds. (#/hr)	12		11	18		19	11		18	19		12
Heavy Vehicles (%)	0%	3%	1%	0%	2%	8%	1%	2%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		26.7			26.7			20.0			20.0	
Effective Green, g (s)		26.7			26.7			20.0			20.0	
Actuated g/C Ratio		0.47			0.47			0.35			0.35	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		842			694			547			657	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.38			c0.27			0.08	
v/c Ratio		0.36			0.80			0.77			0.24	
Uniform Delay, d1		9.6			12.7			16.3			13.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			6.0			5.8			0.1	
Delay (s)		9.7			18.7			22.1			13.0	
Level of Service		A			B			C			B	
Approach Delay (s)		9.7			18.7			22.1			13.0	
Approach LOS		A			B			C			B	
Intersection Summary												
HCM 2000 Control Delay			17.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			56.7			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			85.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

9: Pond St & Summer St
Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday AM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	35	35	35	35
Maximum Split (%)	50.0%	50.0%	50.0%	50.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35
End Time (s)	35	0	35	0
Yield/Force Off (s)	30	65	30	65
Yield/Force Off 170(s)	30	65	30	65
Local Start Time (s)	0	35	0	35
Local Yield (s)	30	65	30	65
Local Yield 170(s)	30	65	30	65
Intersection Summary				
Cycle Length				70
Control Type	Actuated-Uncoordinated			
Natural Cycle				55

Splits and Phases: 9: Pond St & Summer St

 ø2	 ø4
35 s	35 s
 ø6	 ø8
35 s	35 s

10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	462	815	5	2	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	513	906	6	2	3
Pedestrians		1	1		1	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		752				
pX, platoon unblocked					0.81	
vC, conflicting volume	912				1433	910
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	912				1417	910
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	99
cM capacity (veh/h)	746				121	332
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	518	911	2	3		
Volume Left	4	0	2	0		
Volume Right	0	6	0	3		
cSH	746	1700	121	332		
Volume to Capacity	0.01	0.54	0.02	0.01		
Queue Length 95th (ft)	0	0	1	1		
Control Delay (s)	0.2	0.0	35.2	16.0		
Lane LOS	A		E	C		
Approach Delay (s)	0.2	0.0	23.7			
Approach LOS			C			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			53.5%		ICU Level of Service	A
Analysis Period (min)			15			

1: Perkins St & Franklin St
HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Volume (veh/h)	735	191	13	434	191	22
Sign Control	Free			Free	Stop	
Grade	0%			1%	0%	
Peak Hour Factor	0.94	0.94	0.96	0.96	0.86	0.86
Hourly flow rate (vph)	782	203	14	452	222	26
Pedestrians	4			1	4	
Lane Width (ft)	12.0			14.0	15.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			989		1371	889
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			989		1371	889
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		0	93
cM capacity (veh/h)			704		157	343
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	985	466	248			
Volume Left	0	14	222			
Volume Right	203	0	26			
cSH	1700	704	166			
Volume to Capacity	0.58	0.02	1.49			
Queue Length 95th (ft)	0	1	400			
Control Delay (s)	0.0	0.6	300.3			
Lane LOS		A	F			
Approach Delay (s)	0.0	0.6	300.3			
Approach LOS			F			
Intersection Summary						
Average Delay			43.9			
Intersection Capacity Utilization			69.0%	ICU Level of Service		C
Analysis Period (min)			15			

2: Franklin PI & Franklin St Queues

2013 Existing
Timing Plan: Weekday PM

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1107	48	8	827	166	31
v/c Ratio	0.85	0.03	0.04	0.61	0.62	0.07
Control Delay	19.4	0.3	4.1	8.2	41.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	0.3	4.1	8.2	41.4	0.3
Queue Length 50th (ft)	285	0	1	154	71	0
Queue Length 95th (ft)	#897	4	5	314	106	0
Internal Link Dist (ft)	614			643		
Turn Bay Length (ft)		135	145			
Base Capacity (vph)	1298	1546	317	1556	593	679
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	0.85	0.03	0.03	0.53	0.28	0.05

Intersection Summary

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

2: Franklin PI & Franklin St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1063	46	7	736	0	116	0	22	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	13	12	13	12	12	12
Grade (%)		-1%			0%			0%			0%	
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0		5.0			
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		0.98			
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00			
Frt		1.00	0.85	1.00	1.00		1.00		0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1846	1569	1805	1863		1847		1630			
Flt Permitted		1.00	1.00	0.08	1.00		0.95		1.00			
Satd. Flow (perm)		1846	1569	143	1863		1847		1630			
Peak-hour factor, PHF	0.96	0.96	0.96	0.89	0.89	0.89	0.70	0.70	0.70	0.25	0.25	0.25
Adj. Flow (vph)	0	1107	48	8	827	0	166	0	31	0	0	0
RTOR Reduction (vph)	0	0	6	0	0	0	0	0	27	0	0	0
Lane Group Flow (vph)	0	1107	42	8	827	0	166	0	4	0	0	0
Confl. Peds. (#/hr)			1	17			17		1			
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%
Turn Type		NA	pt+ov	pm+pt	NA		Prot		Perm			
Protected Phases		2	2 3	1	6		3	8				
Permitted Phases				6					8			
Actuated Green, G (s)		55.0	71.3	60.9	60.9		11.3		11.3			
Effective Green, g (s)		55.0	71.3	60.9	60.9		11.3		11.3			
Actuated g/C Ratio		0.67	0.87	0.74	0.74		0.14		0.14			
Clearance Time (s)		5.0		5.0	5.0		5.0		5.0			
Vehicle Extension (s)		2.0		2.0	2.0		2.0		2.0			
Lane Grp Cap (vph)		1235	1360	124	1380		253		224			
v/s Ratio Prot		c0.60	0.03	0.00	c0.44		c0.09					
v/s Ratio Perm				0.05					0.00			
v/c Ratio		0.90	0.03	0.06	0.60		0.66		0.02			
Uniform Delay, d1		11.2	0.7	14.4	5.0		33.6		30.7			
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Incremental Delay, d2		8.5	0.0	0.1	0.5		4.6		0.0			
Delay (s)		19.8	0.7	14.5	5.4		38.2		30.7			
Level of Service		B	A	B	A		D		C			
Approach Delay (s)		19.0			5.5			37.0			0.0	
Approach LOS		B			A			D			A	
Intersection Summary												
HCM 2000 Control Delay			15.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			82.2			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			70.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

2: Franklin PI & Franklin St Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday PM

					
Phase Number	1	2	3	6	8
Movement	WBL	EBT	NBL	WBTL	NBT
Lead/Lag	Lead	Lag			
Lead-Lag Optimize					
Recall Mode	None	Min	None	Min	None
Maximum Split (s)	15	55	30	70	30
Maximum Split (%)	15.0%	55.0%	30.0%	70.0%	30.0%
Minimum Split (s)	10	10	10	10	10
Yellow Time (s)	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					
Flash Dont Walk (s)					
Dual Entry	No	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	70	0	70
End Time (s)	15	70	0	70	0
Yield/Force Off (s)	10	65	95	65	95
Yield/Force Off 170(s)	10	65	95	65	95
Local Start Time (s)	85	0	55	85	55
Local Yield (s)	95	50	80	50	80
Local Yield 170(s)	95	50	80	50	80

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	80

Splits and Phases: 2: Franklin PI & Franklin St

 $\phi 1$	 $\phi 2$	 $\phi 3$
15 s	55 s	30 s
 $\phi 6$		 $\phi 8$
70 s		30 s

3: Res Complex/Dunkins & Franklin St HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	22	1095	10	4	826	12	6	0	3	9	1	22
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.75	0.75	0.75	0.57	0.57	0.57
Hourly flow rate (vph)	24	1177	11	4	888	13	8	0	4	16	2	39
Pedestrians		9			9			8			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1051			694							
pX, platoon unblocked	0.77			0.77			0.88	0.88	0.77	0.88	0.88	0.77
vC, conflicting volume	910			1196			2190	2157	1200	2155	2156	913
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	733			1103			1694	1656	1108	1655	1655	736
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			85	100	98	75	98	88
cM capacity (veh/h)	673			487			53	82	195	64	82	315
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	1212	905	12	56								
Volume Left	24	4	8	16								
Volume Right	11	13	4	39								
cSH	673	487	70	144								
Volume to Capacity	0.04	0.01	0.17	0.39								
Queue Length 95th (ft)	3	1	14	42								
Control Delay (s)	1.4	0.3	66.4	45.0								
Lane LOS	A	A	F	E								
Approach Delay (s)	1.4	0.3	66.4	45.0								
Approach LOS			F	E								
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			86.3%		ICU Level of Service				E			
Analysis Period (min)			15									

4: Franklin St & Pleasant St HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	811	408	303	265	7
Sign Control		Free	Free		Stop	
Grade		4%	0%		-4%	
Peak Hour Factor	0.94	0.94	0.88	0.88	0.87	0.87
Hourly flow rate (vph)	5	863	464	344	305	8
Pedestrians		4	4		4	
Lane Width (ft)		10.5	13.0		14.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		482	1263			
pX, platoon unblocked	0.87				0.82	0.87
vC, conflicting volume	812				1517	644
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	705				1153	511
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				0	98
cM capacity (veh/h)	778				178	488
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	5	863	808	313		
Volume Left	5	0	0	305		
Volume Right	0	0	344	8		
cSH	778	1700	1700	181		
Volume to Capacity	0.01	0.51	0.48	1.73		
Queue Length 95th (ft)	1	0	0	547		
Control Delay (s)	9.7	0.0	0.0	395.7		
Lane LOS	A			F		
Approach Delay (s)	0.1		0.0	395.7		
Approach LOS				F		
Intersection Summary						
Average Delay			62.2			
Intersection Capacity Utilization			64.5%		ICU Level of Service	C
Analysis Period (min)			15			

5: Summer St & Franklin St Queues

2013 Existing
Timing Plan: Weekday PM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	65	489	144	390	667	244
v/c Ratio	0.18	0.79	0.49	0.62	0.84	0.42
Control Delay	13.0	34.1	18.5	26.9	29.9	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	34.1	18.5	26.9	29.9	18.3
Queue Length 50th (ft)	16	213	38	156	253	73
Queue Length 95th (ft)	40	358	75	260	#504	147
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	388	925	306	917	1082	800
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	0.53	0.47	0.43	0.62	0.30

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	473	11	125	332	7	6	278	316	41	113	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1718	1846		1701	1831			1876			1770	
Flt Permitted	0.36	1.00		0.22	1.00			1.00			0.79	
Satd. Flow (perm)	654	1846		393	1831			1871			1407	
Peak-hour factor, PHF	0.99	0.99	0.99	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88
Adj. Flow (vph)	65	478	11	144	382	8	7	309	351	47	128	69
RTOR Reduction (vph)	0	1	0	0	1	0	0	44	0	0	16	0
Lane Group Flow (vph)	65	488	0	144	389	0	0	623	0	0	228	0
Confl. Peds. (#/hr)	3		3	4		4	3		4	4		3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	1%	0%	2%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	28.8	24.2		29.8	24.7			29.2			29.2	
Effective Green, g (s)	28.8	24.2		29.8	24.7			29.2			29.2	
Actuated g/C Ratio	0.40	0.33		0.41	0.34			0.40			0.40	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	327	616		253	623			753			566	
v/s Ratio Prot	0.01	c0.26		c0.04	0.21							
v/s Ratio Perm	0.07			0.19				c0.33			0.16	
v/c Ratio	0.20	0.79		0.57	0.62			0.83			0.40	
Uniform Delay, d1	14.1	21.9		15.2	20.0			19.4			15.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	6.5		1.8	1.4			7.1			0.2	
Delay (s)	14.2	28.4		17.0	21.4			26.5			15.6	
Level of Service	B	C		B	C			C			B	
Approach Delay (s)		26.7			20.2			26.5			15.6	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.5			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			72.5			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			83.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

5: Summer St & Franklin St
Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday PM

						
Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	11	38	42	11	38	42
Maximum Split (%)	12.1%	41.8%	46.2%	12.1%	41.8%	46.2%
Minimum Split (s)	9	10	10	9	10	10
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	0	1	1	0	1	1
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)						
Flash Dont Walk (s)						
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	11	49	0	11	49
End Time (s)	11	49	0	11	49	0
Yield/Force Off (s)	7	44	86	7	44	86
Yield/Force Off 170(s)	7	44	86	7	44	86
Local Start Time (s)	80	0	38	80	0	38
Local Yield (s)	87	33	75	87	33	75
Local Yield 170(s)	87	33	75	87	33	75

Intersection Summary

Cycle Length	91
Control Type	Actuated-Uncoordinated
Natural Cycle	60

Splits and Phases: 5: Summer St & Franklin St

 ø1	 ø2	 ø4
11 s	38 s	42 s
 ø5	 ø6	 ø8
11 s	38 s	42 s

6: Pine St & Franklin St Queues

2013 Existing
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	347	547	164	299
v/c Ratio	0.46	0.67	0.26	0.62
Control Delay	11.4	13.5	10.9	18.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.4	13.5	10.9	18.6
Queue Length 50th (ft)	48	73	20	49
Queue Length 95th (ft)	128	191	68	142
Internal Link Dist (ft)	727	984	947	646
Turn Bay Length (ft)				
Base Capacity (vph)	1768	1841	1271	984
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.20	0.30	0.13	0.30
Intersection Summary				

6: Pine St & Franklin St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	278	9	20	268	182	7	99	44	164	61	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	15	15	15	15	15	15
Grade (%)		2%			-3%			5%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.95			0.96			0.98	
Flt Protected		1.00			1.00			1.00			0.97	
Satd. Flow (prot)		1911			1962			1929			1955	
Flt Permitted		0.96			0.98			0.98			0.73	
Satd. Flow (perm)		1846			1919			1890			1467	
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	17	320	10	23	312	212	8	108	48	184	69	46
RTOR Reduction (vph)	0	2	0	0	38	0	0	17	0	0	7	0
Lane Group Flow (vph)	0	345	0	0	509	0	0	147	0	0	292	0
Confl. Peds. (#/hr)	10		18	13		5	18		13	5		10
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		16.6			16.6			13.2			13.2	
Effective Green, g (s)		16.6			16.6			13.2			13.2	
Actuated g/C Ratio		0.42			0.42			0.33			0.33	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		769			800			626			486	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.27			0.08			c0.20	
v/c Ratio		0.45			0.64			0.23			0.60	
Uniform Delay, d1		8.3			9.2			9.6			11.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			1.2			0.1			1.4	
Delay (s)		8.5			10.4			9.7			12.5	
Level of Service		A			B			A			B	
Approach Delay (s)		8.5			10.4			9.7			12.5	
Approach LOS		A			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			10.3			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			39.8			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			68.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

6: Pine St & Franklin St
Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday PM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	52	30	52	30
Maximum Split (%)	63.4%	36.6%	63.4%	36.6%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	52	0	52
End Time (s)	52	0	52	0
Yield/Force Off (s)	47	77	47	77
Yield/Force Off 170(s)	47	77	47	77
Local Start Time (s)	0	52	0	52
Local Yield (s)	47	77	47	77
Local Yield 170(s)	47	77	47	77
Intersection Summary				
Cycle Length	82			
Control Type	Actuated-Uncoordinated			
Natural Cycle	45			

Splits and Phases: 6: Pine St & Franklin St

 ø2		 ø4	
52 s		30 s	
 ø6		 ø8	
52 s		30 s	

7: Main St & Franklin St & Central St Queues

2013 Existing
Timing Plan: Weekday PM

				
Lane Group	WBL	NBT	NBR	SBT
Lane Group Flow (vph)	293	405	313	487
v/c Ratio	0.65	0.40	0.39	0.69
Control Delay	27.6	9.9	7.5	16.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.6	9.9	7.5	16.9
Queue Length 50th (ft)	88	76	39	113
Queue Length 95th (ft)	199	164	105	268
Internal Link Dist (ft)	727	1542		692
Turn Bay Length (ft)			50	
Base Capacity (vph)	1044	1499	1148	1033
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.28	0.27	0.27	0.47
Intersection Summary				

7: Main St & Franklin St & Central St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

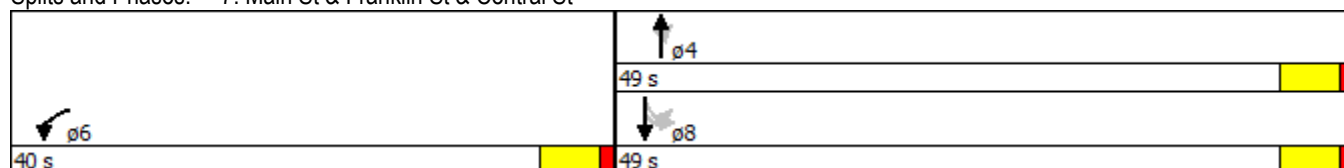
											
Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL	SWR
Lane Configurations											
Volume (vph)	98	162	18	385	140	158	21	145	292	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	14	14	13	12	12	14	14	14	12	12
Grade (%)	4%			3%					1%	0%	
Total Lost time (s)	5.0			5.0	5.0				5.0		
Lane Util. Factor	1.00			1.00	1.00				1.00		
Frpb, ped/bikes	0.91			1.00	0.92				1.00		
Flpb, ped/bikes	1.00			1.00	1.00				0.99		
Frt	0.91			1.00	0.85				1.00		
Flt Protected	0.98			1.00	1.00				0.98		
Satd. Flow (prot)	1554			1934	1462				1914		
Flt Permitted	0.98			1.00	1.00				0.68		
Satd. Flow (perm)	1554			1934	1462				1334		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.25	0.25
Adj. Flow (vph)	103	171	19	405	147	166	22	154	311	0	0
RTOR Reduction (vph)	0	0	0	0	42	0	0	0	0	0	0
Lane Group Flow (vph)	293	0	0	405	271	0	0	0	487	0	0
Confl. Peds. (#/hr)	31	33	37		30	31	32	33			
Heavy Vehicles (%)	4%	5%	0%	0%	0%	1%	0%	3%	2%	0%	0%
Turn Type	Prot			NA	Perm		Perm	Perm	NA		
Protected Phases	6			4					8		
Permitted Phases	6			4	4		8	8			
Actuated Green, G (s)	16.5			30.6	30.6				30.6		
Effective Green, g (s)	16.5			30.6	30.6				30.6		
Actuated g/C Ratio	0.29			0.54	0.54				0.54		
Clearance Time (s)	5.0			5.0	5.0				5.0		
Vehicle Extension (s)	2.0			2.0	2.0				2.0		
Lane Grp Cap (vph)	449			1036	783				714		
v/s Ratio Prot	c0.19			0.21							
v/s Ratio Perm					0.19				c0.37		
v/c Ratio	0.65			0.39	0.35				0.68		
Uniform Delay, d1	17.8			7.8	7.6				9.7		
Progression Factor	1.00			1.00	1.00				1.00		
Incremental Delay, d2	2.6			0.1	0.1				2.2		
Delay (s)	20.4			7.9	7.6				11.8		
Level of Service	C			A	A				B		
Approach Delay (s)	20.4			7.8					11.8	0.0	
Approach LOS	C			A					B	A	
Intersection Summary											
HCM 2000 Control Delay			11.6		HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.67								
Actuated Cycle Length (s)			57.1		Sum of lost time (s)				10.0		
Intersection Capacity Utilization			75.9%		ICU Level of Service				D		
Analysis Period (min)			15								
c Critical Lane Group											

7: Main St & Franklin St & Central St Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday PM

			
Phase Number	4	6	8
Movement	NBT	WBL	SBTL
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	None	None	None
Maximum Split (s)	49	40	49
Maximum Split (%)	55.1%	44.9%	55.1%
Minimum Split (s)	10	10	10
Yellow Time (s)	4	4	4
All-Red Time (s)	1	1	1
Minimum Initial (s)	5	5	5
Vehicle Extension (s)	2	2	2
Minimum Gap (s)	2	2	2
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)			
Flash Dont Walk (s)			
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	40	0	40
End Time (s)	0	40	0
Yield/Force Off (s)	84	35	84
Yield/Force Off 170(s)	84	35	84
Local Start Time (s)	40	0	40
Local Yield (s)	84	35	84
Local Yield 170(s)	84	35	84
Intersection Summary			
Cycle Length	89		
Control Type	Actuated-Uncoordinated		
Natural Cycle	50		

Splits and Phases: 7: Main St & Franklin St & Central St



8: Main St & Marble St/Summer St Queues

2013 Existing
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	419	263	751	364
v/c Ratio	0.77	0.73	0.76	0.38
Control Delay	39.2	42.1	28.8	21.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	39.2	42.1	28.8	21.1
Queue Length 50th (ft)	184	116	164	68
Queue Length 95th (ft)	#405	212	240	105
Internal Link Dist (ft)	821	965	1441	57
Turn Bay Length (ft)				
Base Capacity (vph)	544	467	1868	1821
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	0.56	0.40	0.20

Intersection Summary

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

8: Main St & Marble St/Summer St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	103	258	25	92	113	26	29	448	213	18	217	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	12	12	12	11	12	13
Grade (%)		1%			2%			0%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.98			0.95			0.96	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		2013			1732			3318			3352	
Flt Permitted		0.99			0.98			0.92			0.89	
Satd. Flow (perm)		2013			1732			3072			2998	
Peak-hour factor, PHF	0.92	0.92	0.92	0.88	0.88	0.88	0.92	0.92	0.92	0.87	0.87	0.87
Adj. Flow (vph)	112	280	27	105	128	30	32	487	232	21	249	94
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	417	0	0	263	0	0	751	0	0	364	0
Confl. Peds. (#/hr)	7		6	7		8	6		7	8		7
Heavy Vehicles (%)	4%	4%	4%	3%	5%	8%	0%	2%	4%	0%	2%	2%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	8	8		4	4			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		20.4			15.6			24.2			24.2	
Effective Green, g (s)		20.4			15.6			24.2			24.2	
Actuated g/C Ratio		0.27			0.21			0.32			0.32	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		546			359			988			964	
v/s Ratio Prot		c0.21			c0.15							
v/s Ratio Perm								c0.24			0.12	
v/c Ratio		0.76			0.73			0.76			0.38	
Uniform Delay, d1		25.2			27.9			22.9			19.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.7			6.5			3.1			0.1	
Delay (s)		30.8			34.4			26.0			19.8	
Level of Service		C			C			C			B	
Approach Delay (s)		30.8			34.4			26.0			19.8	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			27.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			75.2			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			66.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

8: Main St & Marble St/Summer St Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday PM



Phase Number	2	4	6	8
Movement	NBTL	WBTL	SBTL	EBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	50	25	50	25
Maximum Split (%)	50.0%	25.0%	50.0%	25.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	50	0	75
End Time (s)	50	75	50	0
Yield/Force Off (s)	45	70	45	95
Yield/Force Off 170(s)	45	70	45	95
Local Start Time (s)	0	50	0	75
Local Yield (s)	45	70	45	95
Local Yield 170(s)	45	70	45	95

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	60

Splits and Phases: 8: Main St & Marble St/Summer St

 2	 4	 8
50 s	25 s	25 s
 6		
50 s		

9: Pond St & Summer St
Queues

2013 Existing
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	557	260	422	60
v/c Ratio	0.74	0.39	0.67	0.09
Control Delay	19.2	12.5	19.2	11.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.2	12.5	19.2	11.2
Queue Length 50th (ft)	107	42	82	9
Queue Length 95th (ft)	282	121	216	28
Internal Link Dist (ft)	965	569	871	731
Turn Bay Length (ft)				
Base Capacity (vph)	1347	1196	1237	1304
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.41	0.22	0.34	0.05
Intersection Summary				

9: Pond St & Summer St HCM Signalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	451	58	53	180	1	48	224	112	1	35	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	12	12	12	12	12	12
Grade (%)		-2%			1%			-1%			0%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.96			0.98	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		1909			2008			1809			1849	
Flt Permitted		0.99			0.83			0.96			0.99	
Satd. Flow (perm)		1897			1683			1741			1838	
Peak-hour factor, PHF	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.72	0.72	0.72
Adj. Flow (vph)	10	485	62	59	200	1	53	246	123	1	49	10
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	557	0	0	260	0	0	422	0	0	60	0
Confl. Peds. (#/hr)	2		3	3		2	3		3	2		2
Confl. Bikes (#/hr)			1						1			
Heavy Vehicles (%)	0%	2%	2%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		18.1			18.1			16.4			16.4	
Effective Green, g (s)		18.1			18.1			16.4			16.4	
Actuated g/C Ratio		0.41			0.41			0.37			0.37	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		771			684			641			677	
v/s Ratio Prot												
v/s Ratio Perm		c0.29			0.15			c0.24			0.03	
v/c Ratio		0.72			0.38			0.66			0.09	
Uniform Delay, d1		11.1			9.3			11.7			9.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.9			0.1			1.9			0.0	
Delay (s)		13.9			9.4			13.6			9.2	
Level of Service		B			A			B			A	
Approach Delay (s)		13.9			9.4			13.6			9.2	
Approach LOS		B			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			12.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			44.5			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			78.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

9: Pond St & Summer St
Timing Report, Sorted By Phase

2013 Existing
Timing Plan: Weekday PM



Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	35	35	35	35
Maximum Split (%)	50.0%	50.0%	50.0%	50.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35
End Time (s)	35	0	35	0
Yield/Force Off (s)	30	65	30	65
Yield/Force Off 170(s)	30	65	30	65
Local Start Time (s)	0	35	0	35
Local Yield (s)	30	65	30	65
Local Yield 170(s)	30	65	30	65

Intersection Summary

Cycle Length	70
Control Type	Actuated-Uncoordinated
Natural Cycle	45

Splits and Phases: 9: Pond St & Summer St

 ø2	 ø4
35 s	35 s
 ø6	 ø8
35 s	35 s

10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2013 Existing
Timing Plan: Weekday PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	1082	742	2	2	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	1202	824	2	2	1
Pedestrians		8	8		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		723				
pX, platoon unblocked					0.37	
vC, conflicting volume	835				2050	842
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	835				2984	842
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				60	100
cM capacity (veh/h)	793				6	360
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	1206	827	2	1		
Volume Left	3	0	2	0		
Volume Right	0	2	0	1		
cSH	793	1700	6	360		
Volume to Capacity	0.00	0.49	0.40	0.00		
Queue Length 95th (ft)	0	0	18	0		
Control Delay (s)	0.2	0.0	873.5	15.0		
Lane LOS	A		F	C		
Approach Delay (s)	0.2	0.0	587.4			
Approach LOS			F			
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			71.7%		ICU Level of Service	C
Analysis Period (min)			15			

1: Perkins St & Franklin St
HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	👉			👈	👈	
Volume (veh/h)	397	203	37	614	129	24
Sign Control	Free			Free	Stop	
Grade	0%			1%	0%	
Peak Hour Factor	0.92	0.92	0.81	0.81	0.78	0.78
Hourly flow rate (vph)	432	221	46	758	165	31
Pedestrians	1				1	
Lane Width (ft)	12.0				15.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			653		1393	543
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			653		1393	543
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		0	94
cM capacity (veh/h)			942		148	543
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	652	804	196			
Volume Left	0	46	165			
Volume Right	221	0	31			
cSH	1700	942	167			
Volume to Capacity	0.38	0.05	1.17			
Queue Length 95th (ft)	0	4	264			
Control Delay (s)	0.0	1.3	178.4			
Lane LOS		A	F			
Approach Delay (s)	0.0	1.3	178.4			
Approach LOS			F			
Intersection Summary						
Average Delay			21.8			
Intersection Capacity Utilization			77.9%	ICU Level of Service		D
Analysis Period (min)			15			

2: Franklin PI & Franklin St Queues

2018 No-Build
Timing Plan: Weekday AM

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	589	736	72	1016	649	128
v/c Ratio	0.68	0.51	0.21	0.92	1.18	0.17
Control Delay	21.8	1.4	8.3	30.0	128.6	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	1.4	8.3	30.0	128.6	0.5
Queue Length 50th (ft)	243	0	15	446	~445	0
Queue Length 95th (ft)	263	0	27	481	263	0
Internal Link Dist (ft)	602			658		
Turn Bay Length (ft)		135	145			
Base Capacity (vph)	1077	1449	412	1448	552	733
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	0.55	0.51	0.17	0.70	1.18	0.17

Intersection Summary

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

2: Franklin PI & Franklin St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	430	537	57	803	0	305	0	60	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	13	12	13	12	12	12
Grade (%)		-1%			0%			0%			0%	
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0		5.0			
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		0.97			
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00			
Frt		1.00	0.85	1.00	1.00		1.00		0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1792	1569	1768	1881		1865		1592			
Flt Permitted		1.00	1.00	0.23	1.00		0.95		1.00			
Satd. Flow (perm)		1792	1569	436	1881		1865		1592			
Peak-hour factor, PHF	0.73	0.73	0.73	0.79	0.79	0.79	0.47	0.47	0.47	0.25	0.25	0.25
Adj. Flow (vph)	0	589	736	72	1016	0	649	0	128	0	0	0
RTOR Reduction (vph)	0	0	125	0	0	0	0	0	90	0	0	0
Lane Group Flow (vph)	0	589	611	72	1016	0	649	0	38	0	0	0
Confl. Peds. (#/hr)			4	16			16		4			
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	2%	1%	0%	0%	0%	2%	0%	0%	0%
Turn Type		NA	pt+ov	pm+pt	NA		Prot		Perm			
Protected Phases		2	2 3	1	6		3	8				
Permitted Phases				6					8			
Actuated Green, G (s)		41.9	72.5	51.7	51.7		25.6		25.6			
Effective Green, g (s)		41.9	72.5	51.7	51.7		25.6		25.6			
Actuated g/C Ratio		0.48	0.83	0.59	0.59		0.29		0.29			
Clearance Time (s)		5.0		5.0	5.0		5.0		5.0			
Vehicle Extension (s)		2.0		2.0	2.0		2.0		2.0			
Lane Grp Cap (vph)		860	1303	331	1113		546		466			
v/s Ratio Prot		0.33	0.39	0.01	c0.54		c0.35					
v/s Ratio Perm				0.12					0.02			
v/c Ratio		0.68	0.47	0.22	0.91		1.19		0.08			
Uniform Delay, d1		17.6	2.1	10.6	15.8		30.8		22.3			
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Incremental Delay, d2		1.8	0.1	0.1	11.1		102.2		0.0			
Delay (s)		19.4	2.2	10.7	26.9		133.0		22.4			
Level of Service		B	A	B	C		F		C			
Approach Delay (s)		9.8			25.8			114.8			0.0	
Approach LOS		A			C			F			A	
Intersection Summary												
HCM 2000 Control Delay			40.8			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			1.07									
Actuated Cycle Length (s)			87.3			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			67.5%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

2: Franklin PI & Franklin St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday AM

					
Phase Number	1	2	3	6	8
Movement	WBL	EBT	NBL	WBTL	NBT
Lead/Lag	Lead	Lag			
Lead-Lag Optimize					
Recall Mode	None	Min	None	Min	None
Maximum Split (s)	15	55	30	70	30
Maximum Split (%)	15.0%	55.0%	30.0%	70.0%	30.0%
Minimum Split (s)	10	10	10	10	10
Yellow Time (s)	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					
Flash Dont Walk (s)					
Dual Entry	No	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	70	0	70
End Time (s)	15	70	0	70	0
Yield/Force Off (s)	10	65	95	65	95
Yield/Force Off 170(s)	10	65	95	65	95
Local Start Time (s)	85	0	55	85	55
Local Yield (s)	95	50	80	50	80
Local Yield 170(s)	95	50	80	50	80

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	90

Splits and Phases: 2: Franklin PI & Franklin St

 $\phi 1$	 $\phi 2$	 $\phi 3$
15 s	55 s	30 s
 $\phi 6$		 $\phi 8$
70 s		30 s

3: Res Complex/Dunkins & Franklin St HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	971	0	1	994	52	6	0	10	19	1	64
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			0%			0%			0%	
Peak Hour Factor	0.72	0.72	0.72	0.95	0.95	0.95	0.67	0.67	0.67	0.75	0.75	0.75
Hourly flow rate (vph)	36	1349	0	1	1046	55	9	0	15	25	1	85
Pedestrians		12			12			3			12	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1060			682							
pX, platoon unblocked	0.58			0.83			0.66	0.66	0.83	0.66	0.66	0.58
vC, conflicting volume	1113			1352			2598	2539	1364	2536	2512	1098
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	834			1322			2588	2500	1336	2495	2459	808
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			0	100	90	0	93	61
cM capacity (veh/h)	455			440			6	18	156	11	19	216
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	1385	1102	24	112								
Volume Left	36	1	9	25								
Volume Right	0	55	15	85								
cSH	455	440	15	40								
Volume to Capacity	0.08	0.00	1.60	2.79								
Queue Length 95th (ft)	6	0	90	309								
Control Delay (s)	5.4	0.1	817.5	1019.6								
Lane LOS	A	A	F	F								
Approach Delay (s)	5.4	0.1	817.5	1019.6								
Approach LOS			F	F								
Intersection Summary												
Average Delay			53.9									
Intersection Capacity Utilization			87.0%		ICU Level of Service				E			
Analysis Period (min)			15									

4: Franklin St & Pleasant St HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	564	690	332	185	12
Sign Control		Free	Free		Stop	
Grade		4%	0%		-4%	
Peak Hour Factor	0.88	0.88	0.90	0.90	0.89	0.89
Hourly flow rate (vph)	3	641	767	369	208	13
Pedestrians			1		1	
Lane Width (ft)			13.0		14.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		482	1260			
pX, platoon unblocked	0.67				0.77	0.67
vC, conflicting volume	1137				1601	952
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	958				1067	684
tC, single (s)	4.8				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.8				3.5	3.3
p0 queue free %	99				0	96
cM capacity (veh/h)	343				186	304
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	3	641	1136	221		
Volume Left	3	0	0	208		
Volume Right	0	0	369	13		
cSH	343	1700	1700	190		
Volume to Capacity	0.01	0.38	0.67	1.16		
Queue Length 95th (ft)	1	0	0	281		
Control Delay (s)	15.6	0.0	0.0	166.4		
Lane LOS	C			F		
Approach Delay (s)	0.1		0.0	166.4		
Approach LOS				F		
Intersection Summary						
Average Delay			18.4			
Intersection Capacity Utilization			74.2%		ICU Level of Service	D
Analysis Period (min)			15			

5: Summer St & Franklin St Queues

2018 No-Build
Timing Plan: Weekday AM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	23	419	181	625	297	483
v/c Ratio	0.08	0.71	0.44	0.73	0.43	0.80
Control Delay	11.2	29.4	13.9	25.6	11.1	31.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.2	29.4	13.9	25.6	11.1	31.6
Queue Length 50th (ft)	4	150	36	177	43	166
Queue Length 95th (ft)	16	252	97	#552	111	318
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	402	799	441	860	1054	990
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	0.06	0.52	0.41	0.73	0.28	0.49

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	315	8	163	561	2	13	71	177	30	346	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.91			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1718	1761		1718	1836			1814			1824	
Flt Permitted	0.27	1.00		0.30	1.00			0.97			0.96	
Satd. Flow (perm)	481	1761		539	1836			1769			1761	
Peak-hour factor, PHF	0.77	0.77	0.77	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Adj. Flow (vph)	23	409	10	181	623	2	15	81	201	34	389	60
RTOR Reduction (vph)	0	1	0	0	0	0	0	96	0	0	7	0
Lane Group Flow (vph)	23	418	0	181	625	0	0	201	0	0	476	0
Confl. Peds. (#/hr)	1		2	2		1	2		2	1		1
Confl. Bikes (#/hr)			1			3						
Heavy Vehicles (%)	0%	6%	0%	1%	3%	0%	0%	0%	1%	0%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	27.8	25.9		37.8	31.9			23.2			23.2	
Effective Green, g (s)	27.8	25.9		37.8	31.9			23.2			23.2	
Actuated g/C Ratio	0.39	0.36		0.53	0.45			0.33			0.33	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	221	642		418	824			578			575	
v/s Ratio Prot	0.00	0.24		c0.05	c0.34							
v/s Ratio Perm	0.04			0.18				0.11			c0.27	
v/c Ratio	0.10	0.65		0.43	0.76			0.35			0.83	
Uniform Delay, d1	14.0	18.8		10.1	16.3			18.2			22.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	1.8		0.3	3.6			0.1			9.1	
Delay (s)	14.1	20.6		10.3	19.9			18.3			31.2	
Level of Service	B	C		B	B			B			C	
Approach Delay (s)		20.3			17.8			18.3			31.2	
Approach LOS		C			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			21.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			71.0			Sum of lost time (s)		14.0				
Intersection Capacity Utilization			77.4%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

5: Summer St & Franklin St Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday AM

						
Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	13	35	42	13	35	42
Maximum Split (%)	14.4%	38.9%	46.7%	14.4%	38.9%	46.7%
Minimum Split (s)	9	10	10	9	10	10
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	0	1	1	0	1	1
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)						
Flash Dont Walk (s)						
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	13	48	0	13	48
End Time (s)	13	48	0	13	48	0
Yield/Force Off (s)	9	43	85	9	43	85
Yield/Force Off 170(s)	9	43	85	9	43	85
Local Start Time (s)	77	0	35	77	0	35
Local Yield (s)	86	30	72	86	30	72
Local Yield 170(s)	86	30	72	86	30	72

Intersection Summary

Cycle Length	90
Control Type	Actuated-Uncoordinated
Natural Cycle	65

Splits and Phases: 5: Summer St & Franklin St

 ø1	 ø2	 ø4
13 s	35 s	42 s
 ø5	 ø6	 ø8
13 s	35 s	42 s

6: Pine St & Franklin St Queues

2018 No-Build
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	256	792	114	541
v/c Ratio	0.33	0.86	0.16	0.86
Control Delay	11.6	24.9	15.9	38.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.6	24.9	15.9	38.2
Queue Length 50th (ft)	60	257	25	192
Queue Length 95th (ft)	81	388	57	#508
Internal Link Dist (ft)	727	984	947	646
Turn Bay Length (ft)				
Base Capacity (vph)	1273	1480	726	629
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.20	0.54	0.16	0.86

Intersection Summary

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

6: Pine St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	186	3	38	527	148	7	57	16	219	189	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	15	15	15	15	15	15
Grade (%)		2%			-3%			5%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.97			0.97			0.98	
Flt Protected		1.00			1.00			1.00			0.98	
Satd. Flow (prot)		1728			2015			1961			1966	
Flt Permitted		0.98			0.97			0.95			0.81	
Satd. Flow (perm)		1696			1964			1872			1625	
Peak-hour factor, PHF	0.76	0.76	0.76	0.90	0.90	0.90	0.70	0.70	0.70	0.90	0.90	0.90
Adj. Flow (vph)	7	245	4	42	586	164	10	81	23	243	210	88
RTOR Reduction (vph)	0	1	0	0	14	0	0	9	0	0	7	0
Lane Group Flow (vph)	0	255	0	0	778	0	0	105	0	0	534	0
Confl. Peds. (#/hr)	5		6	8		7	6		8	7		5
Heavy Vehicles (%)	20%	12%	0%	0%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		31.0			31.0			25.5			25.5	
Effective Green, g (s)		31.0			31.0			25.5			25.5	
Actuated g/C Ratio		0.47			0.47			0.38			0.38	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		790			915			717			623	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.40			0.06			c0.33	
v/c Ratio		0.32			0.85			0.15			0.86	
Uniform Delay, d1		11.2			15.7			13.4			18.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			7.2			0.0			10.8	
Delay (s)		11.2			22.9			13.4			29.6	
Level of Service		B			C			B			C	
Approach Delay (s)		11.2			22.9			13.4			29.6	
Approach LOS		B			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			22.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			66.5			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			95.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

6: Pine St & Franklin St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday AM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	54	30	54	30
Maximum Split (%)	64.3%	35.7%	64.3%	35.7%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	54	0	54
End Time (s)	54	0	54	0
Yield/Force Off (s)	49	79	49	79
Yield/Force Off 170(s)	49	79	49	79
Local Start Time (s)	0	54	0	54
Local Yield (s)	49	79	49	79
Local Yield 170(s)	49	79	49	79
Intersection Summary				
Cycle Length	84			
Control Type	Actuated-Uncoordinated			
Natural Cycle	60			

Splits and Phases: 6: Pine St & Franklin St

 ø2		 ø4
54 s		30 s
 ø6		 ø8
54 s		30 s

7: Main St & Franklin St & Central St Queues

2018 No-Build
Timing Plan: Weekday AM

				
Lane Group	WBL	NBT	NBR	SBT
Lane Group Flow (vph)	620	406	277	792
v/c Ratio	0.91	0.45	0.36	1.06
Control Delay	43.9	17.0	13.0	75.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.9	17.0	13.0	75.7
Queue Length 50th (ft)	300	142	71	~493
Queue Length 95th (ft)	#484	198	114	#743
Internal Link Dist (ft)	727	1542		692
Turn Bay Length (ft)			50	
Base Capacity (vph)	802	899	763	745
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	0.45	0.36	1.06

Intersection Summary

- ~ 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.

7: Main St & Franklin St & Central St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

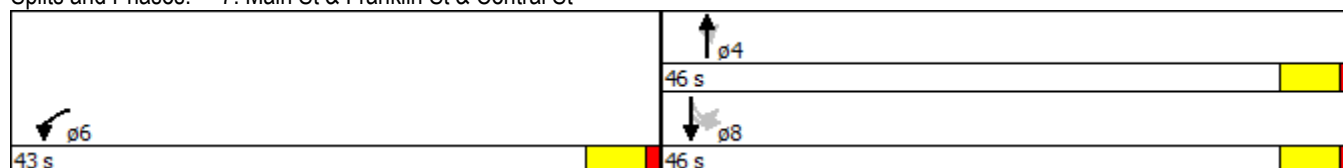
											
Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL	SWR
Lane Configurations											
Volume (vph)	334	212	6	325	126	95	2	102	609	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	14	14	13	12	12	14	14	14	12	12
Grade (%)	4%			3%					1%	0%	
Total Lost time (s)	5.0			5.0	5.0				5.0		
Lane Util. Factor	1.00			1.00	1.00				1.00		
Frpb, ped/bikes	0.99			1.00	0.97				1.00		
Flpb, ped/bikes	1.00			1.00	1.00				1.00		
Frt	0.95			1.00	0.85				1.00		
Flt Protected	0.97			1.00	1.00				0.99		
Satd. Flow (prot)	1752			1824	1492				1897		
Flt Permitted	0.97			1.00	1.00				0.79		
Satd. Flow (perm)	1752			1824	1492				1512		
Peak-hour factor, PHF	0.89	0.89	0.89	0.80	0.80	0.80	0.90	0.90	0.90	0.25	0.25
Adj. Flow (vph)	375	238	7	406	158	119	2	113	677	0	0
RTOR Reduction (vph)	0	0	0	0	28	0	0	0	0	0	0
Lane Group Flow (vph)	620	0	0	406	249	0	0	0	792	0	0
Confl. Peds. (#/hr)	3	7	4		3	3	7	7			
Heavy Vehicles (%)	2%	4%	0%	6%	0%	9%	0%	20%	3%	0%	0%
Turn Type	Prot			NA	Perm		Perm	Perm	NA		
Protected Phases	6			4					8		
Permitted Phases	6			4	4		8	8			
Actuated Green, G (s)	32.3			41.2	41.2				41.2		
Effective Green, g (s)	32.3			41.2	41.2				41.2		
Actuated g/C Ratio	0.39			0.49	0.49				0.49		
Clearance Time (s)	5.0			5.0	5.0				5.0		
Vehicle Extension (s)	2.0			2.0	2.0				2.0		
Lane Grp Cap (vph)	677			899	736				746		
v/s Ratio Prot	c0.35			0.22							
v/s Ratio Perm					0.17				c0.52		
v/c Ratio	0.92			0.45	0.34				1.06		
Uniform Delay, d1	24.3			13.8	12.9				21.1		
Progression Factor	1.00			1.00	1.00				1.00		
Incremental Delay, d2	16.8			0.1	0.1				50.6		
Delay (s)	41.1			13.9	13.0				71.7		
Level of Service	D			B	B				E		
Approach Delay (s)	41.1			13.5					71.7	0.0	
Approach LOS	D			B					E	A	
Intersection Summary											
HCM 2000 Control Delay			43.7								D
HCM 2000 Volume to Capacity ratio			1.00								
Actuated Cycle Length (s)			83.5						10.0		
Intersection Capacity Utilization			99.5%						F		
Analysis Period (min)			15								
c Critical Lane Group											

7: Main St & Franklin St & Central St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday AM

			
Phase Number	4	6	8
Movement	NBT	WBL	SBTL
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	None	None	None
Maximum Split (s)	46	43	46
Maximum Split (%)	51.7%	48.3%	51.7%
Minimum Split (s)	10	10	10
Yellow Time (s)	4	4	4
All-Red Time (s)	1	1	1
Minimum Initial (s)	5	5	5
Vehicle Extension (s)	2	2	2
Minimum Gap (s)	2	2	2
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)			
Flash Dont Walk (s)			
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	43	0	43
End Time (s)	0	43	0
Yield/Force Off (s)	84	38	84
Yield/Force Off 170(s)	84	38	84
Local Start Time (s)	43	0	43
Local Yield (s)	84	38	84
Local Yield 170(s)	84	38	84
Intersection Summary			
Cycle Length	89		
Control Type	Actuated-Uncoordinated		
Natural Cycle	80		

Splits and Phases: 7: Main St & Franklin St & Central St



8: Main St & Marble St/Summer St Queues

2018 No-Build
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	350	340	625	1023
v/c Ratio	0.84	0.85	0.73	0.83
Control Delay	52.0	56.6	28.2	30.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	52.0	56.6	28.2	30.6
Queue Length 50th (ft)	180	190	158	274
Queue Length 95th (ft)	#361	#386	214	342
Internal Link Dist (ft)	821	965	1441	57
Turn Bay Length (ft)				
Base Capacity (vph)	470	420	1122	1615
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.74	0.81	0.56	0.63

Intersection Summary

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

8: Main St & Marble St/Summer St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	139	112	90	209	14	65	403	82	34	734	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	12	12	12	11	12	13
Grade (%)		1%			2%			0%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.95			0.99			0.98			0.98	
Flt Protected		0.99			0.99			0.99			1.00	
Satd. Flow (prot)		1939			1804			3412			3388	
Flt Permitted		0.99			0.99			0.62			0.91	
Satd. Flow (perm)		1939			1804			2134			3075	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	81	149	120	98	227	15	74	458	93	39	834	150
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	332	0	0	340	0	0	625	0	0	1023	0
Confl. Peds. (#/hr)	25		21	29		33	21		29	33		25
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	10%	0%	1%	2%	2%	0%	0%	2%	3%	0%	2%	7%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	8	8		4	4			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		18.0			19.4			34.9			34.9	
Effective Green, g (s)		18.0			19.4			34.9			34.9	
Actuated g/C Ratio		0.21			0.22			0.40			0.40	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		399			400			853			1229	
v/s Ratio Prot		c0.17			c0.19							
v/s Ratio Perm								0.29			c0.33	
v/c Ratio		0.83			0.85			0.73			0.83	
Uniform Delay, d1		33.2			32.6			22.2			23.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		13.2			14.9			2.8			4.7	
Delay (s)		46.4			47.4			25.1			28.3	
Level of Service		D			D			C			C	
Approach Delay (s)		46.4			47.4			25.1			28.3	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			87.3			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			79.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

8: Main St & Marble St/Summer St Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday AM

				
Phase Number	2	4	6	8
Movement	NBTL	WBTL	SBTL	EBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	50	25	50	25
Maximum Split (%)	50.0%	25.0%	50.0%	25.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	50	0	75
End Time (s)	50	75	50	0
Yield/Force Off (s)	45	70	45	95
Yield/Force Off 170(s)	45	70	45	95
Local Start Time (s)	0	50	0	75
Local Yield (s)	45	70	45	95
Local Yield 170(s)	45	70	45	95
Intersection Summary				
Cycle Length	100			
Control Type	Actuated-Uncoordinated			
Natural Cycle	70			

Splits and Phases: 8: Main St & Marble St/Summer St

 ø2	 ø4	 ø8
50 s	25 s	25 s
 ø6		
50 s		

9: Pond St & Summer St
Queues

2018 No-Build
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	324	585	440	164
v/c Ratio	0.37	0.83	0.83	0.26
Control Delay	12.8	28.5	32.1	14.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.8	28.5	32.1	14.9
Queue Length 50th (ft)	70	174	145	42
Queue Length 95th (ft)	140	#434	190	76
Internal Link Dist (ft)	965	569	871	731
Turn Bay Length (ft)				
Base Capacity (vph)	891	719	768	927
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.36	0.81	0.57	0.18

Intersection Summary

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

9: Pond St & Summer St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	155	108	247	301	13	111	179	49	1	136	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	12	12	12	12	12	12
Grade (%)		-2%			1%			-1%			0%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.95			1.00			0.98			0.99	
Flt Protected		1.00			0.98			0.98			1.00	
Satd. Flow (prot)		1811			1991			1798			1868	
Flt Permitted		0.99			0.71			0.84			1.00	
Satd. Flow (perm)		1792			1447			1544			1864	
Peak-hour factor, PHF	0.83	0.83	0.83	0.96	0.96	0.96	0.77	0.77	0.77	0.87	0.87	0.87
Adj. Flow (vph)	7	187	130	257	314	14	144	232	64	1	156	7
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	324	0	0	585	0	0	440	0	0	164	0
Confl. Peds. (#/hr)	12		11	18		19	11		18	19		12
Heavy Vehicles (%)	0%	3%	1%	0%	2%	8%	1%	2%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		29.9			29.9			21.1			21.1	
Effective Green, g (s)		29.9			29.9			21.1			21.1	
Actuated g/C Ratio		0.49			0.49			0.35			0.35	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		878			709			534			644	
v/s Ratio Prot												
v/s Ratio Perm		0.18			c0.40			c0.29			0.09	
v/c Ratio		0.37			0.83			0.82			0.25	
Uniform Delay, d1		9.7			13.3			18.3			14.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			7.4			9.5			0.1	
Delay (s)		9.8			20.7			27.8			14.4	
Level of Service		A			C			C			B	
Approach Delay (s)		9.8			20.7			27.8			14.4	
Approach LOS		A			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			19.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			61.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			89.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

9: Pond St & Summer St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday AM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	35	35	35	35
Maximum Split (%)	50.0%	50.0%	50.0%	50.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35
End Time (s)	35	0	35	0
Yield/Force Off (s)	30	65	30	65
Yield/Force Off 170(s)	30	65	30	65
Local Start Time (s)	0	35	0	35
Local Yield (s)	30	65	30	65
Local Yield 170(s)	30	65	30	65
Intersection Summary				
Cycle Length				70
Control Type	Actuated-Uncoordinated			
Natural Cycle				60

Splits and Phases: 9: Pond St & Summer St

 ø2	 ø4
35 s	35 s
 ø6	 ø8
35 s	35 s

10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	486	857	5	2	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	540	952	6	2	3
Pedestrians		1	1		1	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		738				
pX, platoon unblocked					0.80	
vC, conflicting volume	959				1506	957
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	959				1507	957
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	99
cM capacity (veh/h)	717				105	312
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	544	958	2	3		
Volume Left	4	0	2	0		
Volume Right	0	6	0	3		
cSH	717	1700	105	312		
Volume to Capacity	0.01	0.56	0.02	0.01		
Queue Length 95th (ft)	0	0	2	1		
Control Delay (s)	0.2	0.0	40.0	16.7		
Lane LOS	A		E	C		
Approach Delay (s)	0.2	0.0	26.0			
Approach LOS			D			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			55.7%		ICU Level of Service	B
Analysis Period (min)			15			

1: Perkins St & Franklin St

HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	👉			👈	👈	👉
Volume (veh/h)	773	201	14	457	201	23
Sign Control	Free			Free	Stop	
Grade	0%			1%	0%	
Peak Hour Factor	0.94	0.94	0.96	0.96	0.86	0.86
Hourly flow rate (vph)	822	214	15	476	234	27
Pedestrians	4			1	4	
Lane Width (ft)	12.0			14.0	15.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1040		1442	934
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1040		1442	934
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		0	92
cM capacity (veh/h)			673		142	323
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	1036	491	260			
Volume Left	0	15	234			
Volume Right	214	0	27			
cSH	1700	673	150			
Volume to Capacity	0.61	0.02	1.73			
Queue Length 95th (ft)	0	2	474			
Control Delay (s)	0.0	0.6	408.7			
Lane LOS		A	F			
Approach Delay (s)	0.0	0.6	408.7			
Approach LOS			F			
Intersection Summary						
Average Delay			59.7			
Intersection Capacity Utilization			72.2%	ICU Level of Service		C
Analysis Period (min)			15			

2: Franklin PI & Franklin St Queues

2018 No-Build
Timing Plan: Weekday PM

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1166	50	8	871	174	33
v/c Ratio	0.90	0.03	0.04	0.65	0.63	0.08
Control Delay	23.9	0.4	4.3	9.2	41.3	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.9	0.4	4.3	9.2	41.3	0.3
Queue Length 50th (ft)	332	0	1	172	74	0
Queue Length 95th (ft)	#981	4	5	361	111	0
Internal Link Dist (ft)	592			653		
Turn Bay Length (ft)		135	145			
Base Capacity (vph)	1290	1543	307	1557	593	674
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	0.90	0.03	0.03	0.56	0.29	0.05

Intersection Summary

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

2: Franklin PI & Franklin St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1119	48	7	775	0	122	0	23	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	13	12	13	12	12	12
Grade (%)		-1%			0%			0%			0%	
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0		5.0			
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		0.98			
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00			
Frt		1.00	0.85	1.00	1.00		1.00		0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1846	1569	1805	1863		1847		1630			
Flt Permitted		1.00	1.00	0.07	1.00		0.95		1.00			
Satd. Flow (perm)		1846	1569	127	1863		1847		1630			
Peak-hour factor, PHF	0.96	0.96	0.96	0.89	0.89	0.89	0.70	0.70	0.70	0.25	0.25	0.25
Adj. Flow (vph)	0	1166	50	8	871	0	174	0	33	0	0	0
RTOR Reduction (vph)	0	0	6	0	0	0	0	0	28	0	0	0
Lane Group Flow (vph)	0	1166	44	8	871	0	174	0	5	0	0	0
Confl. Peds. (#/hr)			1	17			17		1			
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%
Turn Type		NA	pt+ov	pm+pt	NA		Prot		Perm			
Protected Phases		2	2 3	1	6		3	8				
Permitted Phases				6					8			
Actuated Green, G (s)		54.7	71.4	60.6	60.6		11.7		11.7			
Effective Green, g (s)		54.7	71.4	60.6	60.6		11.7		11.7			
Actuated g/C Ratio		0.66	0.87	0.74	0.74		0.14		0.14			
Clearance Time (s)		5.0		5.0	5.0		5.0		5.0			
Vehicle Extension (s)		2.0		2.0	2.0		2.0		2.0			
Lane Grp Cap (vph)		1226	1361	111	1371		262		231			
v/s Ratio Prot		c0.63	0.03	0.00	c0.47		c0.09					
v/s Ratio Perm				0.05					0.00			
v/c Ratio		0.95	0.03	0.07	0.64		0.66		0.02			
Uniform Delay, d1		12.6	0.7	18.7	5.4		33.4		30.4			
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Incremental Delay, d2		15.3	0.0	0.1	0.7		4.8		0.0			
Delay (s)		27.9	0.7	18.8	6.1		38.3		30.4			
Level of Service		C	A	B	A		D		C			
Approach Delay (s)		26.8			6.2			37.0			0.0	
Approach LOS		C			A			D			A	
Intersection Summary												
HCM 2000 Control Delay			19.8			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			82.3			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			74.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

2: Franklin PI & Franklin St Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday PM

					
Phase Number	1	2	3	6	8
Movement	WBL	EBT	NBL	WBTL	NBT
Lead/Lag	Lead	Lag			
Lead-Lag Optimize					
Recall Mode	None	Min	None	Min	None
Maximum Split (s)	15	55	30	70	30
Maximum Split (%)	15.0%	55.0%	30.0%	70.0%	30.0%
Minimum Split (s)	10	10	10	10	10
Yellow Time (s)	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					
Flash Dont Walk (s)					
Dual Entry	No	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	70	0	70
End Time (s)	15	70	0	70	0
Yield/Force Off (s)	10	65	95	65	95
Yield/Force Off 170(s)	10	65	95	65	95
Local Start Time (s)	85	0	55	85	55
Local Yield (s)	95	50	80	50	80
Local Yield 170(s)	95	50	80	50	80
Intersection Summary					
Cycle Length	100				
Control Type	Actuated-Uncoordinated				
Natural Cycle	90				

Splits and Phases: 2: Franklin PI & Franklin St

 ø1	 ø2	 ø3
15 s	55 s	30 s
 ø6		 ø8
70 s		30 s

3: Res Complex/Dunkins & Franklin St HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	22	1163	10	4	880	12	6	0	3	9	1	22
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.75	0.75	0.75	0.57	0.57	0.57
Hourly flow rate (vph)	24	1251	11	4	946	13	8	0	4	16	2	39
Pedestrians		9			9			8			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1071			672							
pX, platoon unblocked	0.73			0.74			0.86	0.86	0.74	0.86	0.86	0.73
vC, conflicting volume	968			1269			2321	2288	1273	2287	2287	971
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	773			1188			1776	1737	1193	1736	1736	777
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			82	100	98	71	98	86
cM capacity (veh/h)	618			437			45	71	168	55	72	284
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	1285	963	12	56								
Volume Left	24	4	8	16								
Volume Right	11	13	4	39								
cSH	618	437	59	125								
Volume to Capacity	0.04	0.01	0.20	0.45								
Queue Length 95th (ft)	3	1	17	50								
Control Delay (s)	1.8	0.4	80.7	55.2								
Lane LOS	A	A	F	F								
Approach Delay (s)	1.8	0.4	80.7	55.2								
Approach LOS			F	F								
Intersection Summary												
Average Delay			2.9									
Intersection Capacity Utilization			90.0%		ICU Level of Service				E			
Analysis Period (min)			15									

4: Franklin St & Pleasant St HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	862	439	320	280	7
Sign Control		Free	Free		Stop	
Grade		4%	0%		-4%	
Peak Hour Factor	0.94	0.94	0.88	0.88	0.87	0.87
Hourly flow rate (vph)	5	917	499	364	322	8
Pedestrians		4	4		4	
Lane Width (ft)		10.5	13.0		14.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		482	1261			
pX, platoon unblocked	0.82				0.83	0.82
vC, conflicting volume	866				1616	689
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	726				1147	509
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				0	98
cM capacity (veh/h)	723				180	462
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	5	917	862	330		
Volume Left	5	0	0	322		
Volume Right	0	0	364	8		
cSH	723	1700	1700	183		
Volume to Capacity	0.01	0.54	0.51	1.81		
Queue Length 95th (ft)	1	0	0	591		
Control Delay (s)	10.0	0.0	0.0	427.1		
Lane LOS	B			F		
Approach Delay (s)	0.1		0.0	427.1		
Approach LOS				F		
Intersection Summary						
Average Delay			66.6			
Intersection Capacity Utilization			68.0%		ICU Level of Service	C
Analysis Period (min)			15			

5: Summer St & Franklin St Queues

2018 No-Build
Timing Plan: Weekday PM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	68	521	154	417	703	257
v/c Ratio	0.19	0.85	0.58	0.61	0.90	0.48
Control Delay	13.4	39.6	22.6	26.8	36.4	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	39.6	22.6	26.8	36.4	20.1
Queue Length 50th (ft)	19	257	46	189	301	86
Queue Length 95th (ft)	42	#400	80	280	#550	159
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	387	807	273	800	954	659
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	0.18	0.65	0.56	0.52	0.74	0.39

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	504	12	134	356	7	6	292	335	43	119	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1718	1846		1701	1832			1875			1770	
Flt Permitted	0.37	1.00		0.18	1.00			1.00			0.74	
Satd. Flow (perm)	661	1846		322	1832			1870			1320	
Peak-hour factor, PHF	0.99	0.99	0.99	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88
Adj. Flow (vph)	68	509	12	154	409	8	7	324	372	49	135	73
RTOR Reduction (vph)	0	1	0	0	1	0	0	46	0	0	16	0
Lane Group Flow (vph)	68	520	0	154	416	0	0	657	0	0	241	0
Confl. Peds. (#/hr)	3		3	4		4	3		4	4		3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	1%	0%	2%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	32.2	27.4		36.2	29.4			31.2			31.2	
Effective Green, g (s)	32.2	27.4		36.2	29.4			31.2			31.2	
Actuated g/C Ratio	0.41	0.35		0.46	0.37			0.39			0.39	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	331	637		264	678			734			518	
v/s Ratio Prot	0.01	c0.28		c0.05	0.23							
v/s Ratio Perm	0.07			0.22				c0.35			0.18	
v/c Ratio	0.21	0.82		0.58	0.61			0.90			0.47	
Uniform Delay, d1	15.1	23.7		15.5	20.4			22.6			17.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	7.6		2.1	1.2			13.2			0.2	
Delay (s)	15.2	31.3		17.6	21.5			35.8			18.1	
Level of Service	B	C		B	C			D			B	
Approach Delay (s)		29.4			20.5			35.8			18.1	
Approach LOS		C			C			D			B	
Intersection Summary												
HCM 2000 Control Delay			27.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			79.4			Sum of lost time (s)		14.0				
Intersection Capacity Utilization			87.7%			ICU Level of Service		E				
Analysis Period (min)			15									
c Critical Lane Group												

5: Summer St & Franklin St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday PM

						
Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	11	38	42	11	38	42
Maximum Split (%)	12.1%	41.8%	46.2%	12.1%	41.8%	46.2%
Minimum Split (s)	9	10	10	9	10	10
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	0	1	1	0	1	1
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)						
Flash Dont Walk (s)						
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	11	49	0	11	49
End Time (s)	11	49	0	11	49	0
Yield/Force Off (s)	7	44	86	7	44	86
Yield/Force Off 170(s)	7	44	86	7	44	86
Local Start Time (s)	80	0	38	80	0	38
Local Yield (s)	87	33	75	87	33	75
Local Yield 170(s)	87	33	75	87	33	75

Intersection Summary

Cycle Length	91
Control Type	Actuated-Uncoordinated
Natural Cycle	75

Splits and Phases: 5: Summer St & Franklin St

 ø1	 ø2	 ø4
11 s	38 s	42 s
 ø5	 ø6	 ø8
11 s	38 s	42 s

6: Pine St & Franklin St
Queues

2018 No-Build
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	372	582	171	313
v/c Ratio	0.48	0.70	0.26	0.61
Control Delay	12.3	14.9	11.3	18.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.3	14.9	11.3	18.6
Queue Length 50th (ft)	58	90	25	60
Queue Length 95th (ft)	149	225	74	155
Internal Link Dist (ft)	727	984	947	646
Turn Bay Length (ft)				
Base Capacity (vph)	1714	1791	1177	934
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.22	0.32	0.15	0.34
Intersection Summary				

6: Pine St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	299	9	21	289	191	7	104	46	172	64	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	15	15	15	15	15	15
Grade (%)		2%			-3%			5%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.95			0.96			0.98	
Flt Protected		1.00			1.00			1.00			0.97	
Satd. Flow (prot)		1912			1964			1929			1946	
Flt Permitted		0.96			0.98			0.98			0.75	
Satd. Flow (perm)		1845			1921			1893			1508	
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	18	344	10	24	336	222	8	113	50	193	72	48
RTOR Reduction (vph)	0	2	0	0	36	0	0	17	0	0	7	0
Lane Group Flow (vph)	0	370	0	0	546	0	0	154	0	0	306	0
Confl. Peds. (#/hr)	10		18	13		5	18		13	5		10
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		18.4			18.4			14.9			14.9	
Effective Green, g (s)		18.4			18.4			14.9			14.9	
Actuated g/C Ratio		0.42			0.42			0.34			0.34	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		784			816			651			518	
v/s Ratio Prot												
v/s Ratio Perm		0.20			c0.28			0.08			c0.20	
v/c Ratio		0.47			0.67			0.24			0.59	
Uniform Delay, d1		9.0			10.0			10.1			11.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			1.6			0.1			1.2	
Delay (s)		9.1			11.6			10.2			12.9	
Level of Service		A			B			B			B	
Approach Delay (s)		9.1			11.6			10.2			12.9	
Approach LOS		A			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			11.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			43.3			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			71.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

6: Pine St & Franklin St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday PM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	52	30	52	30
Maximum Split (%)	63.4%	36.6%	63.4%	36.6%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	52	0	52
End Time (s)	52	0	52	0
Yield/Force Off (s)	47	77	47	77
Yield/Force Off 170(s)	47	77	47	77
Local Start Time (s)	0	52	0	52
Local Yield (s)	47	77	47	77
Local Yield 170(s)	47	77	47	77
Intersection Summary				
Cycle Length	82			
Control Type	Actuated-Uncoordinated			
Natural Cycle	40			

Splits and Phases: 6: Pine St & Franklin St

 ø2		 ø4	
52 s		30 s	
 ø6		 ø8	
52 s		30 s	

7: Main St & Franklin St & Central St
Queues

2018 No-Build
Timing Plan: Weekday PM

				
Lane Group	WBL	NBT	NBR	SBT
Lane Group Flow (vph)	315	426	333	516
v/c Ratio	0.73	0.38	0.38	0.70
Control Delay	33.9	9.8	7.7	18.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	33.9	9.8	7.7	18.0
Queue Length 50th (ft)	128	85	45	135
Queue Length 95th (ft)	215	184	121	325
Internal Link Dist (ft)	727	1542		692
Turn Bay Length (ft)			50	
Base Capacity (vph)	865	1322	1024	876
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.36	0.32	0.33	0.59
Intersection Summary				

7: Main St & Franklin St & Central St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

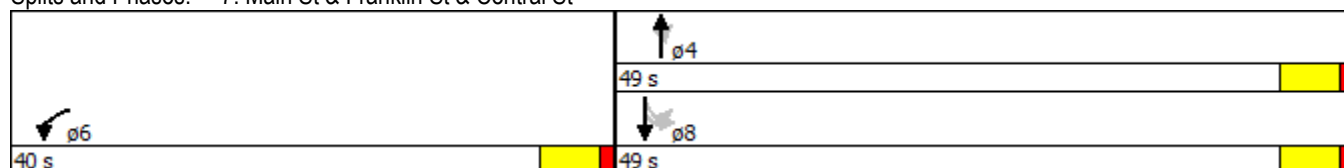
											
Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL	SWR
Lane Configurations											
Volume (vph)	106	174	19	405	147	169	22	156	307	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	14	14	13	12	12	14	14	14	12	12
Grade (%)	4%			3%					1%	0%	
Total Lost time (s)	5.0			5.0	5.0				5.0		
Lane Util. Factor	1.00			1.00	1.00				1.00		
Frpb, ped/bikes	0.91			1.00	0.93				1.00		
Flpb, ped/bikes	1.00			1.00	1.00				0.99		
Frt	0.91			1.00	0.85				1.00		
Flt Protected	0.98			1.00	1.00				0.98		
Satd. Flow (prot)	1547			1934	1469				1916		
Flt Permitted	0.98			1.00	1.00				0.66		
Satd. Flow (perm)	1547			1934	1469				1285		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.25	0.25
Adj. Flow (vph)	112	183	20	426	155	178	23	166	327	0	0
RTOR Reduction (vph)	0	0	0	0	39	0	0	0	0	0	0
Lane Group Flow (vph)	315	0	0	426	294	0	0	0	516	0	0
Confl. Peds. (#/hr)	31	33	37		30	31	32	33			
Heavy Vehicles (%)	4%	5%	0%	0%	0%	1%	0%	3%	2%	0%	0%
Turn Type	Prot			NA	Perm		Perm	Perm	NA		
Protected Phases	6			4					8		
Permitted Phases	6			4	4		8	8			
Actuated Green, G (s)	18.2			38.5	38.5				38.5		
Effective Green, g (s)	18.2			38.5	38.5				38.5		
Actuated g/C Ratio	0.27			0.58	0.58				0.58		
Clearance Time (s)	5.0			5.0	5.0				5.0		
Vehicle Extension (s)	2.0			2.0	2.0				2.0		
Lane Grp Cap (vph)	422			1116	847				741		
v/s Ratio Prot	c0.20			0.22							
v/s Ratio Perm					0.20				c0.40		
v/c Ratio	0.75			0.38	0.35				0.70		
Uniform Delay, d1	22.1			7.6	7.5				10.0		
Progression Factor	1.00			1.00	1.00				1.00		
Incremental Delay, d2	6.2			0.1	0.1				2.3		
Delay (s)	28.3			7.7	7.5				12.3		
Level of Service	C			A	A				B		
Approach Delay (s)	28.3			7.6					12.3	0.0	
Approach LOS	C			A					B	A	
Intersection Summary											
HCM 2000 Control Delay			13.2		HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.71								
Actuated Cycle Length (s)			66.7		Sum of lost time (s)				10.0		
Intersection Capacity Utilization			79.6%		ICU Level of Service				D		
Analysis Period (min)			15								
c Critical Lane Group											

7: Main St & Franklin St & Central St Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday PM

			
Phase Number	4	6	8
Movement	NBT	WBL	SBTL
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	None	None	None
Maximum Split (s)	49	40	49
Maximum Split (%)	55.1%	44.9%	55.1%
Minimum Split (s)	10	10	10
Yellow Time (s)	4	4	4
All-Red Time (s)	1	1	1
Minimum Initial (s)	5	5	5
Vehicle Extension (s)	2	2	2
Minimum Gap (s)	2	2	2
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)			
Flash Dont Walk (s)			
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	40	0	40
End Time (s)	0	40	0
Yield/Force Off (s)	84	35	84
Yield/Force Off 170(s)	84	35	84
Local Start Time (s)	40	0	40
Local Yield (s)	84	35	84
Local Yield 170(s)	84	35	84
Intersection Summary			
Cycle Length	89		
Control Type	Actuated-Uncoordinated		
Natural Cycle	55		

Splits and Phases: 7: Main St & Franklin St & Central St



8: Main St & Marble St/Summer St Queues

2018 No-Build
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	441	278	794	387
v/c Ratio	0.84	0.77	0.78	0.39
Control Delay	46.0	45.2	29.2	21.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	46.0	45.2	29.2	21.1
Queue Length 50th (ft)	207	128	182	75
Queue Length 95th (ft)	#448	#248	256	111
Internal Link Dist (ft)	821	965	1441	57
Turn Bay Length (ft)				
Base Capacity (vph)	527	451	1804	1751
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.84	0.62	0.44	0.22

Intersection Summary

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

8: Main St & Marble St/Summer St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	272	26	99	119	27	30	474	226	19	231	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	12	12	12	11	12	13
Grade (%)		1%			2%			0%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.98			0.95			0.96	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		2013			1733			3318			3354	
Flt Permitted		0.99			0.98			0.92			0.89	
Satd. Flow (perm)		2013			1733			3068			2980	
Peak-hour factor, PHF	0.92	0.92	0.92	0.88	0.88	0.88	0.92	0.92	0.92	0.87	0.87	0.87
Adj. Flow (vph)	117	296	28	112	135	31	33	515	246	22	266	99
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	439	0	0	278	0	0	794	0	0	387	0
Confl. Peds. (#/hr)	7		6	7		8	6		7	8		7
Heavy Vehicles (%)	4%	4%	4%	3%	5%	8%	0%	2%	4%	0%	2%	2%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	8	8		4	4			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		20.3			16.4			26.0			26.0	
Effective Green, g (s)		20.3			16.4			26.0			26.0	
Actuated g/C Ratio		0.26			0.21			0.33			0.33	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		525			365			1026			997	
v/s Ratio Prot		c0.22			c0.16							
v/s Ratio Perm								c0.26			0.13	
v/c Ratio		0.84			0.76			0.77			0.39	
Uniform Delay, d1		27.1			28.8			23.2			19.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		10.6			8.2			3.4			0.1	
Delay (s)		37.7			37.0			26.6			19.9	
Level of Service		D			D			C			B	
Approach Delay (s)		37.7			37.0			26.6			19.9	
Approach LOS		D			D			C			B	
Intersection Summary												
HCM 2000 Control Delay			29.3			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			77.7			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			68.9%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

8: Main St & Marble St/Summer St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday PM

				
Phase Number	2	4	6	8
Movement	NBTL	WBTL	SBTL	EBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	50	25	50	25
Maximum Split (%)	50.0%	25.0%	50.0%	25.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	50	0	75
End Time (s)	50	75	50	0
Yield/Force Off (s)	45	70	45	95
Yield/Force Off 170(s)	45	70	45	95
Local Start Time (s)	0	50	0	75
Local Yield (s)	45	70	45	95
Local Yield 170(s)	45	70	45	95
Intersection Summary				
Cycle Length	100			
Control Type	Actuated-Uncoordinated			
Natural Cycle	60			

Splits and Phases: 8: Main St & Marble St/Summer St

 ø2	 ø4	 ø8
50 s	25 s	25 s
 ø6		
50 s		

9: Pond St & Summer St
Queues

2018 No-Build
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	589	276	443	62
v/c Ratio	0.77	0.41	0.69	0.09
Control Delay	21.0	13.4	20.2	11.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.0	13.4	20.2	11.4
Queue Length 50th (ft)	125	49	98	11
Queue Length 95th (ft)	318	135	229	28
Internal Link Dist (ft)	965	569	871	731
Turn Bay Length (ft)				
Base Capacity (vph)	1289	1123	1183	1250
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.46	0.25	0.37	0.05
Intersection Summary				

9: Pond St & Summer St HCM Signalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	477	61	56	192	1	50	235	118	1	37	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	12	12	12	12	12	12
Grade (%)		-2%			1%			-1%			0%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.96			0.98	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		1908			2008			1808			1850	
Flt Permitted		0.99			0.81			0.96			0.99	
Satd. Flow (perm)		1897			1652			1741			1840	
Peak-hour factor, PHF	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.72	0.72	0.72
Adj. Flow (vph)	10	513	66	62	213	1	55	258	130	1	51	10
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	589	0	0	276	0	0	443	0	0	62	0
Confl. Peds. (#/hr)	2		3	3		2	3		3	2		2
Confl. Bikes (#/hr)			1						1			
Heavy Vehicles (%)	0%	2%	2%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		19.5			19.5			17.7			17.7	
Effective Green, g (s)		19.5			19.5			17.7			17.7	
Actuated g/C Ratio		0.41			0.41			0.37			0.37	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		783			682			652			690	
v/s Ratio Prot												
v/s Ratio Perm		c0.31			0.17			c0.25			0.03	
v/c Ratio		0.75			0.40			0.68			0.09	
Uniform Delay, d1		11.8			9.8			12.4			9.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.6			0.1			2.2			0.0	
Delay (s)		15.4			9.9			14.6			9.6	
Level of Service		B			A			B			A	
Approach Delay (s)		15.4			9.9			14.6			9.6	
Approach LOS		B			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			13.8			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			47.2			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			82.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

9: Pond St & Summer St
Timing Report, Sorted By Phase

2018 No-Build
Timing Plan: Weekday PM



Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	35	35	35	35
Maximum Split (%)	50.0%	50.0%	50.0%	50.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35
End Time (s)	35	0	35	0
Yield/Force Off (s)	30	65	30	65
Yield/Force Off 170(s)	30	65	30	65
Local Start Time (s)	0	35	0	35
Local Yield (s)	30	65	30	65
Local Yield 170(s)	30	65	30	65

Intersection Summary

Cycle Length	70
Control Type	Actuated-Uncoordinated
Natural Cycle	50

Splits and Phases: 9: Pond St & Summer St

 ø2	 ø4
35 s	35 s
 ø6	 ø8
35 s	35 s

10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2018 No-Build
Timing Plan: Weekday PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	1139	781	2	2	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	1266	868	2	2	1
Pedestrians		8	8		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		733				
pX, platoon unblocked					0.37	
vC, conflicting volume	878				2157	885
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878				3291	885
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				36	100
cM capacity (veh/h)	764				3	339
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	1269	870	2	1		
Volume Left	3	0	2	0		
Volume Right	0	2	0	1		
cSH	764	1700	3	339		
Volume to Capacity	0.00	0.51	0.64	0.00		
Queue Length 95th (ft)	0	0	21	0		
Control Delay (s)	0.2	0.0	1504.7	15.6		
Lane LOS	A		F	C		
Approach Delay (s)	0.2	0.0	1008.3			
Approach LOS			F			
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			74.7%		ICU Level of Service	D
Analysis Period (min)			15			

1: Perkins St & Franklin St
 HCM Unsignalized Intersection Capacity Analysis

2018 Build
 Timing Plan: Weekday AM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	👉			👈	👈	
Volume (veh/h)	403	208	37	616	130	24
Sign Control	Free			Free	Stop	
Grade	0%			1%	0%	
Peak Hour Factor	0.92	0.92	0.81	0.81	0.78	0.78
Hourly flow rate (vph)	438	226	46	760	167	31
Pedestrians	1				1	
Lane Width (ft)	12.0				15.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			665		1405	552
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			665		1405	552
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		0	94
cM capacity (veh/h)			933		146	537
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	664	806	197			
Volume Left	0	46	167			
Volume Right	226	0	31			
cSH	1700	933	164			
Volume to Capacity	0.39	0.05	1.20			
Queue Length 95th (ft)	0	4	273			
Control Delay (s)	0.0	1.3	189.7			
Lane LOS		A	F			
Approach Delay (s)	0.0	1.3	189.7			
Approach LOS			F			
Intersection Summary						
Average Delay			23.1			
Intersection Capacity Utilization			78.0%	ICU Level of Service		D
Analysis Period (min)			15			

2: Franklin PI & Franklin St Queues

2018 Build
Timing Plan: Weekday AM

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	625	736	72	1141	649	128
v/c Ratio	0.65	0.50	0.19	0.96	1.32	0.19
Control Delay	20.0	1.4	7.7	35.8	190.5	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	1.4	7.7	35.8	190.5	0.6
Queue Length 50th (ft)	266	0	15	585	~555	0
Queue Length 95th (ft)	284	0	27	616	263	0
Internal Link Dist (ft)	574			678		
Turn Bay Length (ft)		135	145			
Base Capacity (vph)	984	1456	426	1287	491	680
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	0.64	0.51	0.17	0.89	1.32	0.19

Intersection Summary

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

2: Franklin PI & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	456	537	57	901	0	305	0	60	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	13	12	13	12	12	12
Grade (%)		-1%			0%			0%			0%	
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0		5.0			
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		0.97			
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00			
Frt		1.00	0.85	1.00	1.00		1.00		0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1792	1569	1768	1881		1865		1591			
Flt Permitted		1.00	1.00	0.25	1.00		0.95		1.00			
Satd. Flow (perm)		1792	1569	459	1881		1865		1591			
Peak-hour factor, PHF	0.73	0.73	0.73	0.79	0.79	0.79	0.47	0.47	0.47	0.25	0.25	0.25
Adj. Flow (vph)	0	625	736	72	1141	0	649	0	128	0	0	0
RTOR Reduction (vph)	0	0	113	0	0	0	0	0	95	0	0	0
Lane Group Flow (vph)	0	625	623	72	1141	0	649	0	33	0	0	0
Confl. Peds. (#/hr)			4	16			16		4			
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	2%	1%	0%	0%	0%	2%	0%	0%	0%
Turn Type		NA	pt+ov	pm+pt	NA		Prot		Perm			
Protected Phases		2	2 3	1	6		3	8				
Permitted Phases				6					8			
Actuated Green, G (s)		51.6	81.8	61.5	61.5		25.2		25.2			
Effective Green, g (s)		51.6	81.8	61.5	61.5		25.2		25.2			
Actuated g/C Ratio		0.53	0.85	0.64	0.64		0.26		0.26			
Clearance Time (s)		5.0		5.0	5.0		5.0		5.0			
Vehicle Extension (s)		2.0		2.0	2.0		2.0		2.0			
Lane Grp Cap (vph)		956	1327	358	1196		486		414			
v/s Ratio Prot		0.35	0.40	0.01	c0.61		c0.35					
v/s Ratio Perm				0.12					0.02			
v/c Ratio		0.65	0.47	0.20	0.95		1.34		0.08			
Uniform Delay, d1		16.2	1.9	10.0	16.3		35.8		27.0			
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Incremental Delay, d2		1.2	0.1	0.1	16.0		164.5		0.0			
Delay (s)		17.4	2.0	10.1	32.3		200.2		27.0			
Level of Service		B	A	B	C		F		C			
Approach Delay (s)		9.1			31.0			171.7			0.0	
Approach LOS		A			C			F			A	
Intersection Summary												
HCM 2000 Control Delay			54.7			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			96.7			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			72.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

2: Franklin PI & Franklin St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday AM

					
Phase Number	1	2	3	6	8
Movement	WBL	EBT	NBL	WBTL	NBT
Lead/Lag	Lead	Lag			
Lead-Lag Optimize					
Recall Mode	None	Min	None	Min	None
Maximum Split (s)	15	55	30	70	30
Maximum Split (%)	15.0%	55.0%	30.0%	70.0%	30.0%
Minimum Split (s)	10	10	10	10	10
Yellow Time (s)	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					
Flash Dont Walk (s)					
Dual Entry	No	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	70	0	70
End Time (s)	15	70	0	70	0
Yield/Force Off (s)	10	65	95	65	95
Yield/Force Off 170(s)	10	65	95	65	95
Local Start Time (s)	85	0	55	85	55
Local Yield (s)	95	50	80	50	80
Local Yield 170(s)	95	50	80	50	80

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	140

Splits and Phases: 2: Franklin PI & Franklin St

 $\phi 1$	 $\phi 2$	 $\phi 3$
15 s	55 s	30 s
 $\phi 6$		 $\phi 8$
70 s		30 s

3: Res Complex/Dunkins & Franklin St HCM Unsignalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	997	0	1	1092	52	6	0	10	19	1	64
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			0%			0%			0%	
Peak Hour Factor	0.72	0.72	0.72	0.95	0.95	0.95	0.67	0.67	0.67	0.75	0.75	0.75
Hourly flow rate (vph)	36	1385	0	1	1149	55	9	0	15	25	1	85
Pedestrians		12			12			3			12	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1084			654							
pX, platoon unblocked	0.48			0.82			0.57	0.57	0.82	0.57	0.57	0.48
vC, conflicting volume	1216			1388			2737	2678	1400	2675	2651	1201
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	906			1363			2955	2852	1377	2846	2804	874
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			100			0	100	90	0	86	48
cM capacity (veh/h)	351			417			2	9	145	5	9	163
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	1421	1205	24	112								
Volume Left	36	1	9	25								
Volume Right	0	55	15	85								
cSH	351	417	5	20								
Volume to Capacity	0.10	0.00	4.57	5.69								
Queue Length 95th (ft)	9	0	Err	Err								
Control Delay (s)	9.3	0.1	Err	Err								
Lane LOS	A	A	F	F								
Approach Delay (s)	9.3	0.1	Err	Err								
Approach LOS			F	F								
Intersection Summary												
Average Delay			496.8									
Intersection Capacity Utilization			88.4%		ICU Level of Service				E			
Analysis Period (min)			15									

4: Franklin St & Pleasant St HCM Unsignalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	586	772	348	189	12
Sign Control		Free	Free		Stop	
Grade		4%	0%		-4%	
Peak Hour Factor	0.88	0.88	0.90	0.90	0.89	0.89
Hourly flow rate (vph)	3	666	858	387	212	13
Pedestrians			1		1	
Lane Width (ft)			13.0		14.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		482	1256			
pX, platoon unblocked	0.55				0.65	0.55
vC, conflicting volume	1245				1726	1052
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1033				1135	679
tC, single (s)	4.8				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.8				3.5	3.3
p0 queue free %	99				0	95
cM capacity (veh/h)	259				143	248
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	3	666	1244	226		
Volume Left	3	0	0	212		
Volume Right	0	0	387	13		
cSH	259	1700	1700	146		
Volume to Capacity	0.01	0.39	0.73	1.54		
Queue Length 95th (ft)	1	0	0	386		
Control Delay (s)	19.1	0.0	0.0	330.4		
Lane LOS	C			F		
Approach Delay (s)	0.1		0.0	330.4		
Approach LOS				F		
Intersection Summary						
Average Delay			34.9			
Intersection Capacity Utilization			79.7%		ICU Level of Service	D
Analysis Period (min)			15			

5: Summer St & Franklin St Queues

2018 Build
Timing Plan: Weekday AM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	23	440	206	692	304	483
v/c Ratio	0.09	0.74	0.51	0.81	0.44	0.80
Control Delay	11.5	31.1	15.5	29.6	11.2	31.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	31.1	15.5	29.6	11.2	31.9
Queue Length 50th (ft)	4	164	43	211	46	175
Queue Length 95th (ft)	16	266	109	#639	112	318
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	356	785	426	858	1038	972
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	0.06	0.56	0.48	0.81	0.29	0.50

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	331	8	185	621	2	13	71	183	30	346	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.91			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1719	1761		1718	1836			1812			1824	
Flt Permitted	0.20	1.00		0.28	1.00			0.97			0.96	
Satd. Flow (perm)	357	1761		503	1836			1767			1761	
Peak-hour factor, PHF	0.77	0.77	0.77	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Adj. Flow (vph)	23	430	10	206	690	2	15	81	208	34	389	60
RTOR Reduction (vph)	0	1	0	0	0	0	0	99	0	0	7	0
Lane Group Flow (vph)	23	439	0	206	692	0	0	205	0	0	476	0
Confl. Peds. (#/hr)	1		2	2		1	2		2	1		1
Confl. Bikes (#/hr)			1			3						
Heavy Vehicles (%)	0%	6%	0%	1%	3%	0%	0%	0%	1%	0%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	28.4	26.5		38.6	32.7			23.6			23.6	
Effective Green, g (s)	28.4	26.5		38.6	32.7			23.6			23.6	
Actuated g/C Ratio	0.39	0.37		0.53	0.45			0.33			0.33	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	176	646		405	831			577			575	
v/s Ratio Prot	0.00	0.25		c0.06	c0.38							
v/s Ratio Perm	0.05			0.21				0.12			c0.27	
v/c Ratio	0.13	0.68		0.51	0.83			0.36			0.83	
Uniform Delay, d1	14.8	19.3		10.6	17.3			18.5			22.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	2.4		0.4	6.9			0.1			9.1	
Delay (s)	14.9	21.6		10.9	24.2			18.6			31.6	
Level of Service	B	C		B	C			B			C	
Approach Delay (s)		21.3			21.2			18.6			31.6	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			23.2			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			72.2			Sum of lost time (s)		14.0				
Intersection Capacity Utilization			80.7%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

5: Summer St & Franklin St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday AM

						
Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	13	35	42	13	35	42
Maximum Split (%)	14.4%	38.9%	46.7%	14.4%	38.9%	46.7%
Minimum Split (s)	9	10	10	9	10	10
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	0	1	1	0	1	1
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)						
Flash Dont Walk (s)						
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	13	48	0	13	48
End Time (s)	13	48	0	13	48	0
Yield/Force Off (s)	9	43	85	9	43	85
Yield/Force Off 170(s)	9	43	85	9	43	85
Local Start Time (s)	77	0	35	77	0	35
Local Yield (s)	86	30	72	86	30	72
Local Yield 170(s)	86	30	72	86	30	72

Intersection Summary

Cycle Length	90
Control Type	Actuated-Uncoordinated
Natural Cycle	75

Splits and Phases: 5: Summer St & Franklin St

 p1	 p2	 p4
13 s	35 s	42 s
 p5	 p6	 p8
13 s	35 s	42 s

6: Pine St & Franklin St Queues

2018 Build
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	277	858	114	541
v/c Ratio	0.33	0.88	0.16	0.90
Control Delay	11.3	26.3	17.1	44.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.3	26.3	17.1	44.1
Queue Length 50th (ft)	66	296	28	211
Queue Length 95th (ft)	87	446	58	#517
Internal Link Dist (ft)	727	984	947	646
Turn Bay Length (ft)				
Base Capacity (vph)	1212	1414	691	604
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.23	0.61	0.16	0.90

Intersection Summary

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

6: Pine St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	202	3	38	587	148	7	57	16	219	189	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	15	15	15	15	15	15
Grade (%)		2%			-3%			5%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.97			0.97			0.98	
Flt Protected		1.00			1.00			1.00			0.98	
Satd. Flow (prot)		1729			2020			1961			1966	
Flt Permitted		0.98			0.97			0.95			0.82	
Satd. Flow (perm)		1697			1971			1871			1640	
Peak-hour factor, PHF	0.76	0.76	0.76	0.90	0.90	0.90	0.70	0.70	0.70	0.90	0.90	0.90
Adj. Flow (vph)	7	266	4	42	652	164	10	81	23	243	210	88
RTOR Reduction (vph)	0	1	0	0	12	0	0	10	0	0	8	0
Lane Group Flow (vph)	0	276	0	0	846	0	0	104	0	0	533	0
Confl. Peds. (#/hr)	5		6	8		7	6		8	7		5
Heavy Vehicles (%)	20%	12%	0%	0%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		34.2			34.2			25.5			25.5	
Effective Green, g (s)		34.2			34.2			25.5			25.5	
Actuated g/C Ratio		0.49			0.49			0.37			0.37	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		832			967			684			600	
v/s Ratio Prot												
v/s Ratio Perm		0.16			c0.43			0.06			c0.33	
v/c Ratio		0.33			0.87			0.15			0.89	
Uniform Delay, d1		10.8			15.8			14.8			20.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			8.6			0.0			14.6	
Delay (s)		10.9			24.5			14.9			35.3	
Level of Service		B			C			B			D	
Approach Delay (s)		10.9			24.5			14.9			35.3	
Approach LOS		B			C			B			D	
Intersection Summary												
HCM 2000 Control Delay			25.0			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			69.7			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			99.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

6: Pine St & Franklin St
Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday AM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	54	30	54	30
Maximum Split (%)	64.3%	35.7%	64.3%	35.7%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	54	0	54
End Time (s)	54	0	54	0
Yield/Force Off (s)	49	79	49	79
Yield/Force Off 170(s)	49	79	49	79
Local Start Time (s)	0	54	0	54
Local Yield (s)	49	79	49	79
Local Yield 170(s)	49	79	49	79
Intersection Summary				
Cycle Length	84			
Control Type	Actuated-Uncoordinated			
Natural Cycle	75			

Splits and Phases: 6: Pine St & Franklin St

 ø2		 ø4
54 s		30 s
 ø6		 ø8
54 s		30 s

7: Main St & Franklin St & Central St Queues

2018 Build
Timing Plan: Weekday AM

				
Lane Group	WBL	NBT	NBR	SBT
Lane Group Flow (vph)	688	406	286	802
v/c Ratio	0.95	0.47	0.39	1.21
Control Delay	50.0	18.4	13.8	133.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	50.0	18.4	13.8	133.1
Queue Length 50th (ft)	354	152	78	~565
Queue Length 95th (ft)	#570	198	117	#785
Internal Link Dist (ft)	727	1542		692
Turn Bay Length (ft)			50	
Base Capacity (vph)	764	861	734	663
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.90	0.47	0.39	1.21

Intersection Summary

- ~ 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.

7: Main St & Franklin St & Central St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

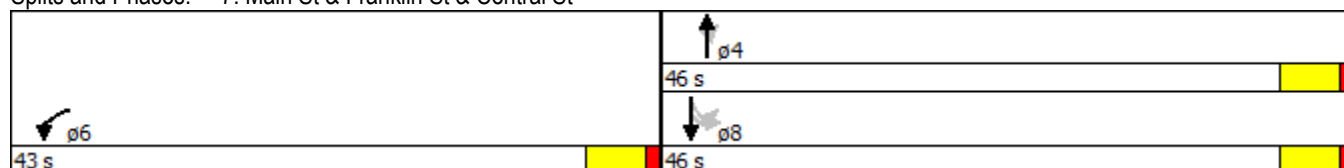
											
Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL	SWR
Lane Configurations											
Volume (vph)	361	245	6	325	126	102	2	111	609	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	14	14	13	12	12	14	14	14	12	12
Grade (%)	4%			3%					1%	0%	
Total Lost time (s)	5.0			5.0	5.0				5.0		
Lane Util. Factor	1.00			1.00	1.00				1.00		
Frpb, ped/bikes	0.99			1.00	0.97				1.00		
Flpb, ped/bikes	1.00			1.00	1.00				1.00		
Frt	0.94			1.00	0.85				1.00		
Flt Protected	0.97			1.00	1.00				0.99		
Satd. Flow (prot)	1749			1824	1489				1893		
Flt Permitted	0.97			1.00	1.00				0.74		
Satd. Flow (perm)	1749			1824	1489				1406		
Peak-hour factor, PHF	0.89	0.89	0.89	0.80	0.80	0.80	0.90	0.90	0.90	0.25	0.25
Adj. Flow (vph)	406	275	7	406	158	128	2	123	677	0	0
RTOR Reduction (vph)	0	0	0	0	32	0	0	0	0	0	0
Lane Group Flow (vph)	688	0	0	406	254	0	0	0	802	0	0
Confl. Peds. (#/hr)	3	7	4		3	3	7	7			
Heavy Vehicles (%)	2%	4%	0%	6%	0%	9%	0%	20%	3%	0%	0%
Turn Type	Prot			NA	Perm		Perm	Perm	NA		
Protected Phases	6			4					8		
Permitted Phases	6			4	4		8	8			
Actuated Green, G (s)	35.9			41.1	41.1				41.1		
Effective Green, g (s)	35.9			41.1	41.1				41.1		
Actuated g/C Ratio	0.41			0.47	0.47				0.47		
Clearance Time (s)	5.0			5.0	5.0				5.0		
Vehicle Extension (s)	2.0			2.0	2.0				2.0		
Lane Grp Cap (vph)	721			861	703				664		
v/s Ratio Prot	c0.39			0.22							
v/s Ratio Perm					0.17				c0.57		
v/c Ratio	0.95			0.47	0.36				1.21		
Uniform Delay, d1	24.8			15.6	14.6				22.9		
Progression Factor	1.00			1.00	1.00				1.00		
Incremental Delay, d2	22.6			0.1	0.1				107.3		
Delay (s)	47.3			15.7	14.7				130.2		
Level of Service	D			B	B				F		
Approach Delay (s)	47.3			15.3					130.2	0.0	
Approach LOS	D			B					F	A	
Intersection Summary											
HCM 2000 Control Delay			67.6								
HCM 2000 Volume to Capacity ratio			1.09								
Actuated Cycle Length (s)			87.0								
Intersection Capacity Utilization			103.6%								
Analysis Period (min)			15								
c Critical Lane Group											

7: Main St & Franklin St & Central St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday AM

			
Phase Number	4	6	8
Movement	NBT	WBL	SBTL
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	None	None	None
Maximum Split (s)	46	43	46
Maximum Split (%)	51.7%	48.3%	51.7%
Minimum Split (s)	10	10	10
Yellow Time (s)	4	4	4
All-Red Time (s)	1	1	1
Minimum Initial (s)	5	5	5
Vehicle Extension (s)	2	2	2
Minimum Gap (s)	2	2	2
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)			
Flash Dont Walk (s)			
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	43	0	43
End Time (s)	0	43	0
Yield/Force Off (s)	84	38	84
Yield/Force Off 170(s)	84	38	84
Local Start Time (s)	43	0	43
Local Yield (s)	84	38	84
Local Yield 170(s)	84	38	84
Intersection Summary			
Cycle Length	89		
Control Type	Actuated-Uncoordinated		
Natural Cycle	90		

Splits and Phases: 7: Main St & Franklin St & Central St



8: Main St & Marble St/Summer St Queues

2018 Build
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	353	364	638	1054
v/c Ratio	0.86	0.90	0.75	0.85
Control Delay	54.9	62.5	29.3	31.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	54.9	62.5	29.3	31.8
Queue Length 50th (ft)	185	210	164	286
Queue Length 95th (ft)	#364	#423	222	356
Internal Link Dist (ft)	821	965	1441	57
Turn Bay Length (ft)				
Base Capacity (vph)	455	406	1068	1565
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.78	0.90	0.60	0.67

Intersection Summary

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

8: Main St & Marble St/Summer St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	141	112	106	215	14	65	410	86	34	761	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	12	12	12	11	12	13
Grade (%)		1%			2%			0%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.95			0.99			0.98			0.98	
Flt Protected		0.99			0.98			0.99			1.00	
Satd. Flow (prot)		1940			1803			3409			3392	
Flt Permitted		0.99			0.98			0.61			0.91	
Satd. Flow (perm)		1940			1803			2102			3078	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	81	152	120	115	234	15	74	466	98	39	865	150
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	335	0	0	364	0	0	638	0	0	1054	0
Confl. Peds. (#/hr)	25		21	29		33	21		29	33		25
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	10%	0%	1%	2%	2%	0%	0%	2%	3%	0%	2%	7%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	8	8		4	4			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		18.1			20.3			36.1			36.1	
Effective Green, g (s)		18.1			20.3			36.1			36.1	
Actuated g/C Ratio		0.20			0.23			0.40			0.40	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		392			408			847			1241	
v/s Ratio Prot		c0.17			c0.20							
v/s Ratio Perm								0.30			c0.34	
v/c Ratio		0.85			0.89			0.75			0.85	
Uniform Delay, d1		34.4			33.5			22.9			24.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		15.8			20.6			3.4			5.4	
Delay (s)		50.2			54.1			26.3			29.6	
Level of Service		D			D			C			C	
Approach Delay (s)		50.2			54.1			26.3			29.6	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			35.5			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			89.5			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			83.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

8: Main St & Marble St/Summer St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday AM



Phase Number	2	4	6	8
Movement	NBTL	WBTL	SBTL	EBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	50	25	50	25
Maximum Split (%)	50.0%	25.0%	50.0%	25.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	50	0	75
End Time (s)	50	75	50	0
Yield/Force Off (s)	45	70	45	95
Yield/Force Off 170(s)	45	70	45	95
Local Start Time (s)	0	50	0	75
Local Yield (s)	45	70	45	95
Local Yield 170(s)	45	70	45	95

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	75

Splits and Phases: 8: Main St & Marble St/Summer St

 2	 4	 8
50 s	25 s	25 s
 6		
50 s		

9: Pond St & Summer St Queues

2018 Build
Timing Plan: Weekday AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	331	606	440	164
v/c Ratio	0.37	0.85	0.83	0.26
Control Delay	12.8	30.2	32.6	14.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.8	30.2	32.6	14.9
Queue Length 50th (ft)	72	183	145	42
Queue Length 95th (ft)	143	#454	190	76
Internal Link Dist (ft)	965	569	871	731
Turn Bay Length (ft)				
Base Capacity (vph)	884	716	761	918
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.37	0.85	0.58	0.18

Intersection Summary

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

9: Pond St & Summer St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	161	108	247	322	13	111	179	49	1	136	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	12	12	12	12	12	12
Grade (%)		-2%			1%			-1%			0%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.95			1.00			0.98			0.99	
Flt Protected		1.00			0.98			0.98			1.00	
Satd. Flow (prot)		1814			1993			1798			1868	
Flt Permitted		0.99			0.71			0.84			1.00	
Satd. Flow (perm)		1795			1453			1543			1864	
Peak-hour factor, PHF	0.83	0.83	0.83	0.96	0.96	0.96	0.77	0.77	0.77	0.87	0.87	0.87
Adj. Flow (vph)	7	194	130	257	335	14	144	232	64	1	156	7
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	331	0	0	606	0	0	440	0	0	164	0
Confl. Peds. (#/hr)	12		11	18		19	11		18	19		12
Heavy Vehicles (%)	0%	3%	1%	0%	2%	8%	1%	2%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		30.3			30.3			21.1			21.1	
Effective Green, g (s)		30.3			30.3			21.1			21.1	
Actuated g/C Ratio		0.49			0.49			0.34			0.34	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		885			717			530			640	
v/s Ratio Prot												
v/s Ratio Perm		0.18			c0.42			c0.29			0.09	
v/c Ratio		0.37			0.85			0.83			0.26	
Uniform Delay, d1		9.7			13.5			18.5			14.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			8.7			10.2			0.1	
Delay (s)		9.8			22.2			28.7			14.6	
Level of Service		A			C			C			B	
Approach Delay (s)		9.8			22.2			28.7			14.6	
Approach LOS		A			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			20.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			61.4			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			90.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

9: Pond St & Summer St
Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday AM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	35	35	35	35
Maximum Split (%)	50.0%	50.0%	50.0%	50.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35
End Time (s)	35	0	35	0
Yield/Force Off (s)	30	65	30	65
Yield/Force Off 170(s)	30	65	30	65
Local Start Time (s)	0	35	0	35
Local Yield (s)	30	65	30	65
Local Yield 170(s)	30	65	30	65
Intersection Summary				
Cycle Length				70
Control Type	Actuated-Uncoordinated			
Natural Cycle				55

Splits and Phases: 9: Pond St & Summer St

 ø2	 ø4
35 s	35 s
 ø6	 ø8
35 s	35 s

10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	26	490	860	3	11	98
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	544	956	3	12	109
Pedestrians		1	1		1	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		758				
pX, platoon unblocked					0.80	
vC, conflicting volume	960				1561	959
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	960				1577	959
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				87	65
cM capacity (veh/h)	716				92	311
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	573	959	12	109		
Volume Left	29	0	12	0		
Volume Right	0	3	0	109		
cSH	716	1700	92	311		
Volume to Capacity	0.04	0.56	0.13	0.35		
Queue Length 95th (ft)	3	0	11	38		
Control Delay (s)	1.1	0.0	50.1	22.7		
Lane LOS	A		F	C		
Approach Delay (s)	1.1	0.0	25.4			
Approach LOS			D			
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			58.5%		ICU Level of Service	B
Analysis Period (min)			15			

1: Perkins St & Franklin St

HCM Unsignalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	➡			➡	➡	
Volume (veh/h)	779	205	14	465	207	23
Sign Control	Free			Free	Stop	
Grade	0%			1%	0%	
Peak Hour Factor	0.94	0.94	0.96	0.96	0.86	0.86
Hourly flow rate (vph)	829	218	15	484	241	27
Pedestrians	4			1	4	
Lane Width (ft)	12.0			14.0	15.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1051		1459	943
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1051		1459	943
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		0	92
cM capacity (veh/h)			667		138	320
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	1047	499	267			
Volume Left	0	15	241			
Volume Right	218	0	27			
cSH	1700	667	146			
Volume to Capacity	0.62	0.02	1.83			
Queue Length 95th (ft)	0	2	503			
Control Delay (s)	0.0	0.6	449.3			
Lane LOS		A	F			
Approach Delay (s)	0.0	0.6	449.3			
Approach LOS			F			
Intersection Summary						
Average Delay			66.4			
Intersection Capacity Utilization			73.1%	ICU Level of Service		D
Analysis Period (min)			15			

2: Franklin PI & Franklin St Queues

2018 Build
Timing Plan: Weekday PM

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1274	50	8	940	174	33
v/c Ratio	0.99	0.03	0.04	0.70	0.62	0.08
Control Delay	38.1	0.4	4.4	10.6	40.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	0.4	4.4	10.6	40.8	0.3
Queue Length 50th (ft)	432	0	1	199	74	0
Queue Length 95th (ft)	#1125	4	5	431	111	0
Internal Link Dist (ft)	590			660		
Turn Bay Length (ft)		135	145			
Base Capacity (vph)	1288	1541	306	1550	591	665
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	0.99	0.03	0.03	0.61	0.29	0.05

Intersection Summary

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

2: Franklin PI & Franklin St

HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1223	48	7	837	0	122	0	23	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	13	12	13	12	12	12
Grade (%)		-1%			0%			0%			0%	
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0		5.0			
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		0.98			
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00			
Frt		1.00	0.85	1.00	1.00		1.00		0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1846	1569	1805	1863		1847		1630			
Flt Permitted		1.00	1.00	0.07	1.00		0.95		1.00			
Satd. Flow (perm)		1846	1569	127	1863		1847		1630			
Peak-hour factor, PHF	0.96	0.96	0.96	0.89	0.89	0.89	0.70	0.70	0.70	0.25	0.25	0.25
Adj. Flow (vph)	0	1274	50	8	940	0	174	0	33	0	0	0
RTOR Reduction (vph)	0	0	6	0	0	0	0	0	28	0	0	0
Lane Group Flow (vph)	0	1274	44	8	940	0	174	0	5	0	0	0
Confl. Peds. (#/hr)			1	17			17		1			
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%
Turn Type		NA	pt+ov	pm+pt	NA		Prot		Perm			
Protected Phases		2	2 3	1	6		3	8				
Permitted Phases				6					8			
Actuated Green, G (s)		54.8	71.7	60.7	60.7		11.9		11.9			
Effective Green, g (s)		54.8	71.7	60.7	60.7		11.9		11.9			
Actuated g/C Ratio		0.66	0.87	0.73	0.73		0.14		0.14			
Clearance Time (s)		5.0		5.0	5.0		5.0		5.0			
Vehicle Extension (s)		2.0		2.0	2.0		2.0		2.0			
Lane Grp Cap (vph)		1224	1361	111	1369		266		234			
v/s Ratio Prot		c0.69	0.03	0.00	c0.50		c0.09					
v/s Ratio Perm				0.05					0.00			
v/c Ratio		1.04	0.03	0.07	0.69		0.65		0.02			
Uniform Delay, d1		13.9	0.7	21.8	5.9		33.4		30.3			
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Incremental Delay, d2		37.0	0.0	0.1	1.2		4.4		0.0			
Delay (s)		50.9	0.7	21.9	7.0		37.8		30.4			
Level of Service		D	A	C	A		D		C			
Approach Delay (s)		49.0			7.1			36.6			0.0	
Approach LOS		D			A			D			A	
Intersection Summary												
HCM 2000 Control Delay			32.0			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			82.6			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			79.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

2: Franklin PI & Franklin St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday PM

					
Phase Number	1	2	3	6	8
Movement	WBL	EBT	NBL	WBTL	NBT
Lead/Lag	Lead	Lag			
Lead-Lag Optimize					
Recall Mode	None	Min	None	Min	None
Maximum Split (s)	15	55	30	70	30
Maximum Split (%)	15.0%	55.0%	30.0%	70.0%	30.0%
Minimum Split (s)	10	10	10	10	10
Yellow Time (s)	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					
Flash Dont Walk (s)					
Dual Entry	No	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	70	0	70
End Time (s)	15	70	0	70	0
Yield/Force Off (s)	10	65	95	65	95
Yield/Force Off 170(s)	10	65	95	65	95
Local Start Time (s)	85	0	55	85	55
Local Yield (s)	95	50	80	50	80
Local Yield 170(s)	95	50	80	50	80

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	90

Splits and Phases: 2: Franklin PI & Franklin St

 $\phi 1$	 $\phi 2$	 $\phi 3$
15 s	55 s	30 s
 $\phi 6$		 $\phi 8$
70 s		30 s

3: Res Complex/Dunkins & Franklin St HCM Unsignalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	22	1267	10	4	942	12	6	0	3	9	1	22
Sign Control		Free			Free			Stop			Stop	
Grade		-1%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.75	0.75	0.75	0.57	0.57	0.57
Hourly flow rate (vph)	24	1362	11	4	1013	13	8	0	4	16	2	39
Pedestrians		9			9			8			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1071			670							
pX, platoon unblocked	0.67			0.70			0.82	0.82	0.70	0.82	0.82	0.67
vC, conflicting volume	1035			1381			2499	2466	1385	2465	2465	1037
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	808			1331			1899	1859	1336	1857	1857	812
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			76	100	97	63	97	84
cM capacity (veh/h)	551			366			34	57	131	42	57	249
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	1397	1030	12	56								
Volume Left	24	4	8	16								
Volume Right	11	13	4	39								
cSH	551	366	45	101								
Volume to Capacity	0.04	0.01	0.27	0.56								
Queue Length 95th (ft)	3	1	22	65								
Control Delay (s)	2.8	0.5	112.2	78.6								
Lane LOS	A	A	F	F								
Approach Delay (s)	2.8	0.5	112.2	78.6								
Approach LOS			F	F								
Intersection Summary												
Average Delay			4.1									
Intersection Capacity Utilization			95.6%		ICU Level of Service				F			
Analysis Period (min)			15									

4: Franklin St & Pleasant St HCM Unsignalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	949	491	330	297	7
Sign Control		Free	Free		Stop	
Grade		4%	0%		-4%	
Peak Hour Factor	0.94	0.94	0.88	0.88	0.87	0.87
Hourly flow rate (vph)	5	1010	558	375	341	8
Pedestrians		4	4		4	
Lane Width (ft)		10.5	13.0		14.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		482	1259			
pX, platoon unblocked	0.75				0.82	0.75
vC, conflicting volume	937				1774	753
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	749				1145	504
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				0	98
cM capacity (veh/h)	649				178	426
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	5	1010	933	349		
Volume Left	5	0	0	341		
Volume Right	0	0	375	8		
cSH	649	1700	1700	181		
Volume to Capacity	0.01	0.59	0.55	1.93		
Queue Length 95th (ft)	1	0	0	653		
Control Delay (s)	10.6	0.0	0.0	483.3		
Lane LOS	B			F		
Approach Delay (s)	0.1		0.0	483.3		
Approach LOS				F		
Intersection Summary						
Average Delay			73.5			
Intersection Capacity Utilization			73.5%		ICU Level of Service	D
Analysis Period (min)			15			

5: Summer St & Franklin St Queues

2018 Build
Timing Plan: Weekday PM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	68	585	171	460	730	257
v/c Ratio	0.20	0.91	0.75	0.65	0.93	0.49
Control Delay	13.7	46.3	37.8	28.1	41.8	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	46.3	37.8	28.1	41.8	21.3
Queue Length 50th (ft)	20	309	53	218	351	95
Queue Length 95th (ft)	42	#506	#140	317	#585	161
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	357	740	229	736	881	587
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	0.19	0.79	0.75	0.63	0.83	0.44

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	567	12	149	393	7	6	292	359	43	119	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1718	1847		1701	1832			1869			1770	
Flt Permitted	0.32	1.00		0.13	1.00			1.00			0.71	
Satd. Flow (perm)	583	1847		224	1832			1864			1277	
Peak-hour factor, PHF	0.99	0.99	0.99	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88
Adj. Flow (vph)	68	573	12	171	452	8	7	324	399	49	135	73
RTOR Reduction (vph)	0	1	0	0	1	0	0	49	0	0	16	0
Lane Group Flow (vph)	68	584	0	171	459	0	0	681	0	0	241	0
Confl. Peds. (#/hr)	3		3	4		4	3		4	4		3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	1%	0%	2%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	35.3	30.4		39.7	32.6			33.3			33.3	
Effective Green, g (s)	35.3	30.4		39.7	32.6			33.3			33.3	
Actuated g/C Ratio	0.42	0.36		0.47	0.38			0.39			0.39	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	308	662		228	704			731			501	
v/s Ratio Prot	0.01	c0.32		c0.06	0.25							
v/s Ratio Perm	0.08			0.29				c0.37			0.19	
v/c Ratio	0.22	0.88		0.75	0.65			0.93			0.48	
Uniform Delay, d1	15.8	25.5		17.4	21.4			24.7			19.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	12.9		11.6	1.7			18.4			0.3	
Delay (s)	15.9	38.4		29.0	23.1			43.1			19.6	
Level of Service	B	D		C	C			D			B	
Approach Delay (s)		36.1			24.7			43.1			19.6	
Approach LOS		D			C			D			B	
Intersection Summary												
HCM 2000 Control Delay			33.3			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			84.8			Sum of lost time (s)		14.0				
Intersection Capacity Utilization			92.1%			ICU Level of Service		F				
Analysis Period (min)			15									
c Critical Lane Group												

5: Summer St & Franklin St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday PM

						
Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	11	38	42	11	38	42
Maximum Split (%)	12.1%	41.8%	46.2%	12.1%	41.8%	46.2%
Minimum Split (s)	9	10	10	9	10	10
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	0	1	1	0	1	1
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)						
Flash Dont Walk (s)						
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	11	49	0	11	49
End Time (s)	11	49	0	11	49	0
Yield/Force Off (s)	7	44	86	7	44	86
Yield/Force Off 170(s)	7	44	86	7	44	86
Local Start Time (s)	80	0	38	80	0	38
Local Yield (s)	87	33	75	87	33	75
Local Yield 170(s)	87	33	75	87	33	75

Intersection Summary

Cycle Length	91
Control Type	Actuated-Uncoordinated
Natural Cycle	80

Splits and Phases: 5: Summer St & Franklin St

 ø1	 ø2	 ø4
11 s	38 s	42 s
 ø5	 ø6	 ø8
11 s	38 s	42 s

6: Pine St & Franklin St
Queues

2018 Build
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	444	625	171	313
v/c Ratio	0.55	0.72	0.27	0.62
Control Delay	13.0	15.4	12.4	20.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.0	15.4	12.4	20.0
Queue Length 50th (ft)	76	106	27	64
Queue Length 95th (ft)	181	249	81	169
Internal Link Dist (ft)	727	984	947	646
Turn Bay Length (ft)				
Base Capacity (vph)	1689	1760	1125	900
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.26	0.36	0.15	0.35
Intersection Summary				

6: Pine St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	362	9	21	326	191	7	104	46	172	64	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	15	15	15	15	15	15
Grade (%)		2%			-3%			5%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.95			0.96			0.98	
Flt Protected		1.00			1.00			1.00			0.97	
Satd. Flow (prot)		1914			1972			1929			1946	
Flt Permitted		0.97			0.97			0.98			0.76	
Satd. Flow (perm)		1855			1927			1893			1523	
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	18	416	10	24	379	222	8	113	50	193	72	48
RTOR Reduction (vph)	0	1	0	0	32	0	0	17	0	0	7	0
Lane Group Flow (vph)	0	443	0	0	593	0	0	154	0	0	306	0
Confl. Peds. (#/hr)	10		18	13		5	18		13	5		10
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		20.3			20.3			15.3			15.3	
Effective Green, g (s)		20.3			20.3			15.3			15.3	
Actuated g/C Ratio		0.45			0.45			0.34			0.34	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		825			857			635			511	
v/s Ratio Prot												
v/s Ratio Perm		0.24			c0.31			0.08			c0.20	
v/c Ratio		0.54			0.69			0.24			0.60	
Uniform Delay, d1		9.2			10.1			11.0			12.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			2.0			0.1			1.3	
Delay (s)		9.6			12.1			11.0			13.9	
Level of Service		A			B			B			B	
Approach Delay (s)		9.6			12.1			11.0			13.9	
Approach LOS		A			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			11.6			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			45.6			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			74.4%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

6: Pine St & Franklin St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday PM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	52	30	52	30
Maximum Split (%)	63.4%	36.6%	63.4%	36.6%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	52	0	52
End Time (s)	52	0	52	0
Yield/Force Off (s)	47	77	47	77
Yield/Force Off 170(s)	47	77	47	77
Local Start Time (s)	0	52	0	52
Local Yield (s)	47	77	47	77
Local Yield 170(s)	47	77	47	77
Intersection Summary				
Cycle Length	82			
Control Type	Actuated-Uncoordinated			
Natural Cycle	50			

Splits and Phases: 6: Pine St & Franklin St

 ø2	 ø4
52 s	30 s
 ø6	 ø8
52 s	30 s

7: Main St & Franklin St & Central St Queues

2018 Build
Timing Plan: Weekday PM

				
Lane Group	WBL	NBT	NBR	SBT
Lane Group Flow (vph)	353	426	363	552
v/c Ratio	0.80	0.37	0.40	0.78
Control Delay	39.6	10.5	8.3	24.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	39.6	10.5	8.3	24.1
Queue Length 50th (ft)	151	93	53	175
Queue Length 95th (ft)	242	201	143	#465
Internal Link Dist (ft)	727	1542		692
Turn Bay Length (ft)			50	
Base Capacity (vph)	747	1141	901	704
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.47	0.37	0.40	0.78

Intersection Summary

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

7: Main St & Franklin St & Central St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

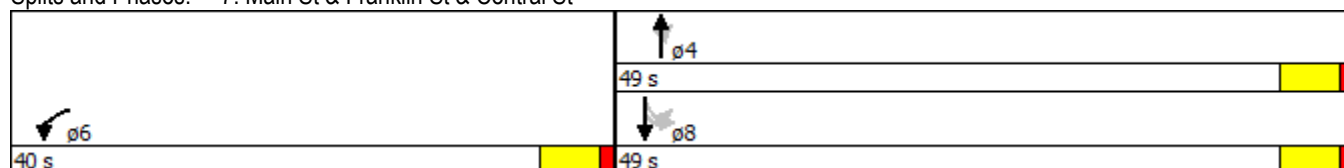
												
Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL	SWR	
Lane Configurations												
Volume (vph)	123	194	19	405	147	198	22	190	307	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	14	14	14	13	12	12	14	14	14	12	12	
Grade (%)	4%			3%					1%	0%		
Total Lost time (s)	5.0			5.0	5.0				5.0			
Lane Util. Factor	1.00			1.00	1.00				1.00			
Frpb, ped/bikes	0.91			1.00	0.93				1.00			
Flpb, ped/bikes	1.00			1.00	1.00				0.99			
Frt	0.91			1.00	0.85				1.00			
Flt Protected	0.98			1.00	1.00				0.98			
Satd. Flow (prot)	1553			1934	1470				1909			
Flt Permitted	0.98			1.00	1.00				0.61			
Satd. Flow (perm)	1553			1934	1470				1196			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.25	0.25	
Adj. Flow (vph)	129	204	20	426	155	208	23	202	327	0	0	
RTOR Reduction (vph)	0	0	0	0	44	0	0	0	0	0	0	
Lane Group Flow (vph)	353	0	0	426	319	0	0	0	552	0	0	
Confl. Peds. (#/hr)	31	33	37		30	31	32	33				
Heavy Vehicles (%)	4%	5%	0%	0%	0%	1%	0%	3%	2%	0%	0%	
Turn Type	Prot			NA	Perm		Perm	Perm	NA			
Protected Phases	6			4					8			
Permitted Phases	6			4	4		8	8				
Actuated Green, G (s)	20.7			44.3	44.3				44.3			
Effective Green, g (s)	20.7			44.3	44.3				44.3			
Actuated g/C Ratio	0.28			0.59	0.59				0.59			
Clearance Time (s)	5.0			5.0	5.0				5.0			
Vehicle Extension (s)	2.0			2.0	2.0				2.0			
Lane Grp Cap (vph)	428			1142	868				706			
v/s Ratio Prot	c0.23			0.22								
v/s Ratio Perm					0.22				c0.46			
v/c Ratio	0.82			0.37	0.37				0.78			
Uniform Delay, d1	25.4			8.1	8.0				11.7			
Progression Factor	1.00			1.00	1.00				1.00			
Incremental Delay, d2	11.7			0.1	0.1				5.2			
Delay (s)	37.1			8.1	8.1				16.9			
Level of Service	D			A	A				B			
Approach Delay (s)	37.1			8.1					16.9	0.0		
Approach LOS	D			A					B	A		
Intersection Summary												
HCM 2000 Control Delay			17.0		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			75.0		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			83.6%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

7: Main St & Franklin St & Central St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday PM

			
Phase Number	4	6	8
Movement	NBT	WBL	SBTL
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	None	None	None
Maximum Split (s)	49	40	49
Maximum Split (%)	55.1%	44.9%	55.1%
Minimum Split (s)	10	10	10
Yellow Time (s)	4	4	4
All-Red Time (s)	1	1	1
Minimum Initial (s)	5	5	5
Vehicle Extension (s)	2	2	2
Minimum Gap (s)	2	2	2
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)			
Flash Dont Walk (s)			
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	40	0	40
End Time (s)	0	40	0
Yield/Force Off (s)	84	35	84
Yield/Force Off 170(s)	84	35	84
Local Start Time (s)	40	0	40
Local Yield (s)	84	35	84
Local Yield 170(s)	84	35	84
Intersection Summary			
Cycle Length	89		
Control Type	Actuated-Uncoordinated		
Natural Cycle	60		

Splits and Phases: 7: Main St & Franklin St & Central St



8: Main St & Marble St/Summer St Queues

2018 Build
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	448	296	844	406
v/c Ratio	0.89	0.79	0.79	0.40
Control Delay	53.9	48.0	30.0	21.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	53.9	48.0	30.0	21.2
Queue Length 50th (ft)	228	142	208	84
Queue Length 95th (ft)	#481	#288	276	116
Internal Link Dist (ft)	821	965	1441	57
Turn Bay Length (ft)				
Base Capacity (vph)	503	431	1719	1654
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.89	0.69	0.49	0.25

Intersection Summary

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

8: Main St & Marble St/Summer St

HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	279	26	109	124	27	30	503	243	19	248	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	12	12	12	11	12	13
Grade (%)		1%			2%			0%			1%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.95			0.96	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		2014			1734			3317			3362	
Flt Permitted		0.99			0.98			0.92			0.88	
Satd. Flow (perm)		2014			1734			3069			2952	
Peak-hour factor, PHF	0.92	0.92	0.92	0.88	0.88	0.88	0.92	0.92	0.92	0.87	0.87	0.87
Adj. Flow (vph)	117	303	28	124	141	31	33	547	264	22	285	99
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	446	0	0	296	0	0	844	0	0	406	0
Confl. Peds. (#/hr)	7		6	7		8	6		7	8		7
Heavy Vehicles (%)	4%	4%	4%	3%	5%	8%	0%	2%	4%	0%	2%	2%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	8	8		4	4			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		20.3			17.7			28.3			28.3	
Effective Green, g (s)		20.3			17.7			28.3			28.3	
Actuated g/C Ratio		0.25			0.22			0.35			0.35	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		502			377			1068			1027	
v/s Ratio Prot		c0.22			c0.17							
v/s Ratio Perm								c0.28			0.14	
v/c Ratio		0.89			0.79			0.79			0.40	
Uniform Delay, d1		29.4			30.0			23.8			20.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		16.7			9.5			3.8			0.1	
Delay (s)		46.1			39.5			27.6			20.1	
Level of Service		D			D			C			C	
Approach Delay (s)		46.1			39.5			27.6			20.1	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			81.3			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			70.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

8: Main St & Marble St/Summer St Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday PM



Phase Number	2	4	6	8
Movement	NBTL	WBTL	SBTL	EBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	50	25	50	25
Maximum Split (%)	50.0%	25.0%	50.0%	25.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	50	0	75
End Time (s)	50	75	50	0
Yield/Force Off (s)	45	70	45	95
Yield/Force Off 170(s)	45	70	45	95
Local Start Time (s)	0	50	0	75
Local Yield (s)	45	70	45	95
Local Yield 170(s)	45	70	45	95

Intersection Summary

Cycle Length	100
Control Type	Actuated-Uncoordinated
Natural Cycle	65

Splits and Phases: 8: Main St & Marble St/Summer St

 2	 4	 8
50 s	25 s	25 s
 6		
50 s		

9: Pond St & Summer St Queues

2018 Build
Timing Plan: Weekday PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	615	293	443	62
v/c Ratio	0.78	0.43	0.70	0.09
Control Delay	21.7	13.5	20.9	11.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.7	13.5	20.9	11.8
Queue Length 50th (ft)	136	53	103	11
Queue Length 95th (ft)	#339	144	229	28
Internal Link Dist (ft)	965	569	871	731
Turn Bay Length (ft)				
Base Capacity (vph)	1264	1104	1158	1224
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.27	0.38	0.05

Intersection Summary

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

9: Pond St & Summer St HCM Signalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	501	61	56	207	1	50	235	118	1	37	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	15	15	15	12	12	12	12	12	12
Grade (%)		-2%			1%			-1%			0%	
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.96			0.98	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		1910			2009			1808			1850	
Flt Permitted		0.99			0.82			0.96			0.99	
Satd. Flow (perm)		1899			1659			1741			1840	
Peak-hour factor, PHF	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.72	0.72	0.72
Adj. Flow (vph)	10	539	66	62	230	1	55	258	130	1	51	10
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	615	0	0	293	0	0	443	0	0	62	0
Confl. Peds. (#/hr)	2		3	3		2	3		3	2		2
Confl. Bikes (#/hr)			1						1			
Heavy Vehicles (%)	0%	2%	2%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		20.4			20.4			17.9			17.9	
Effective Green, g (s)		20.4			20.4			17.9			17.9	
Actuated g/C Ratio		0.42			0.42			0.37			0.37	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		802			700			645			681	
v/s Ratio Prot												
v/s Ratio Perm		c0.32			0.18			c0.25			0.03	
v/c Ratio		0.77			0.42			0.69			0.09	
Uniform Delay, d1		11.9			9.8			12.8			9.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		4.0			0.1			2.4			0.0	
Delay (s)		15.9			9.9			15.3			9.9	
Level of Service		B			A			B			A	
Approach Delay (s)		15.9			9.9			15.3			9.9	
Approach LOS		B			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			48.3			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			83.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

9: Pond St & Summer St
Timing Report, Sorted By Phase

2018 Build
Timing Plan: Weekday PM

				
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	35	35	35	35
Maximum Split (%)	50.0%	50.0%	50.0%	50.0%
Minimum Split (s)	10	10	10	10
Yellow Time (s)	4	4	4	4
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	2	2	2	2
Minimum Gap (s)	2	2	2	2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35
End Time (s)	35	0	35	0
Yield/Force Off (s)	30	65	30	65
Yield/Force Off 170(s)	30	65	30	65
Local Start Time (s)	0	35	0	35
Local Yield (s)	30	65	30	65
Local Yield 170(s)	30	65	30	65
Intersection Summary				
Cycle Length				70
Control Type	Actuated-Uncoordinated			
Natural Cycle				55

Splits and Phases: 9: Pond St & Summer St

 ø2	 ø4
35 s	35 s
 ø6	 ø8
35 s	35 s

10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2018 Build
Timing Plan: Weekday PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	104	1142	782	14	10	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	116	1269	869	16	11	69
Pedestrians		8	8		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		740				
pX, platoon unblocked					0.35	
vC, conflicting volume	892				2393	893
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	892				4071	893
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				0	79
cM capacity (veh/h)	755				1	336
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	1384	884	11	69		
Volume Left	116	0	11	0		
Volume Right	0	16	0	69		
cSH	755	1700	1	336		
Volume to Capacity	0.15	0.52	13.12	0.21		
Queue Length 95th (ft)	13	0	Err	19		
Control Delay (s)	6.8	0.0	Err	18.5		
Lane LOS	A		F	C		
Approach Delay (s)	6.8	0.0	1404.6			
Approach LOS			F			
Intersection Summary						
Average Delay			51.8			
Intersection Capacity Utilization			123.5%		ICU Level of Service	H
Analysis Period (min)			15			

Queues

2018 Build w. Mitigation

Timing Plan: Weekday AM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	23	440	206	692	304	483
v/c Ratio	0.09	0.68	0.56	0.81	0.45	0.81
Control Delay	9.4	24.0	17.0	26.6	13.9	34.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	24.0	17.0	26.6	13.9	34.8
Queue Length 50th (ft)	4	151	44	218	48	162
Queue Length 95th (ft)	13	212	90	#539	140	#401
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	262	1138	371	1186	904	837
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	0.09	0.39	0.56	0.58	0.34	0.58

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build w. Mitigation

Timing Plan: Weekday AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	331	8	185	621	2	13	71	183	30	346	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.91			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1719	1761		1718	1836			1812			1824	
Flt Permitted	0.19	1.00		0.31	1.00			0.97			0.96	
Satd. Flow (perm)	335	1761		556	1836			1767			1761	
Peak-hour factor, PHF	0.77	0.77	0.77	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Adj. Flow (vph)	23	430	10	206	690	2	15	81	208	34	389	60
RTOR Reduction (vph)	0	1	0	0	0	0	0	88	0	0	6	0
Lane Group Flow (vph)	23	439	0	206	692	0	0	216	0	0	477	0
Confl. Peds. (#/hr)	1		2	2		1	2		2	1		1
Confl. Bikes (#/hr)			1			3						
Heavy Vehicles (%)	0%	6%	0%	1%	3%	0%	0%	0%	1%	0%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	29.7	28.2		37.5	32.1			23.1			23.1	
Effective Green, g (s)	29.7	28.2		37.5	32.1			23.1			23.1	
Actuated g/C Ratio	0.42	0.40		0.53	0.45			0.33			0.33	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	170	702		383	833			577			575	
v/s Ratio Prot	0.00	0.25		c0.04	c0.38							
v/s Ratio Perm	0.05			0.24				0.12			c0.27	
v/c Ratio	0.14	0.63		0.54	0.83			0.38			0.83	
Uniform Delay, d1	13.7	17.0		10.3	16.9			18.3			22.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	1.3		0.7	6.8			0.1			9.2	
Delay (s)	13.9	18.3		11.0	23.7			18.4			31.2	
Level of Service	B	B		B	C			B			C	
Approach Delay (s)		18.1			20.8			18.4			31.2	
Approach LOS		B			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			22.2			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			70.7			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			79.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

2018 Build w. Mitigation
Timing Plan: Weekday AM

Intersection Summary		
Cycle Length		90
Control Type	Actuated-Uncoordinated	
Natural Cycle		65

 ρ_1	 ρ_2	 ρ_4
9 s	46 s	35 s
 ρ_5	 ρ_6	 ρ_8
9 s	46 s	35 s

Queues

2018 Build w. Mitigation

Timing Plan: Weekday AM

				
Lane Group	WBL	NBT	NBR	SBT
Lane Group Flow (vph)	688	406	286	802
v/c Ratio	1.03	0.44	0.36	1.08
Control Delay	72.3	15.9	11.6	81.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	72.3	15.9	11.6	81.6
Queue Length 50th (ft)	~418	138	69	~509
Queue Length 95th (ft)	#617	179	103	#729
Internal Link Dist (ft)	727	1542		692
Turn Bay Length (ft)			50	
Base Capacity (vph)	667	922	786	741
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.03	0.44	0.36	1.08

Intersection Summary

- | | |
|---|---|
| ~ | 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. |

Timing Plan: Weekday AM

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GPI Page 5

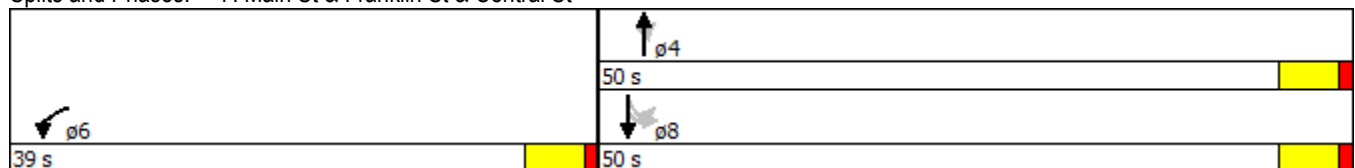
7: Main St & Franklin St & Central St
Timing Report, Sorted By Phase

2018 Build w. Mitigation

Timing Plan: Weekday AM

			
Phase Number	4	6	8
Movement	NBT	WBL	SBTL
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	None	None	None
Maximum Split (s)	50	39	50
Maximum Split (%)	56.2%	43.8%	56.2%
Minimum Split (s)	10	10	10
Yellow Time (s)	4	4	4
All-Red Time (s)	1	1	1
Minimum Initial (s)	5	5	5
Vehicle Extension (s)	2	2	2
Minimum Gap (s)	2	2	2
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)			
Flash Dont Walk (s)			
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	39	0	39
End Time (s)	0	39	0
Yield/Force Off (s)	84	34	84
Yield/Force Off 170(s)	84	34	84
Local Start Time (s)	39	0	39
Local Yield (s)	84	34	84
Local Yield 170(s)	84	34	84
Intersection Summary			
Cycle Length	89		
Control Type	Actuated-Uncoordinated		
Natural Cycle	90		

Splits and Phases: 7: Main St & Franklin St & Central St



10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2018 Build w. Mitigation
Timing Plan: Weekday AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	26	490	860	3	11	98
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	544	956	3	12	109
Pedestrians		1	1		1	
Lane Width (ft)		10.5	11.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		758				
pX, platoon unblocked					0.81	
vC, conflicting volume	960				1561	959
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	960				1576	959
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				87	65
cM capacity (veh/h)	716				94	311
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	29	544	959	12	109	
Volume Left	29	0	0	12	0	
Volume Right	0	0	3	0	109	
cSH	716	1700	1700	94	311	
Volume to Capacity	0.04	0.32	0.56	0.13	0.35	
Queue Length 95th (ft)	3	0	0	11	38	
Control Delay (s)	10.2	0.0	0.0	49.1	22.7	
Lane LOS	B			E	C	
Approach Delay (s)	0.5		0.0	25.3		
Approach LOS				D		
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			58.5%		ICU Level of Service	B
Analysis Period (min)			15			

2: Franklin PI & Franklin St Queues

2018 Build w. Mitigation

Timing Plan: Weekday PM

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1274	50	8	940	174	33
v/c Ratio	0.93	0.03	0.06	0.67	0.72	0.10
Control Delay	25.7	0.2	3.6	8.6	53.3	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	0.2	3.6	8.6	53.3	0.6
Queue Length 50th (ft)	467	0	1	216	87	0
Queue Length 95th (ft)	#1035	3	4	334	122	0
Internal Link Dist (ft)	590			660		
Turn Bay Length (ft)		135	145			
Base Capacity (vph)	1363	1503	142	1463	275	356
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	0.93	0.03	0.06	0.64	0.63	0.09

Intersection Summary

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

2: Franklin PI & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build w. Mitigation

Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1223	48	7	837	0	122	0	23	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	13	12	13	12	12	12
Grade (%)		-1%			0%			0%			0%	
Total Lost time (s)		5.0	5.0	4.0	5.0		5.0		5.0			
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		0.98			
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00		1.00			
Frt		1.00	0.85	1.00	1.00		1.00		0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1846	1569	1805	1863		1847		1629			
Flt Permitted		1.00	1.00	0.06	1.00		0.95		1.00			
Satd. Flow (perm)		1846	1569	111	1863		1847		1629			
Peak-hour factor, PHF	0.96	0.96	0.96	0.89	0.89	0.89	0.70	0.70	0.70	0.25	0.25	0.25
Adj. Flow (vph)	0	1274	50	8	940	0	174	0	33	0	0	0
RTOR Reduction (vph)	0	0	5	0	0	0	0	0	29	0	0	0
Lane Group Flow (vph)	0	1274	45	8	940	0	174	0	4	0	0	0
Confl. Peds. (#/hr)			1	17			17		1			
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%
Turn Type		NA	pt+ov	pm+pt	NA		Prot		Perm			
Protected Phases		2	2 3	1	6		3	8				
Permitted Phases				6					8			
Actuated Green, G (s)		64.5	80.9	69.1	69.1		11.4		11.4			
Effective Green, g (s)		64.5	80.9	69.1	69.1		11.4		11.4			
Actuated g/C Ratio		0.71	0.89	0.76	0.76		0.13		0.13			
Clearance Time (s)		5.0		4.0	5.0		5.0		5.0			
Vehicle Extension (s)		2.0		2.0	2.0		2.0		2.0			
Lane Grp Cap (vph)		1315	1402	95	1422		232		205			
v/s Ratio Prot		c0.69	0.03	0.00	c0.50		c0.09					
v/s Ratio Perm				0.06					0.00			
v/c Ratio		0.97	0.03	0.08	0.66		0.75		0.02			
Uniform Delay, d1		12.1	0.5	23.9	5.1		38.2		34.7			
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00			
Incremental Delay, d2		17.5	0.0	0.1	0.9		11.4		0.0			
Delay (s)		29.6	0.5	24.0	6.0		49.6		34.7			
Level of Service		C	A	C	A		D		C			
Approach Delay (s)		28.5			6.2			47.2			0.0	
Approach LOS		C			A			D			A	
Intersection Summary												
HCM 2000 Control Delay			21.5			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			90.5			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			79.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

2: Franklin PI & Franklin St
Timing Report, Sorted By Phase

2018 Build w. Mitigation
Timing Plan: Weekday PM

					
Phase Number	1	2	3	6	8
Movement	WBL	EBT	NBL	WBTL	NBT
Lead/Lag	Lead	Lag			
Lead-Lag Optimize					
Recall Mode	None	Min	None	Min	None
Maximum Split (s)	7	65	18	72	18
Maximum Split (%)	7.8%	72.2%	20.0%	80.0%	20.0%
Minimum Split (s)	7	10	10	10	10
Yellow Time (s)	4	4	4	4	4
All-Red Time (s)	0	1	1	1	1
Minimum Initial (s)	3	5	5	5	5
Vehicle Extension (s)	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					
Flash Dont Walk (s)					
Dual Entry	No	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	7	72	0	72
End Time (s)	7	72	0	72	0
Yield/Force Off (s)	3	67	85	67	85
Yield/Force Off 170(s)	3	67	85	67	85
Local Start Time (s)	83	0	65	83	65
Local Yield (s)	86	60	78	60	78
Local Yield 170(s)	86	60	78	60	78

Intersection Summary

Cycle Length	90
Control Type	Actuated-Uncoordinated
Natural Cycle	90

Splits and Phases: 2: Franklin PI & Franklin St

 ø1	 ø2	 ø3
7 s	65 s	18 s
 ø6		 ø8
72 s		18 s

5: Summer St & Franklin St Queues

2018 Build w. Mitigation

Timing Plan: Weekday PM

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	68	585	171	460	730	257
v/c Ratio	0.19	0.92	0.76	0.63	0.96	0.53
Control Delay	10.7	43.4	35.5	22.3	45.4	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	43.4	35.5	22.3	45.4	19.5
Queue Length 50th (ft)	14	231	38	166	267	73
Queue Length 95th (ft)	33	#418	#113	254	#495	137
Internal Link Dist (ft)		984		402	380	774
Turn Bay Length (ft)	70		100			
Base Capacity (vph)	355	682	226	734	775	499
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	0.19	0.86	0.76	0.63	0.94	0.52

Intersection Summary

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

5: Summer St & Franklin St HCM Signalized Intersection Capacity Analysis

2018 Build w. Mitigation

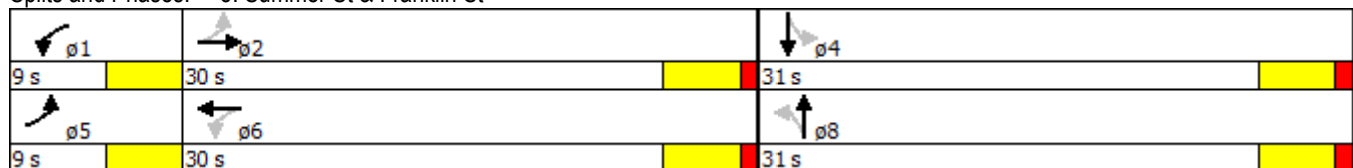
Timing Plan: Weekday PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	567	12	149	393	7	6	292	359	43	119	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	10	11	11	14	14	14	12	12	12
Grade (%)		3%			-6%			-2%			3%	
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1718	1847		1701	1832			1869			1770	
Flt Permitted	0.35	1.00		0.15	1.00			1.00			0.70	
Satd. Flow (perm)	634	1847		262	1832			1864			1251	
Peak-hour factor, PHF	0.99	0.99	0.99	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88
Adj. Flow (vph)	68	573	12	171	452	8	7	324	399	49	135	73
RTOR Reduction (vph)	0	1	0	0	1	0	0	63	0	0	20	0
Lane Group Flow (vph)	68	584	0	171	459	0	0	667	0	0	237	0
Confl. Peds. (#/hr)	3		3	4		4	3		4	4		3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	1%	0%	2%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	28.1	25.2		32.3	27.3			25.5			25.5	
Effective Green, g (s)	28.1	25.2		32.3	27.3			25.5			25.5	
Actuated g/C Ratio	0.40	0.36		0.46	0.39			0.37			0.37	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	300	667		224	717			681			457	
v/s Ratio Prot	0.01	c0.32		c0.05	0.25							
v/s Ratio Perm	0.08			0.30				c0.36			0.19	
v/c Ratio	0.23	0.88		0.76	0.64			0.98			0.52	
Uniform Delay, d1	13.4	20.8		14.3	17.2			21.8			17.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	11.9		12.9	1.5			29.0			0.4	
Delay (s)	13.5	32.7		27.2	18.7			50.8			17.7	
Level of Service	B	C		C	B			D			B	
Approach Delay (s)		30.7			21.0			50.8			17.7	
Approach LOS		C			C			D			B	
Intersection Summary												
HCM 2000 Control Delay			33.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			69.7			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			92.1%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

2018 Build w. Mitigation
Timing Plan: Weekday PM

Intersection Summary

Splits and Phases: 5: Summer St & Franklin St



10: Franklin St & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2018 Build w. Mitigation
Timing Plan: Weekday PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	104	1142	782	14	10	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	116	1269	869	16	11	69
Pedestrians		8	8		8	
Lane Width (ft)		10.5	11.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		740				
pX, platoon unblocked					0.32	
vC, conflicting volume	892				2393	893
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	892				4260	893
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				0	80
cM capacity (veh/h)	755				1	336
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	116	1269	884	11	69	
Volume Left	116	0	0	11	0	
Volume Right	0	0	16	0	69	
cSH	755	1700	1700	1	336	
Volume to Capacity	0.15	0.75	0.52	18.92	0.20	
Queue Length 95th (ft)	13	0	0	Err	19	
Control Delay (s)	10.6	0.0	0.0	Err	18.4	
Lane LOS	B			F	C	
Approach Delay (s)	0.9		0.0	1404.6		
Approach LOS				F		
Intersection Summary						
Average Delay			48.4			
Intersection Capacity Utilization			72.4%		ICU Level of Service	C
Analysis Period (min)			15			

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

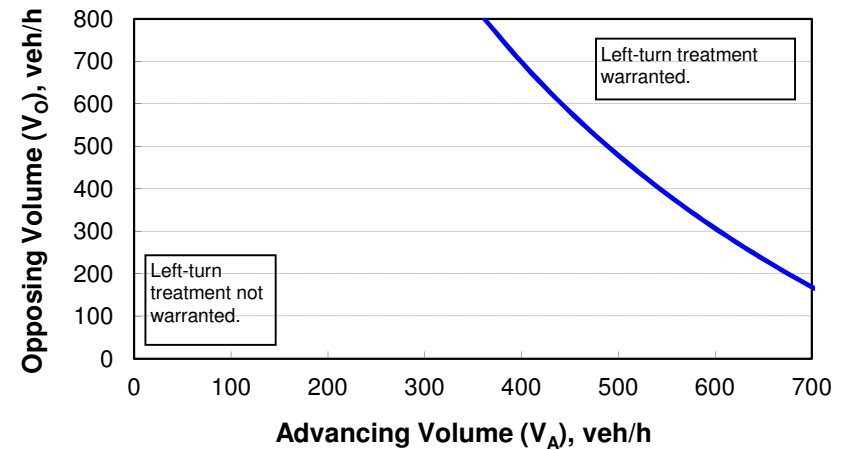
LEFT-TURN LANE WARRANT ANALYSIS

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.**2-lane roadway (English)****INPUT**

Variable	Value
85 th percentile speed, mph:	34
Percent of left-turns in advancing volume (V_A), %:	5%
Advancing volume (V_A), veh/h:	516
Opposing volume (V_O), veh/h:	863

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	340
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	

**CALIBRATION CONSTANTS**

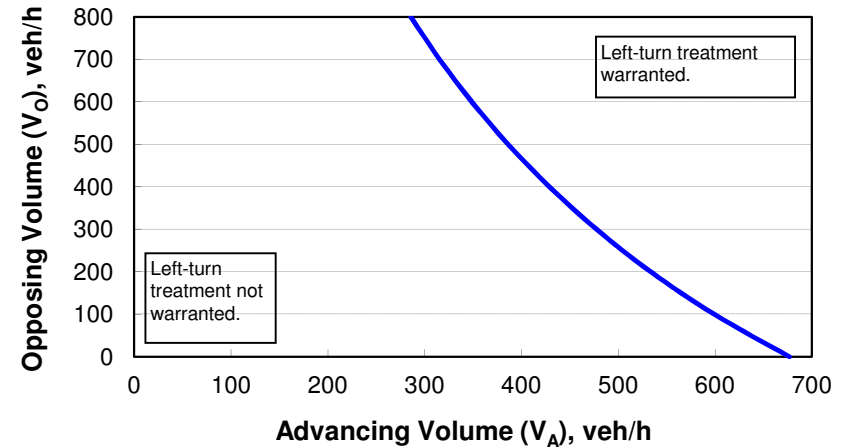
Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.**2-lane roadway (English)****INPUT**

Variable	Value
85 th percentile speed, mph:	34
Percent of left-turns in advancing volume (V_A), %:	8%
Advancing volume (V_A), veh/h:	1246
Opposing volume (V_O), veh/h:	796

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	287
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	

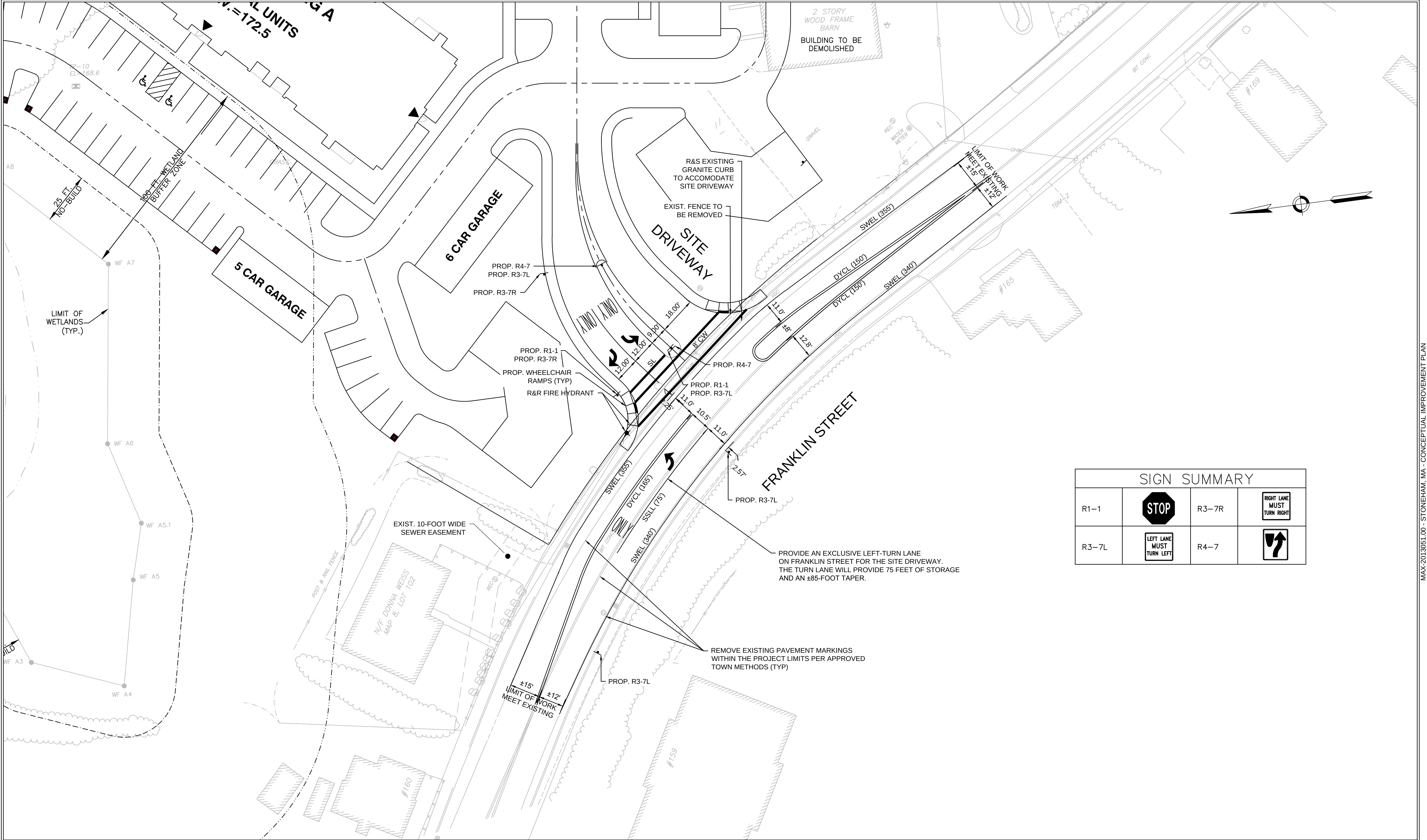
**CALIBRATION CONSTANTS**

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

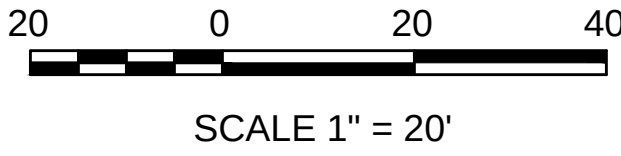
TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

CONCEPTUAL IMPROVEMENT PLAN



SIGN SUMMARY			
R1-1		R3-7R	
R3-7L		R4-7	



GPI

Greenman-Pedersen, Inc.

Engineers, Architects, Planners, Construction Engineers & Inspectors

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PROJECT:	THE COMMONS AT WEISS FARM STONEHAM, MASSACHUSETTS
PREPARED FOR:	WEISS FARM APARTMENTS LLC 100 GRANDVIEW ROAD, SUITE 201 BRAINTREE, MASSACHUSETTS 02184

CONCEPTUAL IMPROVEMENT PLAN

FRANKLIN STREET
STONEHAM, MASSACHUSETTS

DESIGN/DRAWN BY:	HLM
CHECK BY:	JWD
DATE:	6/20/2014
SCALE:	1" = 20'
JOB NO.:	MAX-2013051
FILE NAME:	LT CONCEPT
DRAWING NO.:	1 of 1

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential Development – Stoneham, Massachusetts

TRAFFIC CONTROL SIGNAL WARRANT ANALYSES WORKSHEET

Traffic Control Signal Warrant Analyses

(Based on MUTCD-2009 Edition)

Intersection:	Franklin Street at Residential Site Driveway				
Pop. <10,000? (Y/N)	N	Count Date:	9/19/2013	Analysis Date:	03/24/14
Speed (in mph):	40 mph	Analysis Year:	2018 Build	Analyst:	SEB
Is Major?* (Y/N)		Adjustment Factor:	1	Raw counts	
	#Lanes* (one way)				
EB	Y 1	Major Lanes:	1	Enter the higher number of lanes for the major street approach	
WB	Y 1	Minor Lanes:	1	Enter the number of lanes for the minor street approach you want to analyze	
NB					
SB	N 1	*Note: If intersection is a "T" intersection, leave cells blank for the non-existent approach			

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	17	432	0	0	684	2	0	0	0	0	93	0
8:00	22	536	0	0	868	3	0	0	0	0	102	0
9:00	26	447	0	0	649	3	0	0	0	0	75	0
10:00	26	436	0	0	500	3	0	0	0	0	45	0
11:00	31	505	0	0	502	4	0	0	0	0	32	0
12:00	36	520	0	0	475	4	0	0	0	0	48	0
13:00	39	532	0	0	532	5	0	0	0	0	43	0
14:00	38	546	0	0	615	4	0	0	0	0	33	0
15:00	46	701	0	0	586	5	0	0	0	0	40	0
16:00	60	851	0	0	570	7	0	0	0	0	36	0
17:00	79	963	0	0	594	9	0	0	0	0	39	0
18:00	104	828	0	0	541	12	0	0	0	0	66	0
19:00	75	639	0	0	431	9	0	0	0	0	47	0

Time	Σ EB	Σ WB	Σ NB	Σ SB	Σ Major	Σ Minor	Σ Max Minor	W1 A	W1 B	W1combo	W2	W3
7:00	449	686	0	93	1136	93	93	N	Y	N	Y	N
8:00	558	871	0	102	1429	102	102	N	Y	N	Y	N
9:00	473	652	0	75	1125	75	75	N	Y	N	N	N
10:00	462	503	0	45	965	45	45	N	N	N	N	N
11:00	536	505	0	32	1042	32	32	N	N	N	N	N
12:00	556	479	0	48	1035	48	48	N	N	N	N	N
13:00	571	537	0	43	1108	43	43	N	N	N	N	N
14:00	584	620	0	33	1204	33	33	N	N	N	N	N
15:00	746	591	0	40	1338	40	40	N	N	N	N	N
16:00	911	577	0	36	1487	36	36	N	N	N	N	N
17:00	1042	603	0	39	1645	39	39	N	N	N	N	N
18:00	932	553	0	66	1485	66	66	N	N	N	N	N
19:00	713	440	0	47	1153	47	47	N	N	N	N	N
								0 of 8	3 of 8	0 of 8	2 of 4	0 of 1

Warrant Analyses

Warrant 1: Condition A Minimum Vehicular Volume Warrant is Not Met
Warrant 1: Condition B Interruption of Continuous Traffic Warrant is Not Met
Warrant 1: Combination of Warrants 1A and 1B is Not Met
Warrant 2: Four-Hour Warrant is Not Met
Warrant 3: One-Hour Warrant is Not Met