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BEACON STREET HOTEL
Traffic Impact and Access Study

traffic solutions
resources reliability results

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Executive Summary

This Traffic Impact and Access Study (TIAS) has been performed for a proposed hotel and restaurant at 369-371 Beacon Street in Somerville, Massachusetts, a site currently occupied by a gas station and auto repair shop. The study was conducted to evaluate the impact of the redevelopment on the surrounding roadway network. The study provides detailed information, including study methodology, field observations, and findings.

In summary, existing traffic volumes were recorded in December of 2008. However, the traffic volumes collected were lower than data collected in 1998; possibly due to Somerville Avenue construction. Therefore, the 1998 data was grown for ten years to establish the existing 2008 traffic volumes. The volumes were projected five years into the future in conformance with the traffic study guidelines Executive Office of Transportation & Public Works (EOTPW) and Executive Office of Environmental & Energy Affairs (EOEEA). Traffic analyses were performed and comparisons were made between existing conditions, no-build conditions (existing conditions projected to design year) and the build conditions (no-build conditions with the addition of site trips) for the following intersections:

- Somerville Avenue at Beacon Street/ Mossland Street/ Adelaide Road (signalized);
- Beacon Street at Oxford Street (unsignalized);
- Beacon Street at Roseland Street (unsignalized); and
- Beacon Street at Site Drive (unsignalized)

The number of trips generated by the new use is a nominal amount as compared to the trips associated with the existing permitted use, a gas station. Using industry accepted trip generation values for this type of development, it is clear that the impact on surrounding streets is negligible during the peak hours. The proposed project is expected to attract only 11 net new vehicles during the morning peak hour and 12 net new vehicles in the evening peak hour; approximately one new vehicle every five minutes.

Using a conservative approach, the signalized and the unsignalized intersections will operate at the same LOS with or without the project. According to the crash history, safety has not been an issue at the study area intersections. Based on these findings, the proposed project will have a negligible impact, if any, on the transportation network surrounding the project during the peak hours.

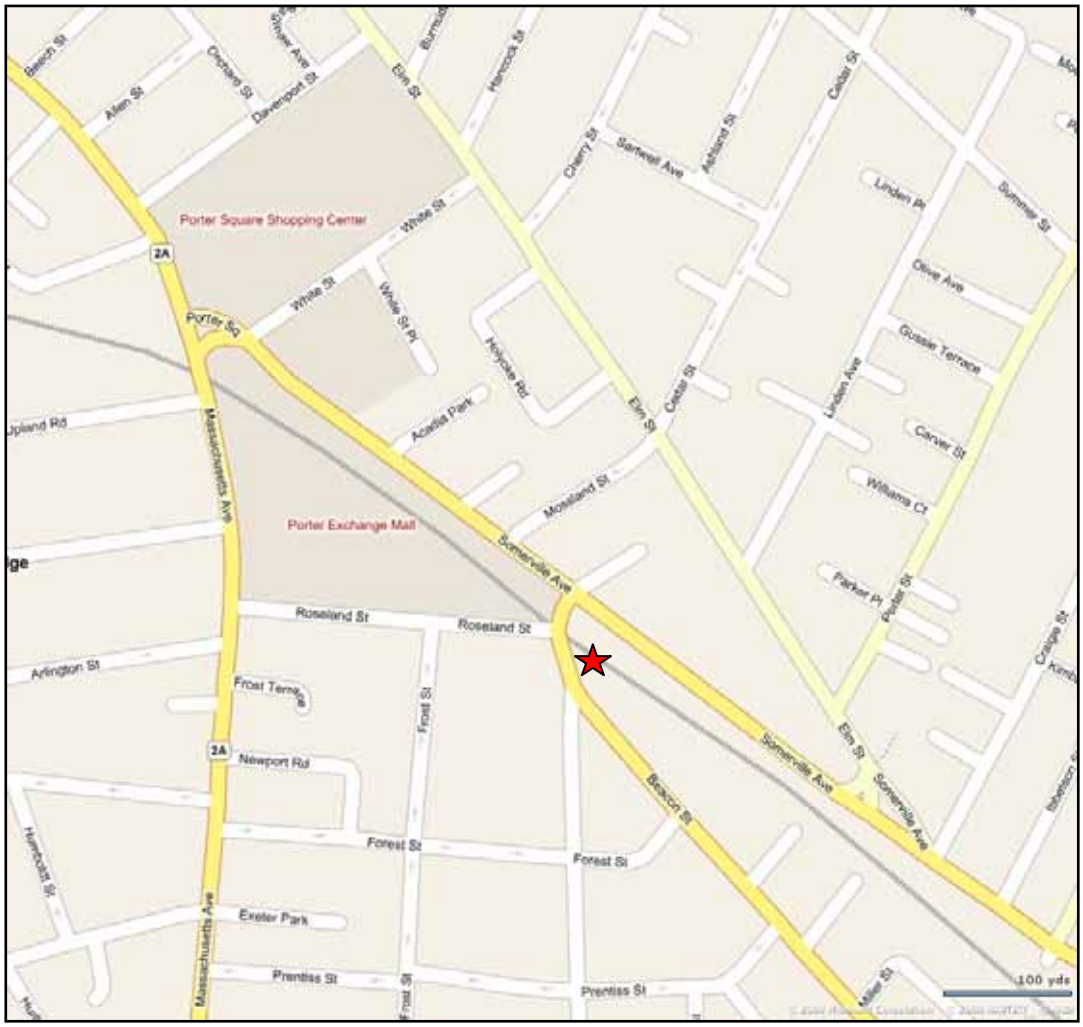
Finally, the proposed driveway is situated at the southern end of the site, which provides the greatest distance between the driveway and the intersection of Somerville Avenue at Beacon Street. This is the ideal driveway location to minimize the impact of the development on the roadway network.

1.0 Introduction

The subject property is an approximately 9,670 square feet lot located at 369-371 Beacon Street in Somerville, Massachusetts (Figure 1). Although no longer in operation, occupying the lot is a gas station with a small ancillary single-story building that houses an office/retail storefront and a mechanic's bay. It is the applicant's intention to demolish and remove the existing building and service pumps and in their place construct a new hotel building with 35 guestrooms and a 60 seat restaurant. An underground parking structure on the lot would provide 28 parking spaces.

Currently, vehicular access to the site is provided from Beacon Street, an urban arterial with one travel lane in each direction. Vehicles entering or exiting the site do so via existing curb cuts on Beacon Street. Vehicular access to the proposed underground parking at the hotel would also be from Beacon Street, where a driveway ramp capable of accommodating two-way traffic would be located.

Figure 1 Locus - Proposed Beacon Street Hotel, Somerville, MA



2.0 Scope

Traffic Solutions, LLC has compiled and analyzed traffic data to evaluate the potential effect of the project on the surrounding roadway network. This Traffic Impact and Access Study (TIAS) includes a substantive evaluation of the overall operations, safety as well and potential traffic impacts of the project.

Traffic Solutions, LLC, has analyzed the existing intersection capacity at locations that were identified through conversations with the City Traffic Engineer. The capacity analyses include the level of service, volume-to-capacity ratio, 50th percentile queue (i.e., average), and 95th percentile queue for all time periods. Data were collected and analyzed to ensure that the project will not have significant negative impacts on area intersections, or on the surrounding roadway network.

2.1 Methodology and LOS Criteria

This TIAS presents the traffic related data collected, analysis methods, and results for the proposed hotel project. The methodology comports with standard approaches and recommendations as identified by the traffic study guidelines published by the Executive Office of Transportation & Public Works (EOTPW) and Executive Office of Environmental & Energy Affairs (EOEEA), and the Institute of Transportation Engineers (ITE) recommended practices. Once all of the data were collected and processed, a capacity analysis was performed on all of the study area intersections, and a level of service (LOS) was calculated for each intersection identified by the City Engineer.

LOS is a term used to describe the quality of the traffic flow on a roadway facility at a particular point in time. It is an aggregate measure of travel delay, travel speed, congestion, driver discomfort, convenience, and safety based on a comparison of roadway system capacity to roadway system travel demand. Operating levels of service are reported on a scale from A to F, with A representing the best operating conditions and F representing the worst operating conditions (TABLE 1). Depending on the type of facility being analyzed, LOS A represents free-flow or uncongested conditions with little or no delay to motorists, while LOS F represents a forced-flow condition with long delays and traffic demands exceeding roadway capacity.

TABLE 1 LEVEL OF SERVICE CRITERIA – INTERSECTIONS

	Average Delay per Vehicle (Seconds)	
Level of Service	Signalized Intersections	Unsignalized Intersections
A	≤10.0	≤10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 to 80.0	35.1 to 50.0
F	>80.0	>50.0

Source: Highway Capacity Manual, Special Report 209, Fourth Edition, Transportation Research Board, National Research Council, Washington, DC, 2000.

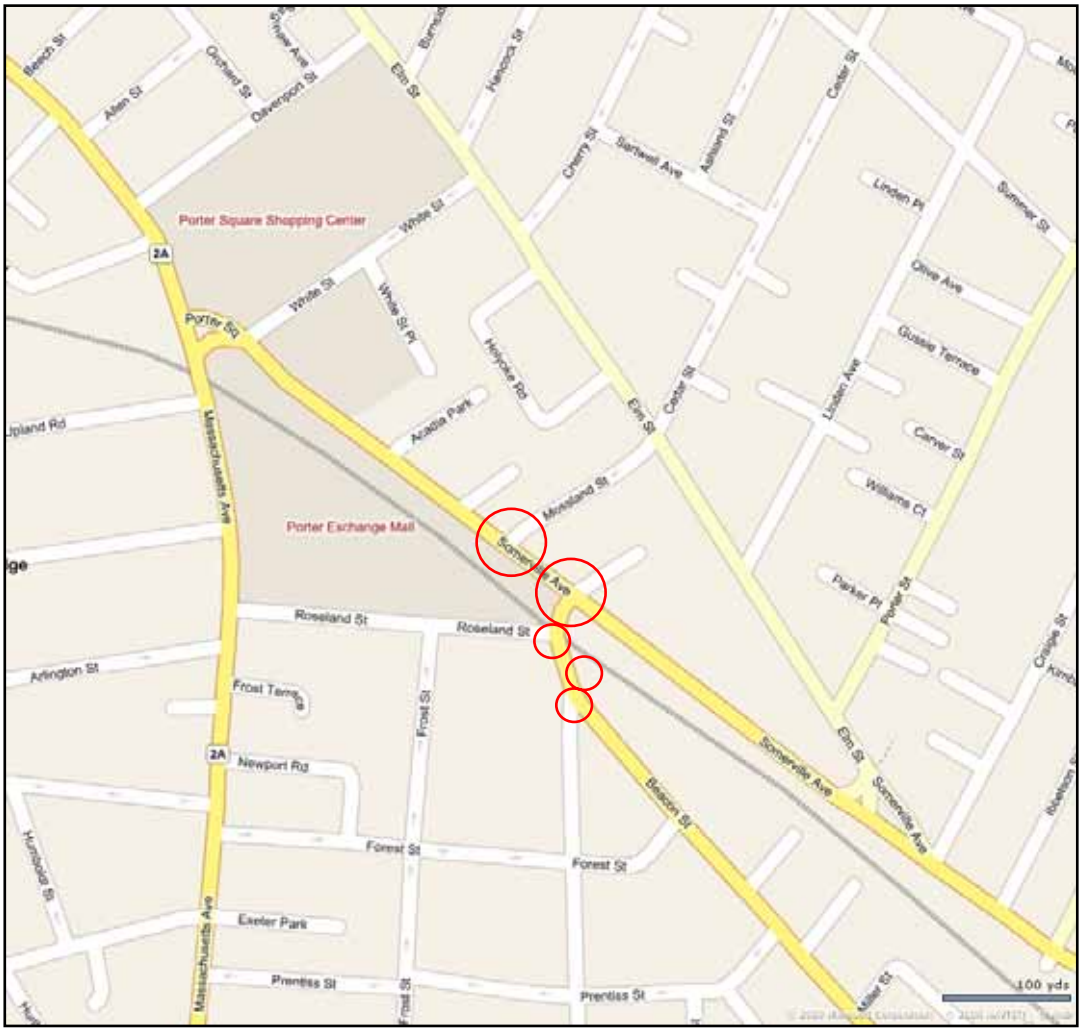
LOS D is often cited as the design standard for suburban roadways. However, when trying to establish minimum "acceptable" LOS thresholds for existing roadways a number of factors must be considered. These include existing operating levels of service on other similar and nearby facilities, the duration of the peak traffic periods, the feasibility and cost of providing traffic mitigation, and applicable state and local regulations.

2.2 Study Area

The scope for this TIAS was established by the City Traffic Engineer and includes one traffic signal (including two intersections) and three unsignalized intersections (Figure 2), one of which is the proposed site drive to the underground parking area at the hotel. The three intersections studied are:

- Somerville Avenue at Beacon Street/Adelaide Road and Somerville Avenue at Mossland Street (signalized);
- Beacon Street at Oxford Street (unsignalized);
- Beacon Street at Roseland Street (unsignalized); and
- Beacon Street at Site Drive (unsignalized)

Figure 2 – Study Area Intersections – Proposed Hotel – Somerville, MA



3.0 Existing Conditions Inventory

3.1 Description of Roadways

Five streets are located within the scope of this TIAS and are all in the immediate vicinity of the proposed hotel. Data were recorded for each of these five roadways.

Somerville Avenue

Originating at the Somerville/Cambridge City Line in the Porter Square neighborhood of Cambridge, Somerville Avenue has one travel lane in each direction and runs roughly in an east west direction for 1.3 miles before terminating in the heart of Somerville's Union Square. One of Somerville's urban principal arterials, the Avenue is presently undergoing a major roadway reconstruction project that is scheduled for completion in 2010. Sidewalks are located on each of Somerville Avenue throughout its entire length, while the Avenue is bordered primarily by a mix of residential and retail uses.

Somerville Avenue runs just north of the project site and intersects with Beacon Street approximately 100 feet from the proposed hotel. A fully-actuated traffic signal will control both Somerville Avenue at Beacon Street and the nearby intersection of Somerville Avenue and Mossland Street. Both intersections have been controlled by the same controller prior to and during construction. Somerville Avenue has a speed limit of 30 mph where it intersects with Beacon Street. On-street parking is permitted on both sides of Somerville Avenue at various locations.

Beacon Street

Originating about 100 feet north of the project site at its intersection with Somerville Avenue, Beacon Street has one travel lane in each direction and runs roughly North to South for 1.1 miles to the Cambridge City Line, where it becomes Hampshire Street. A heavily travelled urban principal arterial, Beacon Street is also scheduled for major reconstruction throughout its length, with work anticipated to commence sometime in 2011. Sidewalks are located on each of Beacon Street throughout its entire length, while the Street is bordered primarily by a mix of residential and retail uses.

With direct frontage on Beacon Street, two existing curb cuts provide for vehicular access to the project site. The proposal would eliminate one of these existing cub cuts and realign the other, moving it as far from the intersection with Somerville Avenue as possible. On-street parking is permitted on both sides of Beacon Street at various locations, though not immediately in front of the subject property. Beacon Street has a speed limit of 30 mph.

Mossland Street

Mossland Street in Somerville is a short one-way street that connects Elm Street through to Somerville Avenue. It is essentially an extension of Cedar Street. A fully-actuated signal at its intersection with Somerville Avenue will exist once the State's Somerville Avenue roadway reconstruction is complete. As stated above, the signal controls both Somerville Avenue at Mossland Street and Somerville Avenue at Beacon Street. Mossland Street has sidewalks on both sides and is bordered exclusively by one-, two-, and multi-family homes. On-street parking is permitted on both sides of the Street except near the intersection of Somerville Avenue where

parking is restricted to provide two storage lanes. There is no posted speed limit on Mossland Street.

Adelaide Road

Adelaide Road is one leg of a four-legged signalized intersection, with Beacon Street and Somerville Avenue (two legs) being the others. A short, dead-end private way, Adelaide Road services solely as an access drive to and from four multi-family apartment buildings. There are no sidewalks on Adelaide Road and the road is not formally laid out, with an absence of pavement markings and an informal surface parking arrangement present on both sides of the street. Adelaide Road has no posted speed limit.

Oxford Street

Oxford Street, which is almost entirely in the city of Cambridge, has sidewalks on both sides and is bordered almost exclusively by residential properties. On-street parking is permitted on both sides of Oxford Street and the street has a speed limit of 25 mph. Oxford Street, which has one travel lane in each direction, runs north-south parallel to Massachusetts Avenue connecting Kirkland Street in the Harvard University campus to Beacon Street in Somerville. The Cambridge-Somerville City Line runs almost through the unsignalized intersection of Oxford Street and Beacon Street, which is located directly opposite the southern end of the subject property.

Roseland Street

Roseland Street, a one way-street which is almost entirely in the city of Cambridge, has sidewalks on both sides and is bordered almost exclusively by residential properties. On-street parking is permitted on both sides of Roseland Street and the street is assumed to have a speed limit of 30 mph since it is not posted. Roseland Street, which has one travel lane in the westbound direction, runs exclusively east to west connecting Beacon Street in Somerville to Massachusetts Avenue in Cambridge. The Cambridge-Somerville City Line on Roseland Street is just west of Beacon Street. Roseland Street is located directly opposite the northern end of the subject property.

3.2 Description of Intersections

Each of the intersections identified by the City Traffic Engineer in the scoping of this TIAS has been inventoried, with the geometric and operational characteristics of each intersection recorded.

Somerville Avenue at Beacon Street/Adelaide Road and
Somerville Avenue at Mossland Street

The intersection of Somerville Avenue at Beacon Street and Adelaide Road is controlled by the same controller as the nearby intersection of Somerville Avenue with Mossland Street, which is approximately 200 feet to the west.

The overall signalized intersection is essentially a five-legged intersection, with Somerville Avenue at the west end, in the middle, and at the east end. Mossland Street is the northern leg and Beacon Street is the southern leg. Adelaide Road is also located on the northern leg directly opposite Beacon Street (versus Mossland Street which is offset to the west by approximately 200 feet).

Mossland Street, the southbound approach has two lanes at its approach to Somerville Avenue; an exclusive "left turn only" lane and an exclusive "right turn only" lane. Mossland Street has no receiving lanes due to the fact it is a one-way street.

Somerville Avenue, the eastbound approach has two through lanes at its approach to Mossland Street and one through lane and an exclusive "right turn only" lane at its approach to Beacon Street. Somerville Avenue has two receiving lanes that eventually taper to one lane. Somerville Avenue, the westbound approach has one through lane and an exclusive "left turn only" lane at its approach to Beacon Street and two through lanes its approach to Mossland Street. Somerville Avenue has two receiving lanes that eventually taper to one lane.

Beacon Street, the northbound approach has one through lane and an exclusive "left turn only" lane at its approach to Somerville Avenue. Beacon Street has one wide receiving lane. Adelaide Road, another southbound approach has one all purpose lane at its approach to Somerville Avenue. Adelaide Road has one narrow receiving lane.

The signal is fully actuated with five phases based on the signal plans provided by the City as part of the Somerville Avenue Reconstruction Project. The preferential phase sequence is as follows:

1. A westbound protected left (Phase 1) runs with the westbound through movement (Phase 6).
2. The eastbound through movement (Phase 2) runs with the westbound through movement, with a permissive westbound left.
3. An exclusive pedestrian phase (only when actuated).
4. Beacon Street northbound moves along with the Adelaide Road southbound move, both with permissive left turns.
5. Mossland Street southbound left and right turns.

Land use in the vicinity of this intersection is exclusively residential. On-street parking is not permitted on Somerville Avenue between these two intersections, but is permitted a couple of hundred feet prior to the Somerville Avenue approaches to the intersections.

Beacon Street at Oxford Street

Beacon Street at Oxford Street is a three-legged intersection. With a travel lane in each direction, Oxford Street intersects with Beacon Street at an obtuse angle, which allows for a relatively free movement for those vehicles travelling southbound on Beacon Street and turning southbound onto Oxford Street. A ladder type crosswalk exists at the intersection on Oxford Street, and the Oxford Street northbound lane is the only travel lane at the intersection which is under STOP control.

Land use at this intersection is primarily residential, though a small retail storefront also exists at the intersection. On-street parking is also permitted on both Oxford Street and Beacon Street in the immediate vicinity of the intersection.

Beacon Street at Roseland Street

Beacon Street at Roseland Street is a three-legged intersection. With one travel lane in the westbound direction, Roseland Street intersects with Beacon Street approximately 100 feet south of Somerville Avenue. A ladder crosswalk exists at the intersection on Roseland Street, and none of the travel lanes at the intersection is under any type of control.

Land use at this intersection is primarily residential, though a small retail storefront also exists at the intersection. On-street parking is also permitted on Roseland Street and partially on Beacon Street in the immediate vicinity of the intersection.

Beacon Street at Site Drive

This intersection would be three-legged, with the site drive being the northeastern leg and Beacon Street continuing to the north and south. The site drive, which leads directly to a ramp, would have one lane entering and one lane exiting and would be used for access to the below grade parking structure as well as a loading area and trash storage area. The site drive would be under STOP control similar to any other signed or unsigned private driveway entering onto a City Street.

The proposed driveway is situated at the southern end of the site, which provides the greatest distance between the driveway and the intersection of Somerville Avenue at Beacon Street. This is the ideal driveway location to minimize the impact of the development on the roadway network.

Land use at this intersection is primarily residential, though a few small retail storefronts, as mentioned above, are also in close proximity.

3.3 Description Multi-Modal Infrastructure/Services

Transit

The Porter Square area is served by multiple MBTA bus routes including route numbers 77, 83, 87, 88, 90 and 96. Porter Square is also the location of a MBTA subway (Red Line) and commuter rail station (Fitchburg-North Station). This MBTA station is located within 1000 feet of the proposed project site. The close proximity of these transit services means in all likelihood a significant number of hotel and restaurant patrons will use these services. Being a location that is conducive to the use of transit, credits have been taken for this mode of transportation, as will be explained in more detail in Section 6.

Pedestrian Access

Beacon Street, Somerville Avenue, Mossland Street, and Oxford Street all have sidewalks on both sides of the street. It is likely that pedestrians (non-hotel guests) will visit the proposed restaurant from the surrounding residential neighborhoods, and similarly, for hotel guests to walk to the nearby neighborhoods of Porter Square, Davis Square, and Harvard Square. Being a location that is conducive to pedestrian activity, credits have been taken for this mode of transportation, as will be explained in more detail in Section 6.

3.4 Traffic Volumes

Manual TMCs were conducted at intersections throughout the study area during the AM and PM peak hours. However, historical traffic count data were used instead since the traffic volumes collected were deemed to be lower than expected due to the construction activity on Somerville Avenue over the past year (per the City Traffic Engineer). The traffic count data collected as part

of the Functional Design Report (FDR) for the reconstruction of Somerville Avenue were used. Although historical data suggests that traffic growth has not increased over the past decade and in some cases has decreased, the 1998 data was grown to establish a conservative estimate of 2008 traffic volumes. This data (from 1998) was grown ten years to 2008 using a 0.25% per year growth factor to produce 2008 existing conditions traffic volume.

The sole exception to the use of 1998 data is the count data for Beacon Street at Oxford Street. The December 2008 traffic count data were used. The traffic data between the intersection of Somerville Avenue and Beacon Street were balanced with the traffic volumes from Beacon Street at Oxford Street to produce traffic data at Beacon Street and the site drive as well as Beacon Street at Roseland Street.

Peak Hour Traffic Volumes

The traffic counts from the Somerville Avenue FDR were assumed to be collected for each intersection during the two hour morning peak period (7:00 AM to 9:00 AM), two hour evening peak period (4:00 PM to 6:00 PM). Traffic counts were collected for each intersection during the three hour morning peak period (6:30 AM to 9:30 AM) and three hour evening peak period (4:00 PM to 7:00 PM) in December of 2008 but as described previously, they were not used except for Beacon Street at Oxford Street. The FDR for the Somerville Avenue Reconstruction Project did not include count data for the intersection of Beacon Street at Oxford Street.

The peak hours were then identified. This hour represents the highest traffic volume entering the intersection as a total of all approaches during the four highest consecutive 15 minute intervals. The morning peak one period and the evening peak one hour period were used in the analyses.

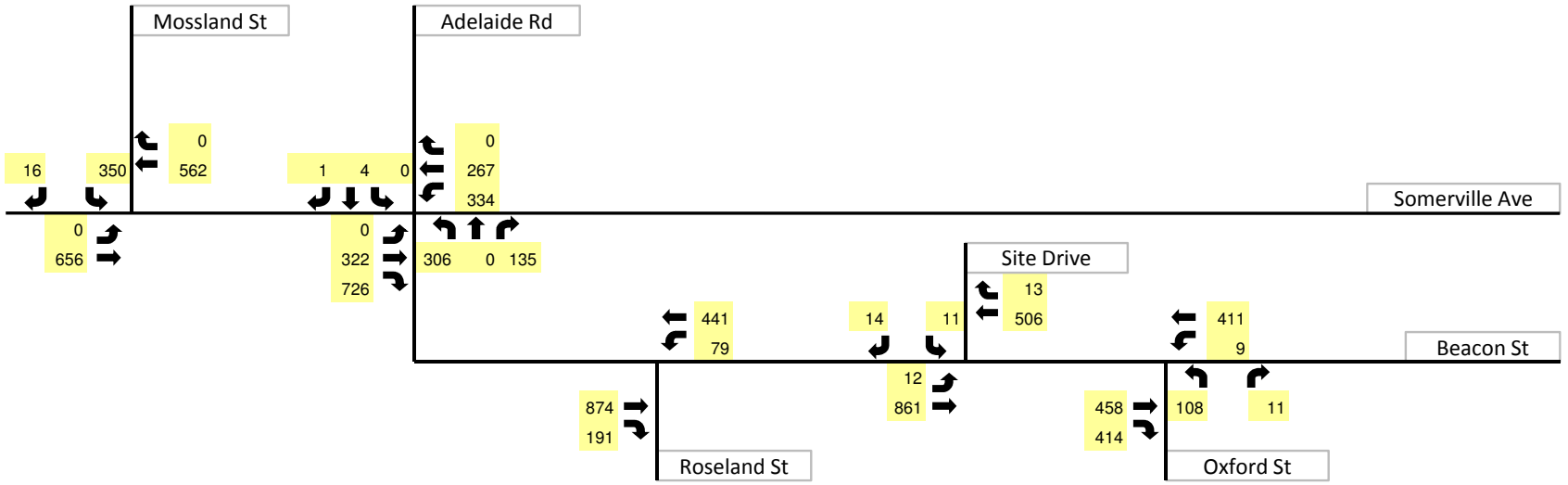
The peak hour traffic volumes used at the study area intersections are illustrated in a figure at the end of this section (Figure 3). The turning movement count data as well as the researched historical data are provided in the Appendix.

Seasonal Adjustment

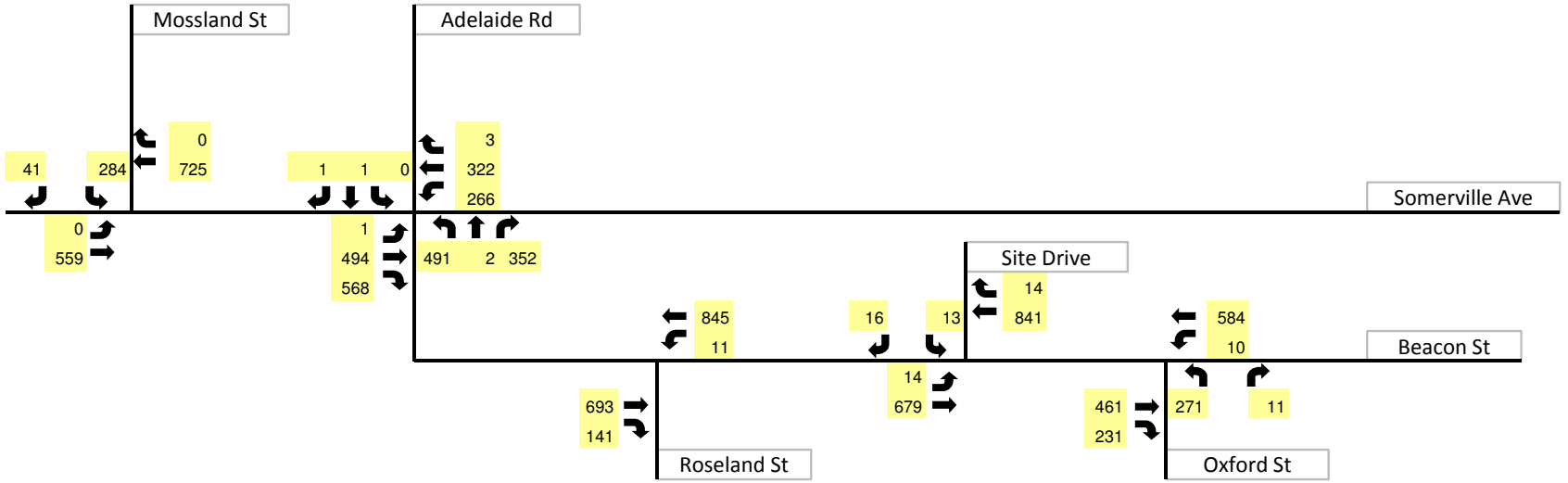
Roadway volumes vary throughout the year. Since traffic volume data are collected during a finite period of time, they must be adjusted to reflect an average workday. Adjusting the collected data requires a comparison to annual trends. It has been assumed that the traffic count data from the Functional Design Report for the Somerville Avenue Reconstruction Project included an adjustment to average month conditions.

Figure 3 - 2008 Existing Traffic Volumes

AM PEAK HOUR



PM PEAK HOUR



3.5 Safety

To identify trends as well as locations where certain types of crashes are over represented, crash data were gathered for all of the study area intersections from the Mass Highway crash database for the three most recent available years. City crash data is typically used to provide for more recent data (up to the present day); however, slightly older Mass Highway data were used due to the construction activity present on Somerville Avenue over the last year or so. The construction activity impacted the accuracy of the traffic volume in the area and may have had the same impacts on the crash history.

Crash data were obtained from MassHighway for the latest available three year period (Table 2). These data were evaluated for specific trends to determine whether or not the studied locations were considered "high-crash" locations and warrant further analysis.

Table 2 MHD CRASH DATA BY YEAR AND LOCATION (2005 – 2007)
SOMERVILLE/CAMBRIDGE

Location	Year 2005	2006	2007	Total
Beacon Street & Oxford Street	0	2	2	**4**
Somerville Avenue & Beacon Street	0	0	1	**1**
Somerville Avenue & Mossland Street	1	1	1	**3**

The total number of crashes for the analysis period was examined even further, conforming to MassHighway's guidelines (Appendix). Their analysis is based on the average number of crashes per year and the intersection volume. Crash rates are calculated by dividing the average number of crashes per year by the number of annual vehicles entering an intersection (measured as "million entering vehicles", or MEV). Turning movement counts for this study and average daily traffic counts published by MassHighway were used to estimate MEV values. The average annual rates were divided by MEV values for each location to calculate crash rates for study area intersections (Table 3).

Table 3 CRASH RATES BY LOCATION (2005-2007)
SOMERVILLE/CAMBRIDGE

Location	Total	Average	Rate
Beacon Street & Oxford Street	4	1.33	0.22
Somerville Avenue & Beacon Street	1	0.33	0.04
Somerville Avenue & Mossland Street	3	1.00	0.15

Each year, MassHighway adds intersection crash rates to their database to establish standardized baseline rates for both signalized and unsignalized intersections throughout the Commonwealth. These official rates can be used as an effective tool to measure safety hazards at specific locations. MassHighway reported that the annual crash rate for District 4 was 0.88 per MEV for signalized intersections and 0.63 for unsignalized intersections. Crash rates at all study area intersections fall well below these values.

4.0 Existing (2008) Conditions Analysis

4.1 Analysis

Capacity analyses for the existing conditions were performed for both the signalized and unsignalized intersections in the study area. This section reports the LOS, volume-to-capacity ratio, and the queue length by approach and turning movement for each study area intersection under these conditions (1st Column of Tables 4 and 5). These metrics are commonly used to determine whether or not a transportation facility provides adequate services for the demand.

The existing building located on site is currently vacant. However, as previously mentioned, the existing conditions analyses include the gas station/service station because the count data used was taken while the uses were occupied.

4.2 Signalized Intersections

The intersection of Somerville Avenue with Mossland Street operates at a LOS D in both the morning and evening peak hours. The intersection of Somerville Avenue at Beacon Street and Adelaide Road operates at a LOS F in both the morning and evening peak hours. This is primarily due to the morning commuter traffic that travels southbound on Mossland Street, taking a left turn onto Somerville Avenue, and then a right turn onto Beacon Street. Therefore, drivers at this intersection typically experience delays over a minute long during the peak hours; even under existing conditions.

4.3 Unsignalized Intersections

Unlike signalized intersections, unsignalized intersections do not have an "overall" LOS. The westbound left turn from Beacon Street to Oxford Street operates at a LOS A in both the morning and evening peak hours. However, the northbound left turn and right turn from Oxford Street to Beacon Street operates at a LOS F in both the morning and evening peak hours. This is due to the one lane stop controlled approach to Beacon Street. Therefore, drivers travelling on Oxford Street typically experience delays a few minutes long during the peak hours under existing conditions.

The westbound left turn from Beacon Street to Roseland Street operates at a LOS A in both the morning and evening peak hours. The southbound move from the Site Drive onto Beacon Street operates at a LOS D in the morning peak hour and a LOS E in evening peak hour. This is typical of a private driveway approaching an urban minor arterial.

The Appendix contains the entire capacity analyses output, including delays and levels of services associated with each individual movement.

Table 4 - AM PEAK LOS

Movement	2008 Existing					2013 No Build					2013 Build w/o Recommended Improvements					2013 Build w/ Recommended Improvements				
	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q
Somerville Ave & Adelaide Rd								**Signalized**												
EB LT	3.7	0.37	A	11	27	3.6	0.37	A	12	28	3.6	0.37	A	12	28	5.9	0.48	A	12	42
EB R	243.5	0.49	F	253	267	247.6	0.50	F	262	271	251.9	0.50	F	264	272	304.3	0.54	F	263	269
WB L	196.3	1.26	F	476	667	262.1	1.40	F	560	695	263.5	1.41	F	560	697	71.5	0.94	E	337	539
WB TR	51.1	0.55	D	342	340	53.3	0.57	D	357	346	53.2	0.57	D	356	346	38.6	0.45	D	296	335
NB L	85.8	0.84	F	298	543	84.1	0.83	F	303	565	84.1	0.83	F	303	565	77.3	0.79	E	291	622
NB TR	68	0.64	E	224	391	67.1	0.64	E	229	414	67.3	0.65	E	231	422	64.7	0.62	E	224	482
SB LTR	55.7	0.03	E	11	11	54.7	0.03	D	11	11	54.7	0.03	D	11	11	53.1	0.03	D	11	12
Intersection	**136.9**	**0.89**	**F**			**149.2**	**0.94**	**F**			**151.0**	**0.95**	**F**			**133.6**	**0.80**	**F**		
Somerville Ave & Mossland St								**Signalized**												
EB T	72.4	0.82	E	424	470	71.3	0.81	E	431	480	71.3	0.82	E	433	483	78.5	0.87	E	435	517
WB T	3.1	0.3	A	8	33	3.2	0.31	A	8	34	3.2	0.31	A	8	34	3.4	0.26	A	7	41
SB L	74.6	0.82	E	415	756	75.3	0.83	E	428	779	76.2	0.83	E	432	787	79.2	0.75	E	249	297
SB R	51.3	0.03	D	6	24	51.0	0.03	D	7	25	51.1	0.03	D	7	25	79.2	0.75	E	249	297
Intersection	**47.5**	**0.62**	**D**			**47.3**	**0.64**	**D**			**47.5**	**0.64**	**D**			**51.5**	**0.54**	**D**		
Roseland St & Beacon St								**Unsignalized**												
NB L	4.5	0.16	A	n/a	14	4.9	0.17	A	n/a	16	4.9	0.17	A	n/a	16	6.3	0.17	A	n/a	15
Intersection	**1.5**	**n/a**	**n/a**			**1.6**	**n/a**	**n/a**			**1.6**	**n/a**	**n/a**			**0.9**	**n/a**	**n/a**		
Beacon St & Oxford St								**Unsignalized**												
WB L	0.9	0.03	A	n/a	2	1	0.03	A	n/a	3	1	0.03	A	n/a	3	1	0.03	A	n/a	3
NB L	377.3	1.61	F	n/a	341	446.7	1.76	F	n/a	375	460.3	1.79	F	n/a	381	385.8	1.59	F	n/a	302
NB R	377.3	1.61	F	n/a	341	446.7	1.76	F	n/a	375	460.3	1.79	F	n/a	381	23	0.15	C	n/a	13
Intersection	**43.2**	**n/a**	**n/a**			**51.7**	**n/a**	**n/a**			**53.4**	**n/a**	**n/a**			**37.1**	**n/a**	**n/a**		
Beacon St & Site Drive								**Unsignalized**												
EB L	0.4	0.01	A	n/a	1	0.4	0.01	A	n/a	1	0.2	0.01	A	n/a	1	0.2	0.01	A	n/a	1
SB LR	26.8	0.14	D	n/a	12	28.7	0.15	D	n/a	13	26.6	0.06	D	n/a	4	25.9	0.05	D	n/a	4
Intersection	**0.7**	**n/a**	**n/a**			**0.7**	**n/a**	**n/a**			**0.3**	**n/a**	**n/a**			**0.3**	**n/a**	**n/a**		

Table 5 - PM PEAK LOS

Movement	2008 Existing					2013 No Build					2013 Build w/o Recommended Improvements					2013 Build w/ Recommended Improvements				
	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q	Delay[1]	v/c[2]	LOS[3]	50th Q	95th Q
Somerville Ave & Adelaide Rd							**Signalized**													
EB LT	10.1	0.72	B	63	66	10.1	0.73	B	64	67	10.0	0.72	A	63	65	16.1	0.83	B	63	117
EB R	17.2	0.51	B	78	67	16.6	0.53	B	82	67	17.1	0.53	B	83	67	22.6	0.64	C	85	129
WB L	677.5	2.35	F	688	633	729.2	2.46	F	711	649	728.1	2.46	F	716	653	294.5	1.48	F	575	532
WB TR	58.2	0.66	E	429	435	58.4	0.67	E	439	440	58.1	0.67	E	438	440	49.9	0.60	D	401	437
NB L	136.1	1.10	F	602	1150	155	1.15	F	634	1203	156.2	1.16	F	635	1204	161.8	1.17	F	680	1142
NB TR	62.7	0.77	E	369	235	66.1	0.8	E	386	246	66.3	0.80	E	387	246	66.7	0.80	E	389	227
SB LTR	42.4	0.01	D	3	3	43	0.01	D	3	3	43.2	0.01	D	3	3	43.6	0.01	D	3	3
Intersection	**135.6**	**1.46**	**F**			**145.9**	**1.53**	**F**			**146.3**	**1.54**	**F**			**91.3**	**1.22**	**F**		
Somerville Ave & Mossland St							**Signalized**													
EB T	71.9	0.8	E	405	416	71.6	0.80	E	415	423	71.5	0.80	E	418	425	79.6	0.87	E	422	461
WB T	3.3	0.33	A	10	42	3.5	0.34	A	18	43	3.6	0.34	A	19	44	3.0	0.32	A	22	37
SB L	102.1	0.91	F	361	544	103.9	0.92	F	371	564	105.0	0.93	F	374	569	78.5	0.70	E	210	272
SB R	62.5	0.05	E	6	46	62.2	0.05	E	7	47	62.2	0.05	E	7	47	78.5	0.70	E	210	272
Intersection	**46.6**	**0.61**	**D**			**46.9**	**0.62**	**D**			**47.1**	**0.62**	**D**			**45.9**	**0.55**	**D**		
Roseland St & Beacon St							**Unsignalized**													
NB L	0.5	0.02	A	n/a	1	0.6	0.02	A	n/a	1	0.6	0.02	A	n/a	1	0.7	0.02	A	n/a	1
Intersection	**0.3**	**n/a**	**n/a**			**0.3**	**n/a**	**n/a**			**0.3**	**n/a**	**n/a**			**0.1**	**n/a**	**n/a**		
Beacon St & Oxford St							**Unsignalized**													
WB L	1	0.04	A	n/a	3	1.1	0.04	A	n/a	3	1.1	0.04	A	n/a	3	1.1	0.04	A	n/a	3
NB L	Err	3.89	F	n/a	Err	Err	4.31	F	n/a	Err	Err	4.38	F	n/a	Err	Err	4.25	F	n/a	Err
NB R	Err	3.89	F	n/a	Err	Err	4.31	F	n/a	Err	Err	4.38	F	n/a	Err	18.4	0.06	C	n/a	5
Intersection	**1728.2**	**n/a**	**n/a**			**1731.2**	**n/a**	**n/a**			**1730.7**	**n/a**	**n/a**			**1637**	**n/a**	**n/a**		
Beacon St & Site Drive							**Unsignalized**													
EB L	0.6	0.02	A	n/a	2	0.6	0.02	A	n/a	2	0.3	0.01	A	n/a	1	0.3	0.01	A	n/a	1
SB LR	39.4	0.23	E	n/a	21	42.7	0.25	E	n/a	23	35.9	0.08	E	n/a	6	35.4	0.08	E	n/a	6
Intersection	**1**	**n/a**	**n/a**			**1**	**n/a**	**n/a**			**0.3**	**n/a**	**n/a**			**0.3**	**n/a**	**n/a**		

5.0 No-Build Conditions Analysis (2013)

5.1 Background Growth

Background traffic growth generally occurs as a result of population increases within and around the study area, demographic changes, and future unspecified development. In accordance with MassHighway and MEPA requirements, a 5-year planning horizon (2013) was used to evaluate future traffic operations with and without the proposed action.

As previously mentioned, the historical traffic data suggests that traffic has been shrinking. A quarter percent (0.25%) growth rate was used to grow the 1998 data to 2008 for conservative purposes. A more conservative growth rate of half a percent (0.5%) per year was used to account for the normal background growth in traffic resulting from changes in local economic activity and other proposed developments that may be in place by the year 2013. With the assumption that the economy will improve over the next five years, the 0.5% per year growth rate was used to predict the future no-build conditions (versus the 0.25% growth rate).

The peak hour traffic volumes used for the future no-build conditions at the study area intersections are illustrated after Section 5.2 (Figure 4).

5.2 Analysis

Capacity analyses for future conditions were performed for both the signalized and unsignalized intersections in the study area for the year 2013. As with the previous sections, this section reports the LOS, volume-to-capacity ratio, and the queue length by approach and turning movement for each study area intersection under these conditions.

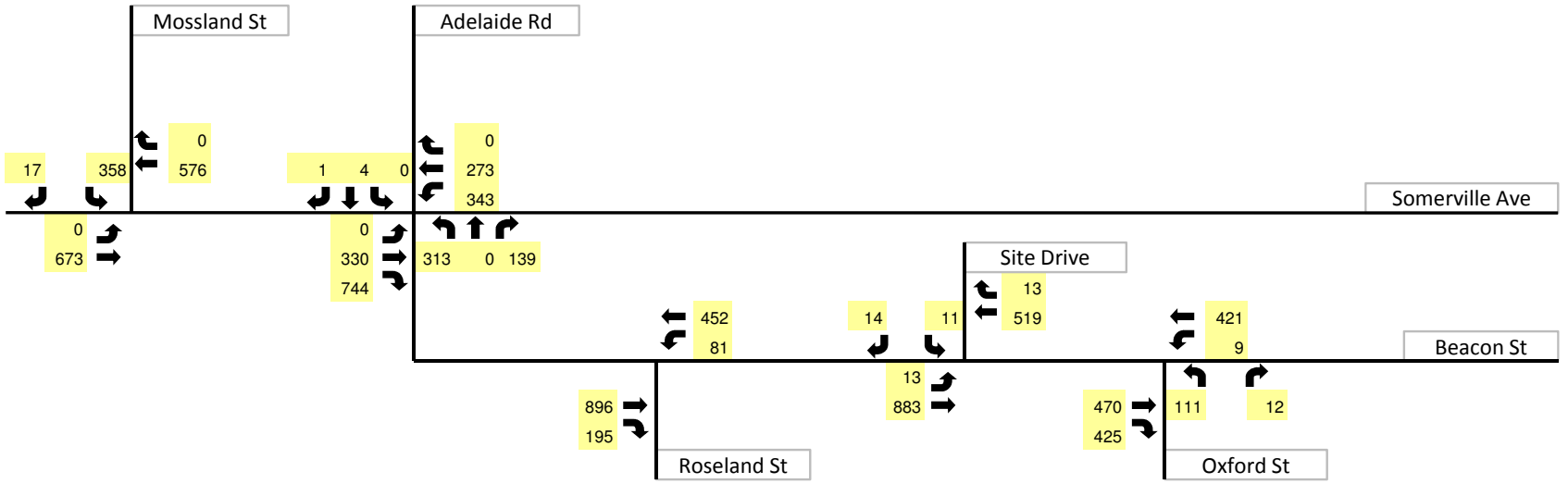
Capacity analyses were conducted at study area intersections for the no-build conditions, 2013 (2nd Column of Table 4). The key findings of these analyses are presented in the following section.

The existing building located on site is currently vacant in the year 2008. However, the site was tenanted and the use was active when the 1998 count data was collected. Therefore, both the existing (2008) and future no-build (2013) conditions include traffic related to the allowed uses within the existing building. If there is degradation in the LOS, when the no-build 2013 conditions are compared to the existing conditions, it is due to the growth factor accounting for increased population, economic activity, and other unforeseen projects.

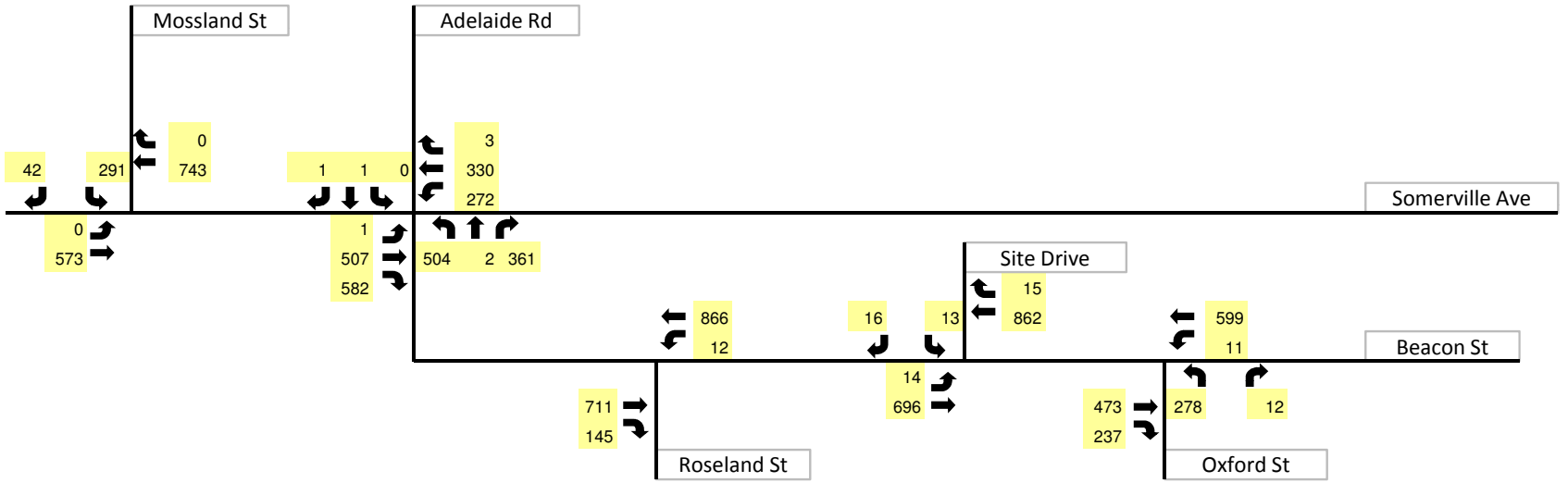
According to the proponent, the most recent use occupied the existing building for many years. The site was used as a gas station with four fueling stations, one to two service bays, and an area for used car sales. Land Use Code (LUC) 944 – Gas Station is the relevant Land Use Code (for traffic generation purposes) provided in the *Institute of Transportation Engineers: Land Use Report*. ITE Land Use Code titles do not necessarily match land use titles within a zoning ordinance. Therefore, traffic engineers choose the most appropriate available use that describes the traffic generation associated with that use. LUC 944 does include both gas pump service and repair service. Again, trips associated with this use are accounted for in the existing and future no-build networks.

Figure 4 - 2013 No Build Traffic Volumes

AM PEAK HOUR



PM PEAK HOUR



5.3 Signalized Intersections

The overall LOS values remain unchanged from 1998 conditions to 2013 no-build conditions; however the delays do increase due to the addition of the background growth. Therefore, drivers at this intersection will continue to experience delays over a minute long during the peak hours; even under future no-build conditions.

The intersection of Somerville Avenue with Mossland Street operates at a LOS D in both the morning and evening peak hours. The intersection of Somerville Avenue at Beacon Street and Adelaide Road operates at a LOS F in both the morning and evening peak hours. This is primarily due to the morning commuter traffic that travels SB on Mossland Street, taking a left turn onto Somerville Avenue, and then a right turn onto Beacon Street.

5.4 Unsignalized Intersections

The LOS values remain unchanged from 1998 conditions to 2013 no-build conditions; however the delays do increase due to the addition of the background growth. Therefore, drivers travelling on Oxford Street will continue to experience delays a few minutes long during the peak hours under future no-build conditions.

The westbound left turn from Beacon Street to Oxford Street operates at a LOS A in both the morning and evening peak hours. However, the northbound left turn and right turn from Oxford Street to Beacon Street operates at a LOS F in both the morning and evening peak hours. This is due to the one lane stop controlled approach to Beacon Street.

The westbound left turn from Beacon Street to Roseland Street operates at a LOS A in both the morning and evening peak hours. The SB move from the Site Drive onto Beacon Street operates at a LOS D in the morning peak hour and a LOS E in evening peak hour. This is typical of a private driveway approaching an urban minor arterial.

The Appendix contains the entire capacity analyses output, including delays and levels of services associated with each individual movement.

6.0 Future Build Analysis (2013)

6.1 Development Program

The subject property is an approximately 9,670 square feet lot located at 369-371 Beacon Street in Somerville, Massachusetts (Figure 1). Although no longer in operation, occupying the lot is a gas station with a small ancillary single-story building that houses an office/retail storefront and a mechanic's bay. It is the applicant's intention to demolish and remove the existing building and service pumps and in their place construct a new hotel building with 35 guestrooms and a 60 seat restaurant. An underground parking structure on the lot would provide 28 parking spaces.

Currently, vehicular access to the site is provided from Beacon Street, an urban arterial with one travel lane in each direction. Vehicles entering or exiting the site do so via existing curb cuts on Beacon Street. Vehicular access to the proposed underground parking at the hotel would also be from Beacon Street, where a driveway ramp capable of accommodating two-way traffic would be located.

6.2 Trip Generation

The proposed program is anticipated to generate additional traffic which is distributed, and assigned to the roadway network. The trips were generated using *ITE's Trip Generation Manual, 7th Edition.* After the trips were generated, they were distributed, based on a gravity model, which relied on existing traffic distributions in the study area. Once the distribution was identified, trips were assigned to the roadway network.

6.3 Trip Rates

Trip generation estimates have been prepared in accordance with the traffic study guidelines established by the Executive Office of Transportation & Public Works (EOTPW) and Executive Office of Environmental & Energy Affairs (EOEEA) using the methodology provided in the most recent edition of the *Trip Generation Handbook* (TGH) published by the Institute of Transportation Engineers and the trip generation rates contained in the 7th Edition of *Trip Generation Manual (TGM)*, also published by the Institute of Transportation Engineers.

The first step in the trip generation process is to calculate the "gross" trips for the existing and proposed uses based on the trip generation rates provided in the above referenced documents. The next step in the trip generation process is to determine if appropriate reductions should be applied to the gross trips. If applicable, the reductions are applied to the existing and proposed site generated trips. Once the reduction factors have been applied, the existing site generated trips are subtracted from the proposed site generated trips to produce the net new site generated trips.

6.3.1 Gross Trip Generation

Land Use Code (LUC) 944 Gas Station from ITE'S TGM was used for the existing site generated trips. The number of fueling positions was used to determine the traffic volume that would be generated for the existing site trips. LUC 312 Business Hotel and LUC 931 Quality Restaurant from ITE'S TGM were used for proposed site generated trips. The number of employees of the hotel and the number of seats for the restaurant were used to determine the traffic volume that would be generated in conjunction with ITE's Trip Generation Manual.

ITE Land Use Code titles do not necessarily match land use titles within a zoning ordinance. Therefore, traffic engineers choose the most appropriate available use that describes the traffic generation associated with that use. LUC 944 includes both gas pump service and repair services. The "gross" site trips associated with the existing and proposed uses are represented in the table below (Table 6).

Table 6 - Gross Trip Generation

AM PEAK							
	Land Use	**Land Use Code**	**Trip Gen (Gross)**	**% In**	**% Out**	**IN**	**OUT**
Proposed Use	Hotel	312	43.0	59%	41%	25.4	17.6
Proposed Use	Restaurant	931	1.8	70%	30%	1.3	0.5
Existing Use	Gas Station	944	48.3	50%	50%	24.1	24.1
Net Trips (Proposed - Existing)			**-3.5**			**2.5**	**-6.0**

PM PEAK							
	Land Use	**Land Use Code**	**Trip Gen (Gross)**	**% In**	**% Out**	**IN**	**OUT**
Proposed Use	Hotel	312	45.6	60%	40%	27.4	18.2
Proposed Use	Restaurant	931	15.6	67%	33%	10.5	5.1
Existing Use	Gas Station	944	55.4	50%	50%	27.7	27.7
Net Trips (Proposed - Existing)			**5.8**			**10.1**	**-4.3**

6.4 Trip Credits

6.4.1 Pass-by

For a conservative approach, the trips associated with the gas station were reduced using industry accepted practices, specifically pass-by trips. The ITE Handbook suggests that approximately 80% of the trips associated with a gas station use already exist on the nearby roadway system.

The State of Massachusetts has historically only allowed a maximum of a 25% as a pass-by reduction factor for proposed uses. We have used the empirical data (from ITE) to arrive at a more conservative approach; it is conservative because the trips are subtracted from the network before adding the hotel & restaurant trips. With a greater the reduction factor, fewer trips are subtracted from the future no-build roadway network. If the 25% reduction factor were applied to the existing site trips, the proposed uses would actually result in a reduction to the number of trips on the street network.

6.4.2 Mode Split

Traditional site development includes applying a number of trip credits to the gross trip generation numbers. Based on the geographical proximity of the site to public transit, as well as the density of housing in the area, a large percentage of patrons will take the subway, a taxi, walk, or ride a bike. As a result, the automobile trips can be reduced by a certain percentage. This "mode-split" is unique to regions, uses, and neighborhoods. Considering the proposed use and location, a mode-split can be applied to the trip generation values. Further reductions to the site trips generate by the proposed uses, including pass-by and diverted-linked credits may also be applicable, *however, were not considered in this study*.

Traffic Solutions knew of a very comparable site already constructed in Cambridge, MA. The ITE TGM assumes all trips drive to and from a site. ITE further suggests that in urban areas, it is acceptable, even recommended to apply applicable reduction factors. ITE recommends using local data wherever possible. Therefore, Traffic Solutions collected mode split data at a similar site, specifically the Kendall Hotel located at 350 Main Street in Kendall Square (Figure 5). The Hotel has similar characteristics including the number of hotel rooms (as compared to a large chain suggest as the Marriot Hotel), an on-site restaurant, and the proximity to a rapid transit station (within 100 feet).

Figure 5 – Kendall Hotel 350 Main Street Cambridge, MA.

6.4.2 Mode Split (Continued)

A data collection effort was identified that would allow for mode split determination. Two primary, traditional data collection methods were used. Vehicle manual turning movement counts were collected at the Kendall Hotel's garage during the daily peak hours. Additionally, a user survey was performed at the hotel's pedestrian entrance. People entering and exiting the Hotel were asked what mode of transportation they used to get to/or what mode of transportation they are using leaving the site.

The results of the data collection effort indicate that a high number of trips arrive/depart using other (non-vehicular) transportation modes (Table 7). Trains, buses, and other modes of public transportation are not considered vehicular modes of transportation since they will not be added to the street network and site driveway, and thus a new trip is not added.

Table 7 – Mode Split (%) – Kendall Hotel Cambridge, MA

Morning Peak Hour		Evening Peak Hour	
Mode	**%**	**Mode**	**%**
Drive	46.1 %	*Drive*	26.8 %
Train	30.8 %	*Train*	17.9 %
Walk	15.4 %	*Walk*	49.6 %
Bus	7.7 %	*Bus*	0.8 %
Taxi	0.0 %	*Taxi*	4.9 %
Bicycle	0.0 %	*Bicycle*	0.0 %
Total	100 %	*Total*	100 %

In the morning peak hour, 46 % of the trips used a vehicle (personal vehicle or taxi) and the remaining 54 % used some other mode of transportation (e.g., bus, train, bicycle, walked). In the evening peak hour, 32 % of the trips used a personal vehicle or taxi and the remaining 68 % used some other mode of transportation.

The resulting mode split percentages (from Section 6.4) were applied to the trip generation rates estimated for the proposed uses during the morning peak hour and evening peak hour, respectively. If the proposed project does not move forward, the site can be re-tenanted with allowed uses including the most recent use, a gas station. The trips associated with this re-tenanting were included in the future no-build condition but are removed during the future build condition to allow the new use to occupy the space.

6.5 Project Traffic – Net Trip Generation

The total trips estimated using ITE's methodology results in potentially 11 new vehicle trips on the roadway network in the morning peak hour and 12 new vehicle trips on the roadway network in the evening peak hour. This estimate includes reductions to existing site generated trips due to pass-by credits and reductions to proposed site generated trips due to mode split credits, as discussed in the previous section. The number of trips that may be on the roadway varies throughout the day. These trips were distributed to the AM and PM peak hours using ITE average rates. The "net" number of trips that will potentially be added to the roadway by the project is simply the difference between the new uses and the existing use (Table 8).

Table 8 - Net Trip Generation

		AM PEAK								
	Land Use	**Land Use Code**	**Trip Gen (Gross)**	**Pass-By/ DL %**	**Mode Split %**	**Net Site Trips**	**% In**	**% Out**	**IN**	**OUT**
Proposed Use	Hotel	312	43.0	0.0%	54%	19.9	59%	41%	11.7	8.1
Proposed Use	Restaurant	931	1.8	0.0%	54%	0.8	70%	30%	0.6	0.2
Existing Use	Gas Station	944	48.3	78.8%	0.0%	10.2	50%	50%	5.1	5.1
Net Trips (Proposed - Existing)						**10.5**			**7.2**	**3.3**

		PM PEAK								
	Land Use	**Land Use Code**	**Trip Gen (Gross)**	**Pass-By/ DL %**	**Mode Split %**	**Net Site Trips**	**% In**	**% Out**	**IN**	**OUT**
Proposed Use	Hotel	312	45.6	0.0%	68%	14.5	60%	40%	8.7	5.8
Proposed Use	Restaurant	931	15.6	0.0%	68%	4.9	67%	33%	3.3	1.6
Existing Use	Gas Station	944	55.4	86.5%	0.0%	7.5	50%	50%	3.7	3.7
Net Trips (Proposed - Existing)						**11.9**			**8.2**	**3.7**

6.6 Trip Distribution

The objective of trip distribution is to distribute the site generated trips by percentages throughout the roadway network that will be used to access the site. The total trip distribution percentages were determined for trips travelling to the site (in) and from the site (out).

An analysis of existing travel patterns were used to distribute the project generated trips onto the roadway network (Figure 6). This traffic pattern was used for the next step in the traffic impact process, trip assignment.

6.7 Trip Assignment

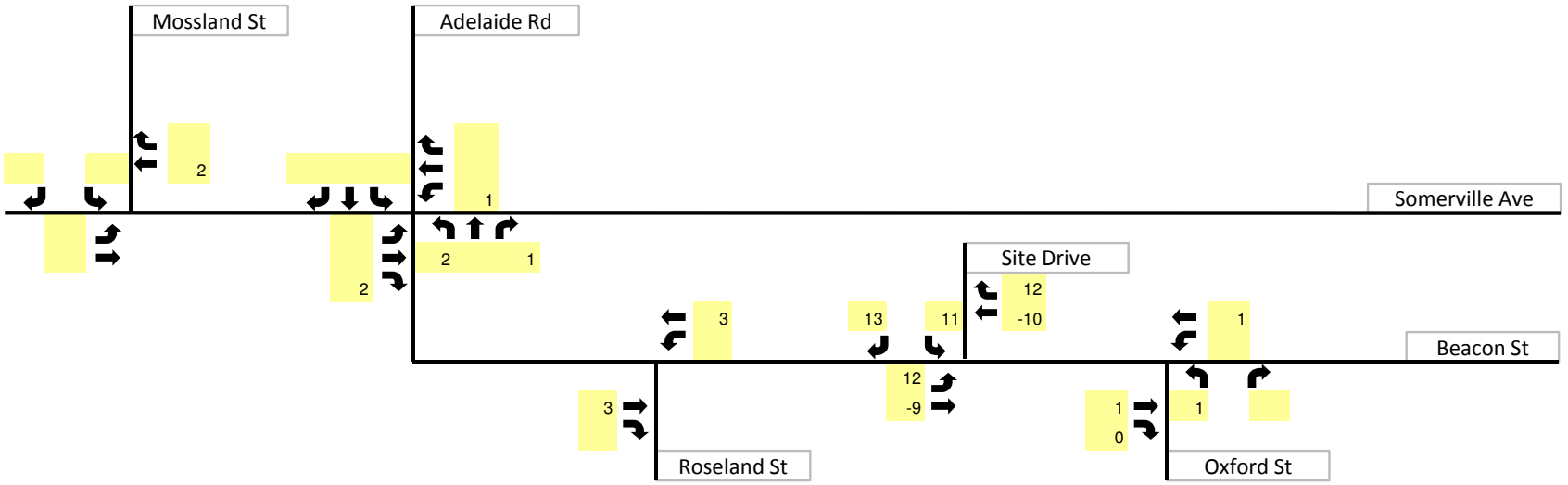
This step assigns each of the project trips to a specific turning movement for each of the study peak hours. Trip assignment is accomplished by combining the trip generation, with the trip distribution patterns. The reduced existing site generated trips were assigned to study area intersections (Figure 7). The reduced proposed site generated trips were assigned to study area intersections (Figure 8). The reduced proposed site generated trips were then added to the future no-build trips (after subtracting the reduced gas station trips) to produce the full build conditions (Figure 9).

6.8 Analysis

Using the project volumes, intersection capacity analyses have been conducted for each study area for both future conditions; without mitigation and with mitigation (3rd and 4th Columns of Table 4). The future build without mitigation condition represents the results of building the project without changing the infrastructure (traffic signal, signs, and markings). As with the previous analyses, this section reports the LOS, volume-to-capacity ratio, and the queue length by approach and turning movement for each study area intersection under these conditions.

Figure 7 - Site Generated Trips - Existing Use (Gas Station)

AM PEAK HOUR



PM PEAK HOUR

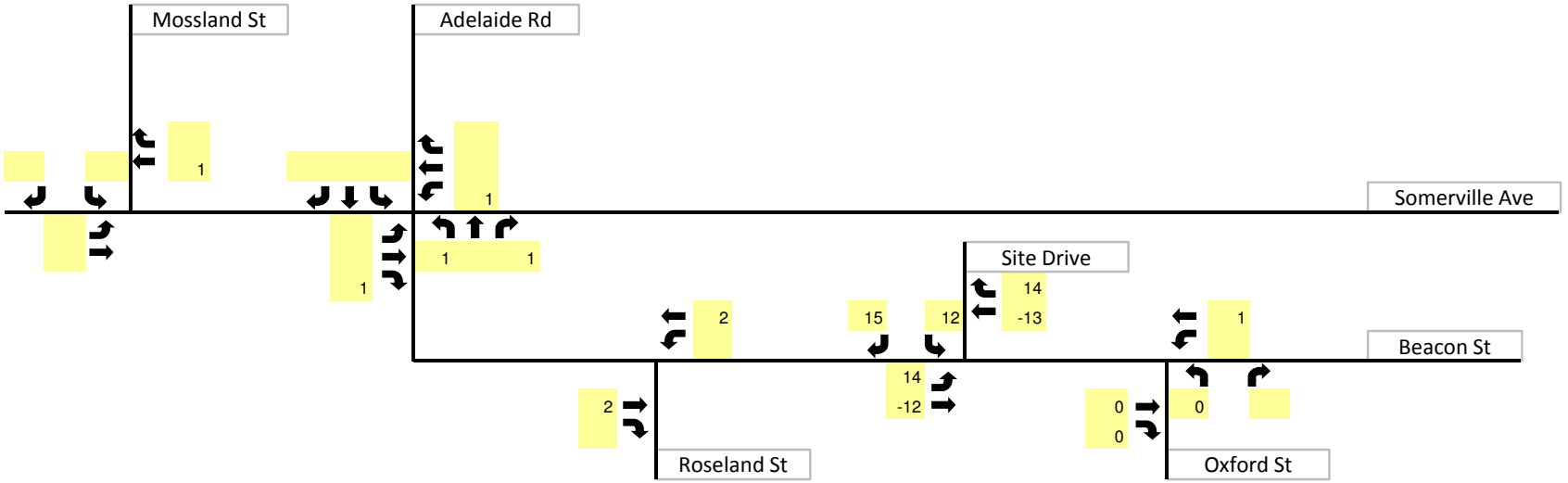
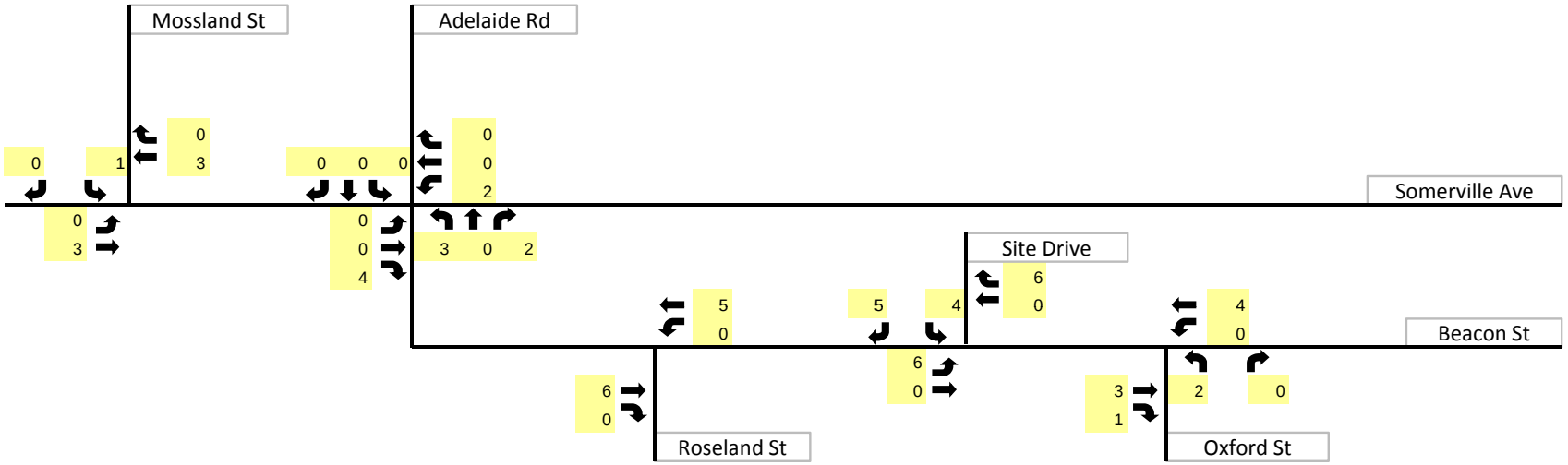


Figure 8 - Site Generated Trips - Proposed Use (Hotel Restaurant)

AM PEAK HOUR



PM PEAK HOUR

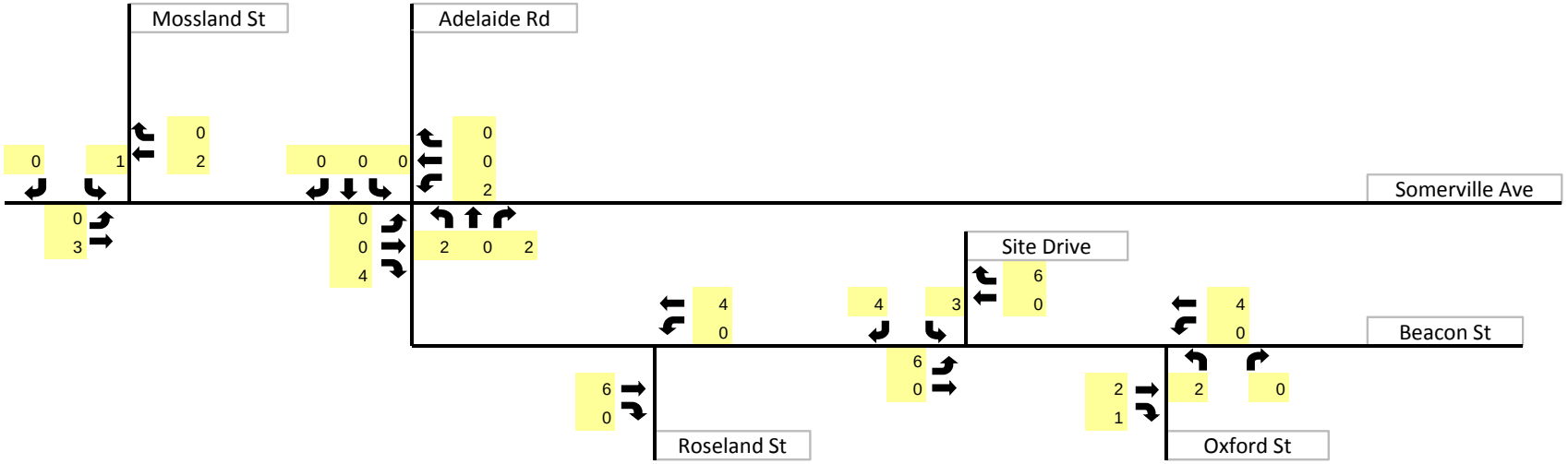
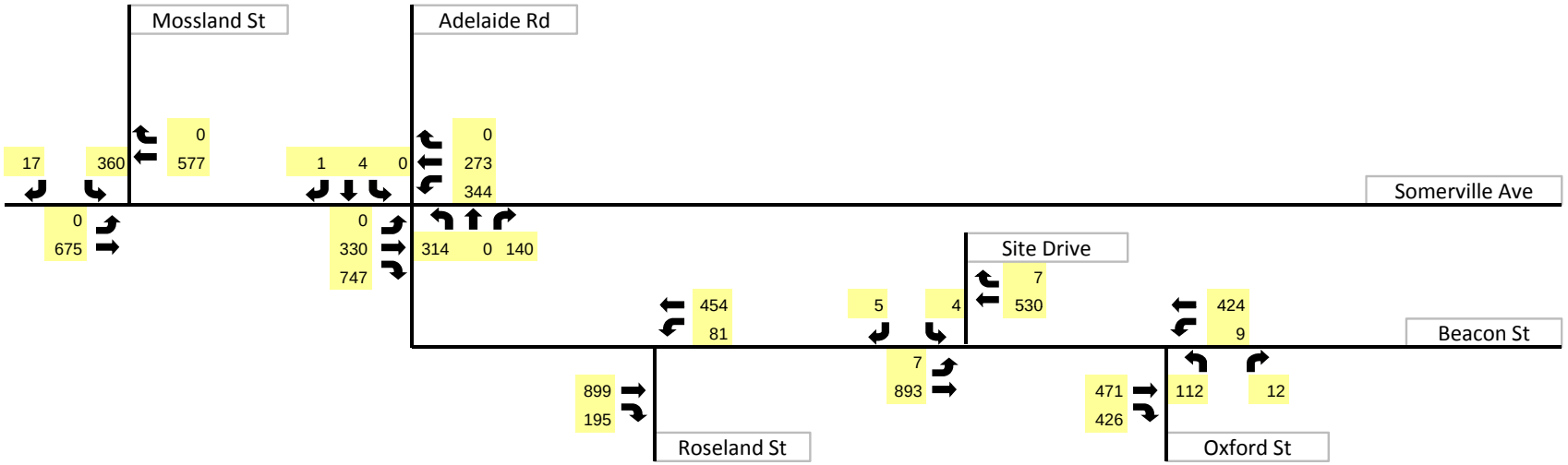
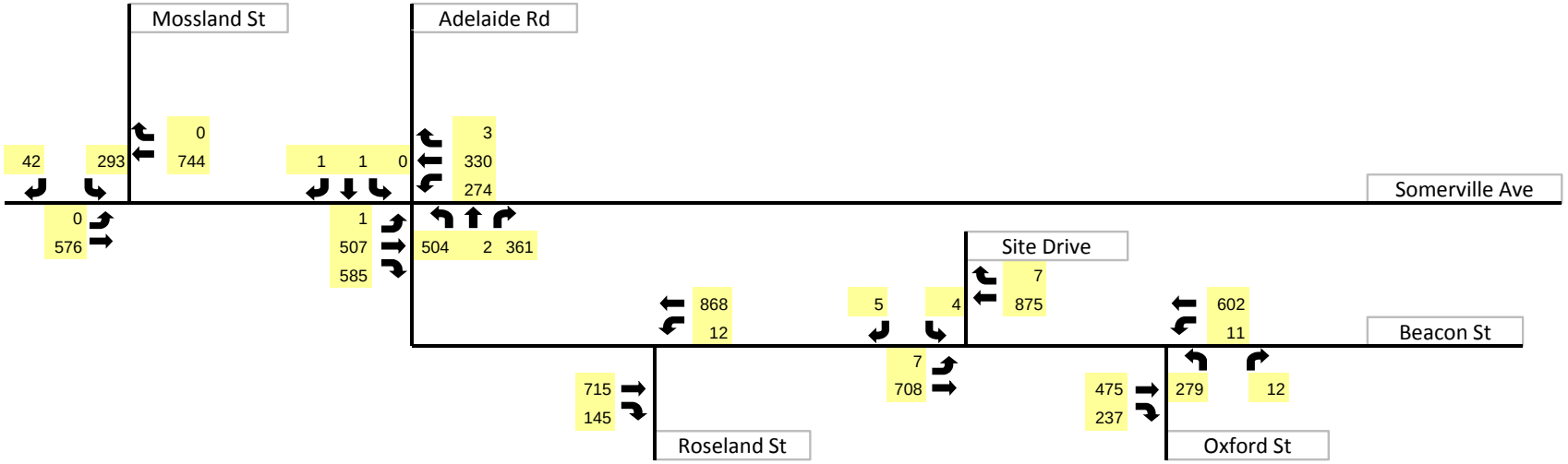


Figure 9 - 2013 Build Traffic Volumes

AM PEAK HOUR



PM PEAK HOUR



6.9 Future Build without Recommended Improvements (2013)

The future build without recommended improvements condition represents the results of building the project without changing the infrastructure (3rd Column of Table 4).

6.9.1 Signalized Intersections

The overall LOS values remain unchanged 2013 no-build conditions to the 2013 build conditions. Even the delays essentially remain the same. Therefore, drivers at this intersection will continue to experience delays over a minute long during the peak hours. However, this is not due to the project because the intersection already operates at these levels of service under future no-build conditions.

The intersection of Somerville Avenue with Mossland Street operates at a LOS D in both the morning and evening peak hours. The intersection of Somerville Avenue at Beacon Street and Adelaide Road operates at a LOS F in both the morning and evening peak hours.

6.9.2 Unsignalized Intersections

The LOS values remain unchanged 2013 no-build conditions to the 2013 build conditions. Therefore, drivers travelling on Oxford Street will continue to experience delays a few minutes long during the peak hours under future no-build conditions. However, this is not due to the project because the intersection already operates at these levels of service under future no-build conditions.

The westbound left turn from Beacon Street to Oxford Street operates at a LOS A in both the morning and evening peak hours. However, the northbound left turn and right turn from Oxford Street to Beacon Street operates at a LOS F in both the morning and evening peak hours.

The westbound left turn from Beacon Street to Roseland Street operates at a LOS A in both the morning and evening peak hours. The southbound move from the Site Drive onto Beacon Street operates at a LOS D in the morning peak hour and a LOS E in evening peak hour. Again, this is typical of a private driveway approaching an urban minor arterial.

The Appendix contains the entire capacity analyses output, including delays and levels of services associated with each individual movement.

6.10 Future Build with Recommended Improvements (2013)

The future build with recommended improvements condition represents the results of building the project with changing the infrastructure (traffic signal, signs, and markings). Specifically, Traffic Solutions included the following improvements to determine if they resulted in improved levels of service (4th Column of Table 4).

- Change the lane assignment for the Mossland Street SB approach, using pavement markings and signs, to allow a double left turn onto Somerville Avenue;

- Change the bridge cross section on the Beacon Street approach to Somerville Avenue, using pavement markings only, to allow for two receiving lanes versus one; so that a double right turn is allowed from Somerville Avenue to Beacon Street;

- Change the lane assignment for the Beacon Street NB approach, using pavement markings and signs, to allow for two lanes around the corner back to Oxford Street;

- Change the lane assignment for the Oxford Street NB approach, using pavement markings and signs and restricting parking, to allow for two lanes approach lanes to Beacon Street; and

- Optimize traffic signal timing without changing the phasing

6.10.1 Signalized Intersections

The signals were "optimized" during the analysis, which improves the LOS at the signalized intersections. The overall LOS values essentially remains unchanged from the 2013 no-build conditions to the 2013 build conditions. However, the delays (in seconds) improve. For instance, the average delay for Somerville Avenue at Beacon Street improves from approximately 150 seconds in both peak periods to approximately 130 seconds in the AM peak hour and approximately 90 seconds in the PM peak hour. Therefore, drivers at this intersection will continue to experience delays over a minute long during the peak hours. However, this is not due to the project because the intersection already operates at these levels of service under future no-build conditions.

The intersection of Somerville Avenue with Mossland Street operates at a LOS D in both the morning and evening peak hours. The intersection of Somerville Avenue at Beacon Street and Adelaide Road operates at a LOS F in both the morning and evening peak hours.

6.10.2 Unsignalized Intersections

The LOS values essentially remains unchanged from the 2013 no-build conditions to the 2013 build conditions during the PM peak hour period. However, the delays (in seconds) improve. Also, in the AM peak hour, the estimated overall intersection LOS does improve. Therefore, drivers travelling on Oxford Street will continue to experience delays during the peak hours under future no-build conditions. However, this is not due to the project because the intersection already operates at these levels of service under future no-build conditions. In fact, the right turning vehicles from Oxford Street would experience fewer delays.

6.10.2 Unsignalized Intersections (Continued)

The westbound left turn from Beacon Street to Oxford Street operates at a LOS A in both the morning and evening peak hours. However, the northbound left turn will operate a LOS F while the right turn from Oxford Street to Beacon Street will improve and operate at a LOS C in both the morning and evening peak hours.

The westbound left turn from Beacon Street to Roseland Street operates at a LOS A in both the morning and evening peak hours. The southbound move from the Site Drive onto Beacon Street operates at a LOS D in the morning peak hour and a LOS E in evening peak hour. Again, this is typical of a private driveway approaching an urban minor arterial.

The Appendix contains the entire capacity analyses output, including delays and levels of services associated with each individual movement.

7.0 Conclusions

This report analyzed the effect of the proposed hotel and restaurant in Somerville, MA. The number of trips generated by the new use is a nominal amount as compared to the trips associated with the existing permitted use, a gas station. Using industry accepted trip generation values for this type of development, it is clear that the impact on surrounding streets is negligible during the peak hours. The proposed project is expected to attract only 11 net new vehicles during the morning peak hour and 12 net new vehicles in the evening peak hour; approximately one new vehicle every five minutes.

As stated in Section 6.3, a conservative approach was taken during the trip generation process. If the 25% reduction factor were applied to the existing site trips (versus the ~80%), the proposed uses would actually result in a net reduction to the site generated trips. This means that the proposed uses (Hotel & Restaurant) would produce fewer vehicle trips than the existing site (Gas Station).

Using the conservative approach, the signalized and unsignalized intersections will operate at the same LOS with or without the project. The study area intersections experience delays but the delays are not associated with the construction of the proposed project. Although the study area intersections experience delays, according to the crash history, safety does not appear to be an issue. Based on these findings, the proposed project will have a negligible impact to safety and delay, if any, on the transportation network surrounding the project.

In addition, Traffic Solutions investigated a few possible improvements to improve levels of service even though the project is not adding a significant amount of trips. These low cost measures included changing lane assignments by use of pavement markings, signs, and parking restrictions (only where applicable). The possible improvements also consisted of optimizing the traffic signal timing at the signalized intersection. These improvements would not result in significant improvements to LOS but would result in slightly fewer delays.

Most of these improvements may be able to be implemented as part of the Somerville Avenue Reconstruction Project since the construction is on-going. The signal equipment has yet to be installed and the pavement markings and signs are typically some of the last items to be installed as part of a reconstruction project.

Finally, the proposed driveway is situated at the southern end of the site, which provides the greatest distance between the driveway and the intersection of Somerville Avenue at Beacon Street. This is the ideal driveway location to minimize the impact of the development on the roadway network.

January 29, 2009

BEACON STREET HOTEL TIAS - APPENDIX

traffic solutions
resources reliability results

Prepared For:
Mr. George Makrigiannis

FAX FROM:

Design Consultants, Inc.
265 Medford Street
Somerville, MA 02143

DCI JOB NO.:
Date: 12/23/08
Number of pages including cover sheet: 2

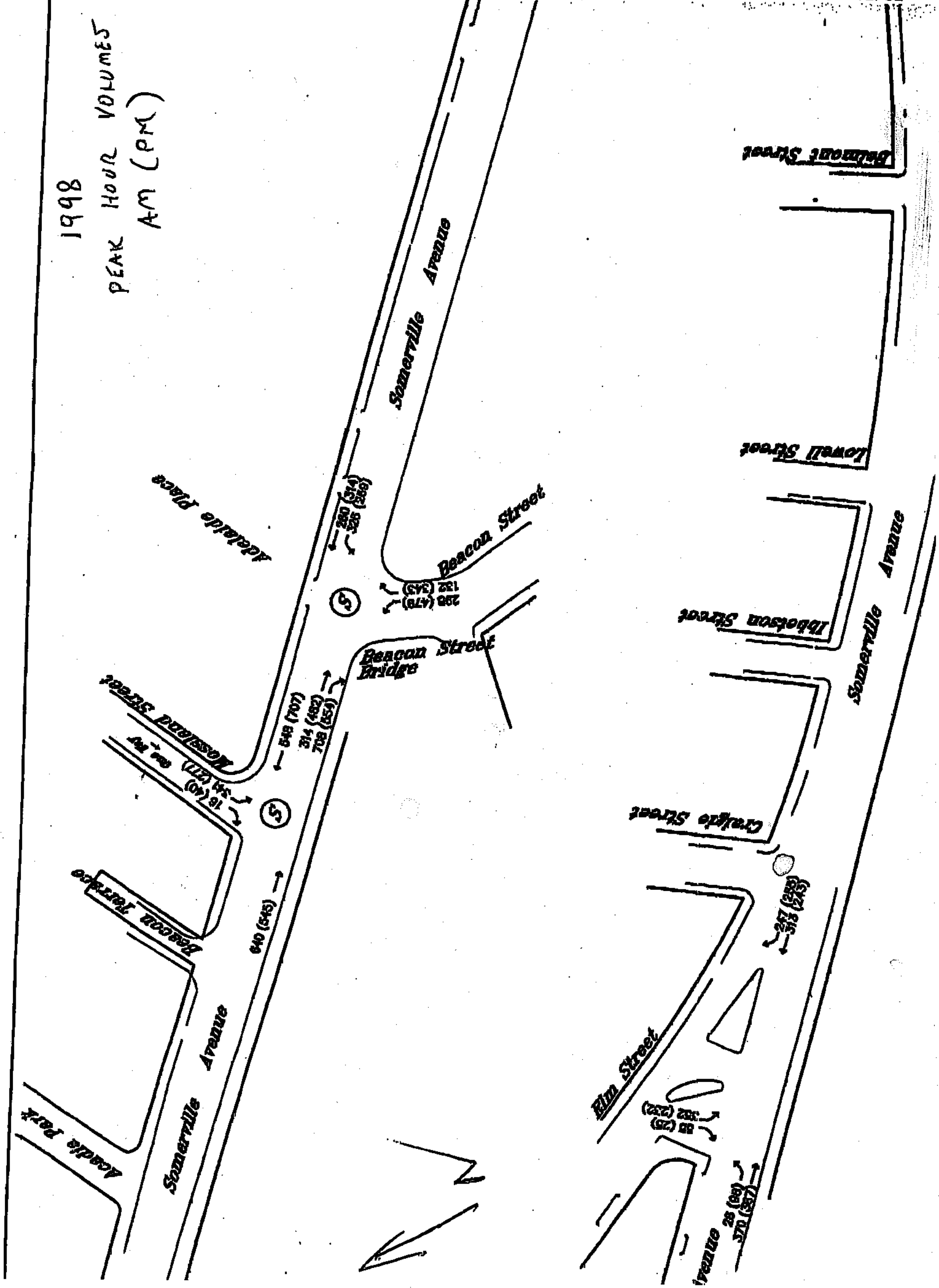
To:
TODD BLAKE
TRAFFIC SOLUTIONS
Phone: 617-722-9901
Fax phone:
CC:

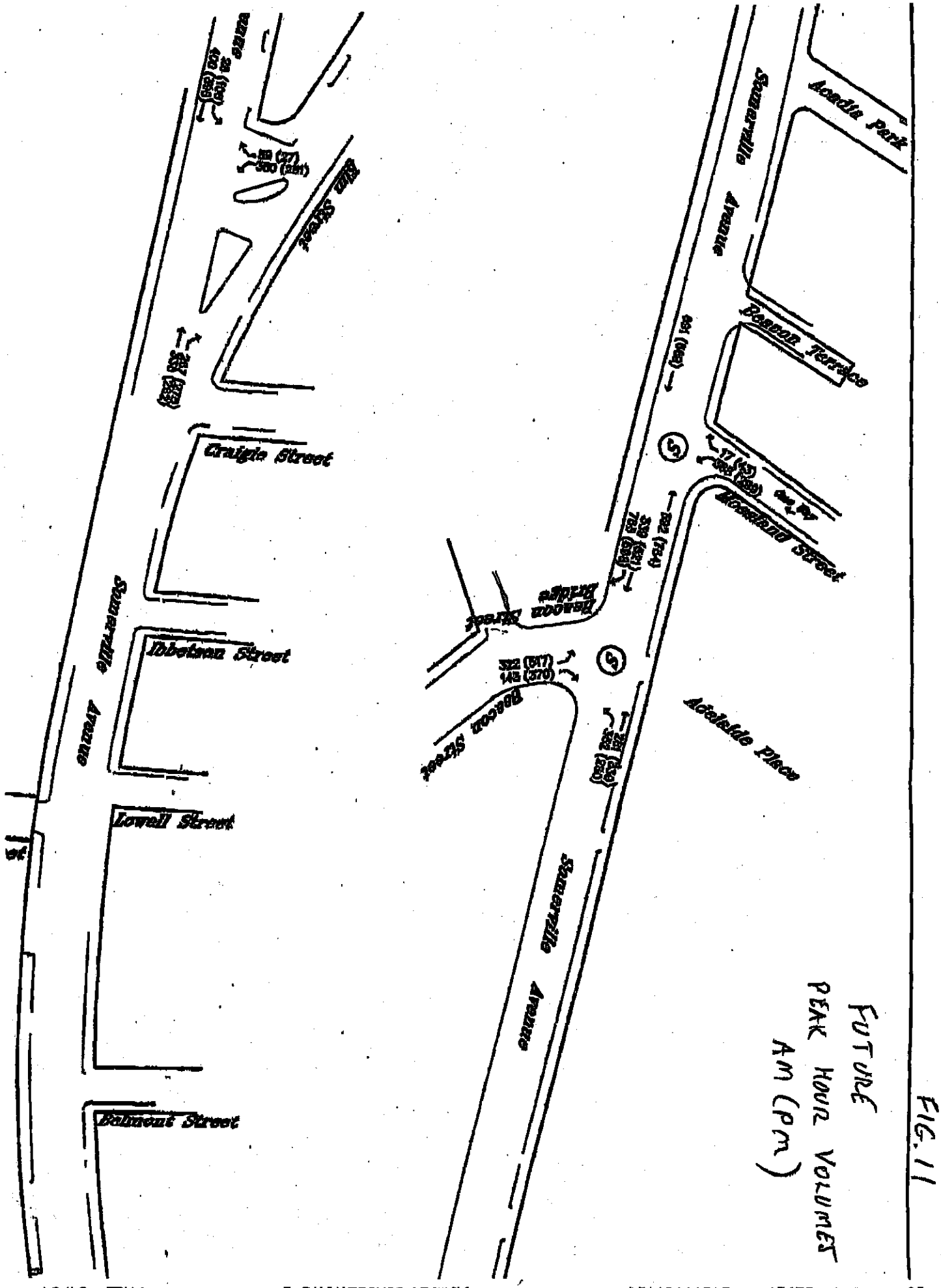
From: David Ivany
For-
Somerville Ave @
Beacon / Morrland
Phone: 617-776-3350 EXT.
Fax phone: 617-776-7710

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

- TMC's attached ~~per~~
- I will be ~~f~~ emailing .pdf's of the SIGNAL PLANS
- per your request

David


1998
PEAK HOUR VOLUMES
AM (PM)
Somerville Avenue
Beacon Street
Beacon Street Bridge
Adelaide Place
Beacon Terrace
Acadia Park
Elm Street
Craigie Street
Ibbetson Street
Lowell Street
Belmont Street
548 (707)
314 (482)
708 (554)
640 (545)
132 (343)
298 (478)
18 (40)
132 (232)
55 (25)
28 (98)



FUTURE PEAK HOUR VOLUMES AM (PM)

FIG. 11

Future Traffic Volumes - To properly evaluate the recommended Somerville Avenue corridor improvements DCI has projected future peak hour traffic volumes for the design year 2003 (5 year horizon). The 1998 peak hour traffic volumes have been increased by an annual growth factor of 1.5% and are shown in Figures 11&12. The growth factor was based upon information provided by the Metropolitan Area Planning Council (MAPC) and on MHD traffic volume data provided by count stations within District #4. The future 2003 traffic volumes were utilized to determine Levels-of-Service for existing geometry and proposed conditions for the year 2003. (See Tables C and D for Levels-of-Service).

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Client: TrafSol/T.Blake

File Name : AM_Beacon @ Oxford
Site Code :
Start Date : 12/16/2008
Page No : 1

Groups Printed- PCs and Peds - HVs / Busses -

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:30 AM	0	66	27	1	94	0	0	0	1	1	1	29	0	0	30	4	0	3	7	14	139
06:45 AM	0	81	44	3	128	0	0	0	4	4	1	24	0	0	25	7	0	1	5	13	170
Total	0	147	71	4	222	0	0	0	5	5	2	53	0	0	55	11	0	4	12	27	309
07:00 AM	0	67	39	4	110	0	0	0	1	1	0	57	0	0	57	9	0	1	3	13	181
07:15 AM	0	69	41	3	113	0	0	0	1	1	0	57	0	1	58	10	0	0	12	22	194
07:30 AM	0	100	57	3	160	0	0	0	11	11	1	58	0	0	59	13	0	1	17	31	261
07:45 AM	0	92	57	2	151	0	0	0	11	11	0	66	0	0	66	14	0	2	18	34	262
Total	0	328	194	12	534	0	0	0	24	24	1	238	0	1	240	46	0	4	50	100	898
08:00 AM	0	86	70	2	158	0	0	0	15	15	2	69	0	2	73	21	0	0	17	38	284
08:15 AM	0	80	66	8	154	0	0	0	26	26	2	79	0	1	82	11	0	8	22	41	303
08:30 AM	0	82	75	2	159	0	0	0	21	21	4	69	0	1	74	17	0	2	24	43	297
08:45 AM	0	77	83	6	166	2	0	0	32	34	1	69	0	1	71	26	0	1	23	50	321
Total	0	325	294	18	637	2	0	0	94	96	9	286	0	5	300	75	0	11	86	172	1205
09:00 AM	0	78	62	10	150	0	0	0	16	16	1	56	0	0	57	26	0	2	13	41	264
09:15 AM	0	57	57	2	116	0	0	0	20	20	3	59	0	0	62	18	0	4	13	35	233
Grand Total	0	935	678	46	1659	2	0	0	159	161	16	692	0	6	714	176	0	25	174	375	2909
Apprch %	0	56.4	40.9	2.8		1.2	0	0	98.8		2.2	96.9	0	0.8		46.9	0	6.7	46.4		
Total %	0	32.1	23.3	1.6	57	0.1	0	0	5.5	5.5	0.6	23.8	0	0.2	24.5	6.1	0	0.9	6	12.9	
PCs and Peds	0	904	670	8	1582	2	0	0	47	49	13	653	0	5	671	170	0	21	174	365	2667
% PCs and Peds	0	96.7	98.8	17.4	95.4	100	0	0	29.6	30.4	81.2	94.4	0	83.3	94	96.6	0	84	100	97.3	91.7
HVs / Busses	0	22	5	38	65	0	0	0	112	112	2	19	0	1	22	3	0	4	0	7	206
% HVs / Busses	0	2.4	0.7	82.6	3.9	0	0	0	70.4	69.6	12.5	2.7	0	16.7	3.1	1.7	0	16	0	1.9	7.1
	0	9	3	0	12	0	0	0	0	0	1	20	0	0	21	3	0	0	0	3	36
%	0	1	0.4	0	0.7	0	0	0	0	0	6.2	2.9	0	0	2.9	1.7	0	0	0	0.8	1.2

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	**86**	70	2	158	0	0	0	15	15	2	69	0	**2**	73	21	0	0	17	38	284
08:15 AM	0	80	66	**8**	154	0	0	0	26	26	2	**79**	0	1	**82**	11	0	**8**	22	41	303
08:30 AM	0	82	75	2	159	0	0	0	21	21	**4**	69	0	1	74	17	0	2	**24**	43	297
08:45 AM	0	77	**83**	6	**166**	**2**	0	0	**32**	**34**	1	69	0	1	71	**26**	0	1	23	**50**	**321**
Total Volume	0	325	294	18	637	2	0	0	94	96	9	286	0	5	300	75	0	11	86	172	1205
% App. Total			46.2						97.9			95.3				43.6					
PHF	.000	.945	.886	.563	.959	.250	.000	.000	.734	.706	.563	.905	.000	.625	.915	.721	.000	.344	.896	.860	.938

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File Name : AM_Beacon @ Oxford
Site Code :
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Groups Printed- HVs / Busses -

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:30 AM	0	2	0	0	2	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	4
06:45 AM	0	3	1	3	7	0	0	0	4	4	0	2	0	0	2	1	0	1	0	2	15
Total	0	5	1	3	9	0	0	0	5	5	0	3	0	0	3	1	0	1	0	2	19
07:00 AM	0	2	0	3	5	0	0	0	1	1	0	8	0	0	8	0	0	0	0	0	14
07:15 AM	0	1	0	2	3	0	0	0	1	1	0	3	0	0	3	1	0	0	0	1	8
07:30 AM	0	4	1	3	8	0	0	0	7	7	0	4	0	0	4	0	0	0	0	0	19
07:45 AM	0	4	0	2	6	0	0	0	5	5	0	2	0	0	2	0	0	0	0	0	13
Total	0	11	1	10	22	0	0	0	14	14	0	17	0	0	17	1	0	0	0	1	54
08:00 AM	0	2	1	1	4	0	0	0	14	14	0	6	0	1	7	1	0	0	0	1	26
08:15 AM	0	1	1	6	8	0	0	0	16	16	1	1	0	0	2	0	0	1	0	1	27
08:30 AM	0	2	3	2	7	0	0	0	13	13	1	2	0	0	3	2	0	1	0	3	26
08:45 AM	0	2	0	6	8	0	0	0	26	26	0	2	0	0	2	0	0	0	0	0	36
Total	0	7	5	15	27	0	0	0	69	69	2	11	0	1	14	3	0	2	0	5	115
09:00 AM	0	5	1	9	15	0	0	0	11	11	1	2	0	0	3	1	0	0	0	1	30
09:15 AM	0	3	0	1	4	0	0	0	13	13	0	6	0	0	6	0	0	1	0	1	24
Grand Total	0	31	8	38	77	0	0	0	112	112	3	39	0	1	43	6	0	4	0	10	242
Apprch %	0	40.3	10.4	49.4		0	0	0	100		7	90.7	0	2.3		60	0	40	0		
Total %	0	12.8	3.3	15.7	31.8	0	0	0	46.3	46.3	1.2	16.1	0	0.4	17.8	2.5	0	1.7	0	4.1	
HVs / Busses	0	22	5	38	65	0	0	0	112	112	2	19	0	1	22	3	0	4	0	7	206
% HVs / Busses	0	71	62.5	100	84.4	0	0	0	100	100	66.7	48.7	0	100	51.2	50	0	100	0	70	85.1
	0	9	3	0	12	0	0	0	0	0	1	20	0	0	21	3	0	0	0	3	36
%	0	29	37.5	0	15.6	0	0	0	0	0	33.3	51.3	0	0	48.8	50	0	0	0	30	14.9

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:15 AM																					
08:15 AM	0	1	1	6	8	0	0	0	16	16	**1**	1	0	0	2	0	0	**1**	0	1	27
08:30 AM	0	2	**3**	2	7	0	0	0	13	13	1	**2**	0	0	**3**	**2**	0	1	0	**3**	26
08:45 AM	0	2	0	6	8	0	0	0	**26**	**26**	0	2	0	0	2	0	0	0	0	0	**36**
09:00 AM	0	**5**	1	**9**	**15**	0	0	0	11	11	1	2	0	0	3	1	0	0	0	1	30
Total Volume	0	10	5	23	38	0	0	0	66	66	3	7	0	0	10	3	0	2	0	5	119
% App. Total		26.3	13.2	60.5																	
PHF	.000	.500	.417	.639	.633	.000	.000	.000	.635	.635	.750	.875	.000	.000	.833	.375	.000	.500	.000	.417	.826

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File Name : AM_Somerville @ Beacon
Site Code :
Start Date : 12/16/2008

Groups Printed- PCs and Peds - HVs / Busses -

	Adelaide Road From North					Somerville Avenue From East					Beacon Street From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:30 AM	0	0	0	8	8	25	19	0	1	45	18	0	3	5	26	0	24	86	3	113	192
06:45 AM	0	0	1	12	13	21	18	0	1	40	19	0	7	6	32	0	25	133	4	162	247
Total	0	0	1	20	21	46	37	0	2	85	37	0	10	11	58	0	49	219	7	275	439
07:00 AM	0	0	0	10	10	27	31	0	1	59	31	0	15	3	49	0	29	110	3	142	260
07:15 AM	0	0	0	22	22	35	26	0	2	63	53	0	9	12	74	0	32	111	4	147	306
07:30 AM	0	0	0	30	30	54	27	0	0	81	51	0	19	7	77	0	47	151	7	205	393
07:45 AM	0	0	0	24	24	44	37	0	4	85	52	0	21	10	83	0	33	147	6	186	378
Total	0	0	0	86	86	160	121	0	7	288	187	0	64	32	283	0	141	519	20	680	1337
08:00 AM	0	0	1	40	41	66	38	0	4	108	45	0	26	11	82	0	44	147	13	204	435
08:15 AM	0	3	0	34	37	47	25	0	3	75	48	0	30	22	100	0	46	136	10	192	404
08:30 AM	0	1	0	39	40	57	44	0	1	102	40	0	27	11	78	0	41	153	17	211	431
08:45 AM	0	0	0	29	29	57	25	0	6	88	42	0	27	11	80	0	45	139	14	198	395
Total	0	4	1	142	147	227	132	0	14	373	175	0	110	55	340	0	176	575	54	805	1665
09:00 AM	0	0	0	25	25	48	21	0	3	72	40	0	25	8	73	0	46	140	18	204	374
09:15 AM	1	0	0	18	19	37	27	0	4	68	49	0	18	10	77	0	47	104	10	161	325
Grand Total	1	4	2	291	298	518	338	0	30	886	488	0	227	116	831	0	459	1557	109	2125	4140
Apprch %	0.3	1.3	0.7	97.7		58.5	38.1	0	3.4		58.7	0	27.3	14		0	21.6	73.3	5.1		
Total %	0	0.1	0	7	7.2	12.5	8.2	0	0.7	21.4	11.8	0	5.5	2.8	20.1	0	11.1	37.6	2.6	51.3	
PCs and Peds	1	4	2	272	279	508	314	0	17	839	461	0	219	110	790	0	416	1524	99	2039	3947
% PCs and Peds	100	100	100	93.5	93.6	98.1	92.9	0	56.7	94.7	94.5	0	96.5	94.8	95.1	0	90.6	97.9	90.8	96	95.3
HVs / Busses	0	0	0	18	18	9	10	0	12	31	13	0	5	6	24	0	15	23	10	48	121
% HVs / Busses	0	0	0	6.2	6	1.7	3	0	40	3.5	2.7	0	2.2	5.2	2.9	0	3.3	1.5	9.2	2.3	2.9
	0	0	0	1	1	1	14	0	1	16	14	0	3	0	17	0	28	10	0	38	72
%	0	0	0	0.3	0.3	0.2	4.1	0	3.3	1.8	2.9	0	1.3	0	2	0	6.1	0.6	0	1.8	1.7

	Adelaide Road From North					Somerville Avenue From East					Beacon Street From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	**1**	**40**	**41**	**66**	38	0	4	**108**	45	0	26	11	82	0	44	147	13	204	**435**
08:15 AM	0	**3**	0	34	37	47	25	0	3	75	**48**	0	**30**	**22**	**100**	0	**46**	136	10	192	404
08:30 AM	0	1	0	39	40	57	**44**	0	1	102	40	0	27	11	78	0	41	**153**	**17**	**211**	431
08:45 AM	0	0	0	29	29	57	25	0	**6**	88	42	0	27	11	80	0	45	139	14	198	395
Total Volume	0	4	1	142	147	227	132	0	14	373	175	0	110	55	340	0	176	575	54	805	1665
% App. Total				96.6		60.9	35.4				51.5		32.4	16.2			21.9	71.4			
PHF	.000	.333	.250	.888	.896	.860	.750	.000	.583	.863	.911	.000	.917	.625	.850	.000	.957	.940	.794	.954	.957

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Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	1	0	5	7
06:45 AM	0	0	0	2	2	0	1	0	0	1	3	0	0	0	3	0	1	3	0	4	10
Total	0	0	0	2	2	0	3	0	0	3	3	0	0	0	3	0	5	4	0	9	17
07:00 AM	0	0	0	1	1	0	3	0	1	4	2	0	2	0	4	0	4	2	1	7	16
07:15 AM	0	0	0	0	0	0	1	0	0	1	4	0	0	0	4	0	2	2	0	4	9
07:30 AM	0	0	0	0	0	1	2	0	0	3	1	0	2	0	3	0	10	3	1	14	20
07:45 AM	0	0	0	1	1	1	2	0	1	4	1	0	1	0	2	0	4	4	0	8	15
Total	0	0	0	2	2	2	8	0	2	12	8	0	5	0	13	0	20	11	2	33	60
08:00 AM	0	0	0	2	2	0	3	0	2	5	4	0	1	0	5	0	1	4	1	6	18
08:15 AM	0	0	0	4	4	1	3	0	2	6	1	0	1	2	4	0	2	1	0	3	17
08:30 AM	0	0	0	3	3	3	2	0	1	6	4	0	0	0	4	0	3	2	1	6	19
08:45 AM	0	0	0	5	5	1	2	0	4	7	2	0	0	0	2	0	3	2	1	6	20
Total	0	0	0	14	14	5	10	0	9	24	11	0	2	2	15	0	9	9	3	21	74
09:00 AM	0	0	0	1	1	3	2	0	1	6	2	0	1	3	6	0	5	5	2	12	25
09:15 AM	0	0	0	0	0	0	1	0	1	2	3	0	0	1	4	0	4	4	3	11	17
Grand Total	0	0	0	19	19	10	24	0	13	47	27	0	8	6	41	0	43	33	10	86	193
Apprch %	0	0	0	100		21.3	51.1	0	27.7		65.9	0	19.5	14.6		0	50	38.4	11.6		
Total %	0	0	0	9.8	9.8	5.2	12.4	0	6.7	24.4	14	0	4.1	3.1	21.2	0	22.3	17.1	5.2	44.6	
HVs / Busses	0	0	0	18	18	9	10	0	12	31	13	0	5	6	24	0	15	23	10	48	121
% HVs / Busses	0	0	0	94.7	94.7	90	41.7	0	92.3	66	48.1	0	62.5	100	58.5	0	34.9	69.7	100	55.8	62.7
	0	0	0	1	1	1	14	0	1	16	14	0	3	0	17	0	28	10	0	38	72
%	0	0	0	5.3	5.3	10	58.3	0	7.7	34	51.9	0	37.5	0	41.5	0	65.1	30.3	0	44.2	37.3

	Adelaide Road From North					Somerville Avenue From East					Beacon Street From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:15 AM																					
08:15 AM	0	0	0	4	4	1	**3**	0	2	6	1	0	**1**	2	4	0	2	1	0	3	17
08:30 AM	0	0	0	3	3	**3**	2	0	1	6	**4**	0	0	0	4	0	3	2	1	6	19
08:45 AM	0	0	0	**5**	**5**	1	2	0	**4**	**7**	2	0	0	0	2	0	3	2	1	6	20
09:00 AM	0	0	0	1	1	3	2	0	1	6	2	0	1	**3**	**6**	0	**5**	**5**	**2**	**12**	**25**
Total Volume	0	0	0	13	13	8	9	0	8	25	9	0	2	5	16	0	13	10	4	27	81
% App. Total											56.2		12.5	31.2			48.1		14.8		
PHF	.000	.000	.000	.650	.650	.667	.750	.000	.500	.893	.563	.000	.500	.417	.667	.000	.650	.500	.500	.563	.810

Data Acquisition, Transformation & Analysis

DATA, Inc.

50 Alden Avenue
Belchertown, MA 01007
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N/S: Mossland Street
E/W: Somerville Avenue
City, State: Somerville, MA
Client: TrafSol/T.Blake

File Name : AM_Somerville @ Mossland
Site Code :
Start Date : 12/16/2008

Groups Printed- PCs and Peds - HVs / Busses -

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:30 AM	44	0	0	7	51	0	36	0	0	36	0	0	0	0	0	0	68	0	0	68	155
06:45 AM	92	0	3	17	112	0	39	0	0	39	0	0	0	0	0	0	74	0	5	79	230
Total	136	0	3	24	163	0	75	0	0	75	0	0	0	0	0	0	142	0	5	147	385
07:00 AM	64	0	2	17	83	0	62	0	0	62	0	0	0	0	0	0	70	0	0	70	215
07:15 AM	69	0	5	15	89	0	74	0	0	74	0	0	0	0	0	0	74	0	5	79	242
07:30 AM	79	0	3	28	110	0	80	0	0	80	0	0	0	0	0	0	117	0	4	121	311
07:45 AM	92	0	2	25	119	0	88	0	0	88	0	0	0	0	0	0	101	0	8	109	316
Total	304	0	12	85	401	0	304	0	0	304	0	0	0	0	0	0	362	0	17	379	1084
08:00 AM	86	0	1	48	135	0	86	0	0	86	0	0	0	0	0	0	105	0	11	116	337
08:15 AM	88	0	6	47	141	0	75	0	5	80	0	0	0	0	0	0	93	0	18	111	332
08:30 AM	91	0	6	44	141	0	84	0	2	86	0	0	0	0	0	0	106	0	14	120	347
08:45 AM	97	0	3	25	125	0	67	0	1	68	0	0	0	0	0	0	99	0	19	118	311
Total	362	0	16	164	542	0	312	0	8	320	0	0	0	0	0	0	403	0	62	465	1327
09:00 AM	80	0	3	22	105	0	62	0	0	62	0	0	0	0	0	0	106	0	19	125	292
09:15 AM	77	0	2	22	101	0	75	0	2	77	0	0	0	0	0	0	83	0	21	104	282
Grand Total	959	0	36	317	1312	0	828	0	10	838	0	0	0	0	0	0	1096	0	124	1220	3370
Apprch %	73.1	0	2.7	24.2		0	98.8	0	1.2		0	0	0	0		0	89.8	0	10.2		
Total %	28.5	0	1.1	9.4	38.9	0	24.6	0	0.3	24.9	0	0	0	0	0	0	32.5	0	3.7	36.2	
PCs and Peds	950	0	36	264	1250	0	785	0	10	795	0	0	0	0	0	0	1029	0	82	1111	3156
% PCs and Peds	99.1	0	100	83.3	95.3	0	94.8	0	100	94.9	0	0	0	0	0	0	93.9	0	66.1	91.1	93.6
HVs / Busses	7	0	0	53	60	0	9	0	0	9	0	0	0	0	0	0	18	0	42	60	129
% HVs / Busses	0.7	0	0	16.7	4.6	0	1.1	0	0	1.1	0	0	0	0	0	0	1.6	0	33.9	4.9	3.8
	2	0	0	0	2	0	34	0	0	34	0	0	0	0	0	0	49	0	0	49	85
%	0.2	0	0	0	0.2	0	4.1	0	0	4.1	0	0	0	0	0	0	4.5	0	0	4	2.5

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**92**	0	2	25	119	0	**88**	0	0	**88**	0	0	0	0	0	0	101	0	8	109	316
08:00 AM	86	0	1	**48**	135	0	86	0	0	86	0	0	0	0	0	0	105	0	11	116	337
08:15 AM	88	0	**6**	47	**141**	0	75	0	**5**	80	0	0	0	0	0	0	93	0	**18**	111	332
08:30 AM	91	0	6	44	141	0	84	0	2	86	0	0	0	0	0	0	**106**	0	14	**120**	**347**
Total Volume	357	0	15	164	536	0	333	0	7	340	0	0	0	0	0	0	405	0	51	456	1332
% App. Total	66.6			30.6			97.9										88.8		11.2		
PHF	.970	.000	.625	.854	.950	.000	.946	.000	.350	.966	.000	.000	.000	.000	.000	.000	.955	.000	.708	.950	.960

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City, State: Somerville, MA
Client: TrafSol/T.Blake

File Name : AM_Somerville @ Mossland
Site Code :
Start Date : 12/16/2008

Groups Printed- HVs / Busses -

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:30 AM	0	0	0	1	1	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	7
06:45 AM	1	0	0	6	7	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	14
Total	1	0	0	7	8	0	6	0	0	6	0	0	0	0	0	0	7	0	0	7	21
07:00 AM	1	0	0	5	6	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	14
07:15 AM	1	0	0	1	2	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	9
07:30 AM	1	0	0	3	4	0	3	0	0	3	0	0	0	0	0	0	14	0	0	14	21
07:45 AM	1	0	0	3	4	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	13
Total	4	0	0	12	16	0	12	0	0	12	0	0	0	0	0	0	29	0	0	29	57
08:00 AM	1	0	0	10	11	0	6	0	0	6	0	0	0	0	0	0	5	0	1	6	23
08:15 AM	0	0	0	12	12	0	2	0	0	2	0	0	0	0	0	0	2	0	4	6	20
08:30 AM	0	0	0	4	4	0	6	0	0	6	0	0	0	0	0	0	5	0	9	14	24
08:45 AM	1	0	0	5	6	0	4	0	0	4	0	0	0	0	0	0	5	0	9	14	24
Total	2	0	0	31	33	0	18	0	0	18	0	0	0	0	0	0	17	0	23	40	91
09:00 AM	1	0	0	1	2	0	3	0	0	3	0	0	0	0	0	0	7	0	10	17	22
09:15 AM	1	0	0	2	3	0	4	0	0	4	0	0	0	0	0	0	7	0	9	16	23
Grand Total	9	0	0	53	62	0	43	0	0	43	0	0	0	0	0	0	67	0	42	109	214
Apprch %	14.5	0	0	85.5		0	100	0	0		0	0	0	0		0	61.5	0	38.5		
Total %	4.2	0	0	24.8	29	0	20.1	0	0	20.1	0	0	0	0	0	0	31.3	0	19.6	50.9	
HVs / Busses	7	0	0	53	60	0	9	0	0	9	0	0	0	0	0	0	18	0	42	60	129
% HVs / Busses	77.8	0	0	100	96.8	0	20.9	0	0	20.9	0	0	0	0	0	0	26.9	0	100	55	60.3
	2	0	0	0	2	0	34	0	0	34	0	0	0	0	0	0	49	0	0	49	85
%	22.2	0	0	0	3.2	0	79.1	0	0	79.1	0	0	0	0	0	0	73.1	0	0	45	39.7

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:30 AM																					
08:30 AM	0	0	0	4	4	0	**6**	0	0	**6**	0	0	0	0	0	0	5	0	9	14	**24**
08:45 AM	**1**	0	0	**5**	**6**	0	4	0	0	4	0	0	0	0	0	0	5	0	9	14	24
09:00 AM	1	0	0	1	2	0	3	0	0	3	0	0	0	0	0	0	**7**	0	**10**	**17**	22
09:15 AM	1	0	0	2	3	0	4	0	0	4	0	0	0	0	0	0	7	0	9	16	23
Total Volume	3	0	0	12	15	0	17	0	0	17	0	0	0	0	0	0	24	0	37	61	93
% App. Total																	39.3		60.7		
PHF	.750	.000	.000	.600	.625	.000	.708	.000	.000	.708	.000	.000	.000	.000	.000	.000	.857	.000	.925	.897	.969

Data Acquisition, Transformation & Analysis

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50 Alden Avenue
Belchertown, MA 01007
888-389-9524 or www.datayourequested.com

N/S: Beacon Street
E/W: Oxford Street
City, State: Somerville, MA
Client: TrafSol/T.Blake

File Name : PM_Beacon @ Oxford
Site Code :
Start Date : 12/16/2008
Page No : 1

Groups Printed- PCs and Peds - HV / Busses -

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	60	33	4	97	0	0	0	6	6	1	99	0	1	101	46	0	6	11	63	267
04:15 PM	0	69	23	1	93	0	0	0	12	12	3	89	0	11	103	45	0	5	19	69	277
04:30 PM	0	45	37	3	85	0	0	0	8	8	4	94	0	8	106	39	0	2	12	53	252
04:45 PM	0	57	33	4	94	0	0	0	17	17	3	91	0	7	101	47	0	2	20	69	281
Total	0	231	126	12	369	0	0	0	43	43	11	373	0	27	411	177	0	15	62	254	1077
05:00 PM	0	66	43	2	111	0	0	0	17	17	5	115	0	3	123	66	0	3	17	86	337
05:15 PM	0	66	36	3	105	0	0	0	13	13	1	113	0	3	117	51	0	1	20	72	307
05:30 PM	0	66	26	5	97	0	0	0	19	19	3	130	0	2	135	42	0	4	17	63	314
05:45 PM	0	63	32	11	106	0	0	0	15	15	0	92	0	1	93	54	0	4	15	73	287
Total	0	261	137	21	419	0	0	0	64	64	9	450	0	9	468	213	0	12	69	294	1245
06:00 PM	0	53	30	9	92	0	0	0	11	11	6	94	0	0	100	52	0	2	22	76	279
06:15 PM	0	60	38	8	106	0	0	0	8	8	2	94	0	0	96	34	0	2	14	50	260
06:30 PM	0	50	22	9	81	0	0	0	12	12	3	87	0	1	91	46	0	0	17	63	247
06:45 PM	0	48	21	6	75	0	0	0	8	8	2	85	0	1	88	43	0	1	12	56	227
Total	0	211	111	32	354	0	0	0	39	39	13	360	0	2	375	175	0	5	65	245	1013
Grand Total	0	703	374	65	1142	0	0	0	146	146	33	1183	0	38	1254	565	0	32	196	793	3335
Apprch %	0	61.6	32.7	5.7		0	0	0	100		2.6	94.3	0	3		71.2	0	4	24.7		
Total %	0	21.1	11.2	1.9	34.2	0	0	0	4.4	4.4	1	35.5	0	1.1	37.6	16.9	0	1	5.9	23.8	
PCs and Peds	0	697	373	27	1097	0	0	0	37	37	33	1181	0	27	1241	558	0	30	189	777	3152
% PCs and Peds	0	99.1	99.7	41.5	96.1	0	0	0	25.3	25.3	100	99.8	0	71.1	99	98.8	0	93.8	96.4	98	94.5
HV / Busses	0	6	1	38	45	0	0	0	109	109	0	2	0	11	13	6	0	2	7	15	182
% HV / Busses																					
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0.1	0

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	**66**	**43**	2	**111**	0	0	0	17	17	**5**	115	0	**3**	123	**66**	0	3	17	**86**	**337**
05:15 PM	0	66	36	3	105	0	0	0	13	13	1	113	0	3	117	51	0	1	**20**	72	307
05:30 PM	0	66	26	5	97	0	0	0	**19**	**19**	3	**130**	0	2	**135**	42	0	**4**	17	63	314
05:45 PM	0	63	32	**11**	106	0	0	0	15	15	0	92	0	1	93	54	0	4	15	73	287
Total Volume	0	261	137	21	419	0	0	0	64	64	9	450	0	9	468	213	0	12	69	294	1245
% App. Total		62.3	32.7									96.2				72.4			23.5		
PHF	.000	.989	.797	.477	.944	.000	.000	.000	.842	.842	.450	.865	.000	.750	.867	.807	.000	.750	.863	.855	.924

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File Name : PM_Beacon @ Oxford
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Groups Printed- HV / Busses -

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	2	1	4	7	0	0	0	5	5	0	0	0	0	0	2	0	1	0	3	15
04:15 PM	0	3	0	1	4	0	0	0	6	6	0	1	0	2	3	0	0	0	2	2	15
04:30 PM	0	0	0	2	2	0	0	0	6	6	0	0	0	1	1	1	0	1	0	2	11
04:45 PM	0	0	0	2	2	0	0	0	13	13	0	1	0	3	4	0	0	0	0	0	19
Total	0	5	1	9	15	0	0	0	30	30	0	2	0	6	8	3	0	2	2	7	60
05:00 PM	0	0	0	2	2	0	0	0	14	14	0	0	0	3	3	0	0	0	2	2	21
05:15 PM	0	0	0	0	0	0	0	0	10	10	0	0	0	1	1	2	0	0	1	3	14
05:30 PM	0	0	0	3	3	0	0	0	11	11	0	0	0	0	0	1	0	0	0	1	15
05:45 PM	0	1	0	3	4	0	0	0	15	15	0	0	0	1	1	0	0	0	2	2	22
Total	0	1	0	8	9	0	0	0	50	50	0	0	0	5	5	3	0	0	5	8	72
06:00 PM	0	0	0	7	7	0	0	0	9	9	0	0	0	0	0	0	0	0	0	0	16
06:15 PM	0	0	0	4	4	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	9
06:30 PM	0	0	0	6	6	0	0	0	9	9	0	0	0	0	0	0	0	0	0	0	15
06:45 PM	0	0	0	4	4	0	0	0	6	6	0	0	0	0	0	1	0	0	0	1	11
Total	0	0	0	21	21	0	0	0	29	29	0	0	0	0	0	1	0	0	0	1	51
Grand Total	0	6	1	38	45	0	0	0	109	109	0	2	0	11	13	7	0	2	7	16	183
Apprch %	0	13.3	2.2	84.4		0	0	0	100		0	15.4	0	84.6		43.8	0	12.5	43.8		
Total %	0	3.3	0.5	20.8	24.6	0	0	0	59.6	59.6	0	1.1	0	6	7.1	3.8	0	1.1	3.8	8.7	
HV / Busses	0	6	1	38	45	0	0	0	109	109	0	2	0	11	13	6	0	2	7	15	182
% HV / Busses																					
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.3	0	0	0	6.2	0.5

	Beacon Street From North					None From East					Beacon Street From South					Oxford Street From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	2	2	0	0	0	14	14	0	0	0	**3**	**3**	0	0	0	**2**	2	21
05:15 PM	0	0	0	0	0	0	0	0	10	10	0	0	0	1	1	**2**	0	0	1	**3**	14
05:30 PM	0	0	0	**3**	3	0	0	0	11	11	0	0	0	0	0	1	0	0	0	1	15
05:45 PM	0	**1**	0	3	**4**	0	0	0	**15**	**15**	0	0	0	1	1	0	0	0	2	2	**22**
Total Volume	0	1	0	8	9	0	0	0	50	50	0	0	0	5	5	3	0	0	5	8	72
% App. Total		11.1		88.9												37.5			62.5		
PHF	.000	.250	.000	.667	.563	.000	.000	.000	.833	.833	.000	.000	.000	.417	.417	.375	.000	.000	.625	.667	.818

DATA, Inc.

Data Acquisition, Transformation & Analysis

50 Alden Avenue
Belchertown, MA 01007
888-389-9524 or www.datayourequested.com

N/S: Adelaide Road / Beacon Street
E/W: Somerville Avenue
City, State: Somerville, MA
Client: TrafSol/T.Blake

File Name : PM_Somerville @ Beacon
Site Code :
Start Date : 12/16/2008

Groups Printed- PCs and Peds - HVs / Busses -

	Adelaide Road From North					Somerville Avenue From East					Beacon Street From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	9	9	26	23	0	4	53	73	0	60	4	137	0	61	95	9	165	364
04:15 PM	0	0	0	9	9	37	33	0	8	78	59	0	59	13	131	0	68	95	7	170	388
04:30 PM	0	0	1	20	21	21	32	0	10	63	69	0	51	13	133	0	60	84	13	157	374
04:45 PM	0	0	0	20	20	20	29	0	9	58	51	0	60	13	124	1	67	99	7	174	376
Total	0	0	1	58	59	104	117	0	31	252	252	0	230	43	525	1	256	373	36	666	1502
05:00 PM	0	0	1	15	16	29	46	0	10	85	88	1	73	12	174	0	53	107	6	166	441
05:15 PM	0	0	0	24	24	42	45	0	8	95	75	0	77	18	170	0	56	98	14	168	457
05:30 PM	0	0	0	33	33	27	23	0	7	57	79	1	72	31	183	1	53	91	16	161	434
05:45 PM	0	0	1	36	37	22	34	1	14	71	71	0	74	22	167	0	64	103	13	180	455
Total	0	0	2	108	110	120	148	1	39	308	313	2	296	83	694	1	226	399	49	675	1787
06:00 PM	0	1	0	44	45	27	40	2	11	80	89	1	79	24	193	0	54	100	9	163	481
06:15 PM	0	0	0	43	43	36	38	1	11	86	75	0	57	18	150	1	63	100	17	181	460
06:30 PM	0	1	0	42	43	28	30	0	15	73	75	0	63	15	153	0	56	77	11	144	413
06:45 PM	1	0	0	27	28	26	34	0	8	68	58	1	49	18	126	0	56	98	3	157	379
Total	1	2	0	156	159	117	142	3	45	307	297	2	248	75	622	1	229	375	40	645	1733
Grand Total	1	2	3	322	328	341	407	4	115	867	862	4	774	201	1841	3	711	1147	125	1986	5022
Apprch %	0.3	0.6	0.9	98.2		39.3	46.9	0.5	13.3		46.8	0.2	42	10.9		0.2	35.8	57.8	6.3		
Total %	0	0	0.1	6.4	6.5	6.8	8.1	0.1	2.3	17.3	17.2	0.1	15.4	4	36.7	0.1	14.2	22.8	2.5	39.5	
PCs and Peds	1	2	3	237	243	337	390	2	37	766	861	4	767	163	1795	3	684	1141	92	1920	4724
% PCs and Peds	100	100	100	73.6	74.1	98.8	95.8	50	32.2	88.4	99.9	100	99.1	81.1	97.5	100	96.2	99.5	73.6	96.7	94.1
HVs / Busses	0	0	0	85	85	4	2	2	78	86	0	0	6	37	43	0	8	6	32	46	260
% HVs / Busses	0	0	0	26.4	25.9	1.2	0.5	50	67.8	9.9	0	0	0.8	18.4	2.3	0	1.1	0.5	25.6	2.3	5.2
	0	0	0	0	0	0	15	0	0	15	1	0	1	1	3	0	19	0	1	20	38
%	0	0	0	0	0	0	3.7	0	0	1.7	0.1	0	0.1	0.5	0.2	0	2.7	0	0.8	1	0.8

	Adelaide Road From North					Somerville Avenue From East					Beacon Street From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:30 PM																					
05:30 PM	0	0	0	33	33	27	23	0	7	57	79	**1**	72	**31**	183	**1**	53	91	16	161	434
05:45 PM	0	0	**1**	36	37	22	34	1	**14**	71	71	0	74	22	167	0	**64**	**103**	13	180	455
06:00 PM	0	**1**	0	**44**	**45**	27	**40**	**2**	11	80	**89**	1	**79**	24	**193**	0	54	100	9	163	**481**
06:15 PM	0	0	0	43	43	**36**	38	1	11	**86**	75	0	57	18	150	1	63	100	**17**	**181**	460
Total Volume	0	1	1	156	158	112	135	4	43	294	314	2	282	95	693	2	234	394	55	685	1830
% App. Total				98.7		38.1	45.9		14.6		45.3		40.7	13.7			34.2	57.5			
PHF	.000	.250	.250	.886	.878	.778	.844	.500	.768	.855	.882	.500	.892	.766	.898	.500	.914	.956	.809	.946	.951

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File Name : PM_Somerville @ Beacon
Site Code :
Start Date : 12/16/2008

Groups Printed- HVs / Busses -

	Adelaide Road From North					Somerville Avenue From East					Beacon Street From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	4	4	2	1	0	3	6	1	0	1	0	2	0	4	3	2	9	21
04:15 PM	0	0	0	2	2	2	2	0	3	7	0	0	2	4	6	0	3	0	4	7	22
04:30 PM	0	0	0	4	4	0	3	0	3	6	0	0	0	2	2	0	3	1	3	7	19
04:45 PM	0	0	0	7	7	0	1	0	6	7	0	0	0	5	5	0	2	0	3	5	24
Total	0	0	0	17	17	4	7	0	15	26	1	0	3	11	15	0	12	4	12	28	86
05:00 PM	0	0	0	5	5	0	2	0	6	8	0	0	0	1	1	0	1	0	0	1	15
05:15 PM	0	0	0	7	7	0	3	0	7	10	0	0	2	2	4	0	3	0	3	6	27
05:30 PM	0	0	0	8	8	0	1	0	5	6	0	0	1	5	6	0	3	0	5	8	28
05:45 PM	0	0	0	11	11	0	0	1	11	12	0	0	0	10	10	0	0	1	5	6	39
Total	0	0	0	31	31	0	6	1	29	36	0	0	3	18	21	0	7	1	13	21	109
06:00 PM	0	0	0	10	10	0	1	0	10	11	0	0	0	3	3	0	3	0	4	7	31
06:15 PM	0	0	0	10	10	0	1	1	7	9	0	0	0	3	3	0	1	0	2	3	25
06:30 PM	0	0	0	11	11	0	1	0	11	12	0	0	0	2	2	0	1	1	2	4	29
06:45 PM	0	0	0	6	6	0	1	0	6	7	0	0	1	1	2	0	3	0	0	3	18
Total	0	0	0	37	37	0	4	1	34	39	0	0	1	9	10	0	8	1	8	17	103
Grand Total	0	0	0	85	85	4	17	2	78	101	1	0	7	38	46	0	27	6	33	66	298
Apprch %	0	0	0	100		4	16.8	2	77.2		2.2	0	15.2	82.6		0	40.9	9.1	50		
Total %	0	0	0	28.5	28.5	1.3	5.7	0.7	26.2	33.9	0.3	0	2.3	12.8	15.4	0	9.1	2	11.1	22.1	
HVs / Busses	0	0	0	85	85	4	2	2	78	86	0	0	6	37	43	0	8	6	32	46	260
% HVs / Busses	0	0	0	100	100	100	11.8	100	100	85.1	0	0	85.7	97.4	93.5	0	29.6	100	97	69.7	87.2
	0	0	0	0	0	0	15	0	0	15	1	0	1	1	3	0	19	0	1	20	38
%	0	0	0	0	0	0	88.2	0	0	14.9	100	0	14.3	2.6	6.5	0	70.4	0	3	30.3	12.8

	Adelaide Road From North					Somerville Avenue From East					Beacon Street From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:15 PM																					
05:15 PM	0	0	0	7	7	0	**3**	0	7	10	0	0	**2**	2	4	0	**3**	0	3	6	27
05:30 PM	0	0	0	8	8	0	1	0	5	6	0	0	1	5	6	0	3	0	**5**	**8**	28
05:45 PM	0	0	0	**11**	**11**	0	0	**1**	**11**	**12**	0	0	0	**10**	**10**	0	0	**1**	5	6	**39**
06:00 PM	0	0	0	10	10	0	1	0	10	11	0	0	0	3	3	0	3	0	4	7	31
Total Volume	0	0	0	36	36	0	5	1	33	39	0	0	3	20	23	0	9	1	17	27	125
% App. Total							12.8		84.6								33.3				
PHF	.000	.000	.000	.818	.818	.000	.417	.250	.750	.813	.000	.000	.375	.500	.575	.000	.750	.250	.850	.844	.801

Data Acquisition, Transformation & Analysis

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50 Alden Avenue
Belchertown, MA 01007
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N/S: Mossland Street
E/W: Somerville Avenue
City, State: Somerville, MA
Client: TrafSol/T.Blake

File Name : PM_Somerville @ Mossland
Site Code :
Start Date : 12/16/2008

Groups Printed- PCs and Peds - HVs / Busses -

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	69	0	6	15	90	0	91	0	1	92	0	0	0	0	0	1	85	0	2	88	270
04:15 PM	55	0	5	13	73	0	92	0	1	93	0	0	0	0	0	0	106	0	3	109	275
04:30 PM	58	0	4	26	88	0	99	0	1	100	0	0	0	0	0	0	82	0	4	86	274
04:45 PM	63	0	2	21	86	0	80	0	0	80	0	0	0	0	0	0	107	0	6	113	279
Total	245	0	17	75	337	0	362	0	3	365	0	0	0	0	0	1	380	0	15	396	1098
05:00 PM	74	0	4	16	94	0	134	0	0	134	0	0	0	0	0	0	82	0	14	96	324
05:15 PM	64	0	4	19	87	0	124	0	0	124	0	0	0	0	0	0	91	0	2	93	304
05:30 PM	69	0	6	28	103	0	102	0	0	102	0	0	0	0	0	16	64	0	1	81	286
05:45 PM	63	0	5	38	106	0	109	0	1	110	0	0	0	0	0	0	101	0	6	107	323
Total	270	0	19	101	390	0	469	0	1	470	0	0	0	0	0	16	338	0	23	377	1237
06:00 PM	70	0	6	48	124	0	125	0	0	125	0	0	0	0	0	0	83	0	14	97	346
06:15 PM	57	0	1	44	102	0	116	0	0	116	0	0	0	0	0	0	102	0	7	109	327
06:30 PM	62	0	6	36	104	0	98	0	0	98	0	0	0	0	0	0	78	0	7	85	287
06:45 PM	59	0	5	33	97	0	88	0	1	89	0	0	0	0	0	0	94	0	9	103	289
Total	248	0	18	161	427	0	427	0	1	428	0	0	0	0	0	0	357	0	37	394	1249
Grand Total	763	0	54	337	1154	0	1258	0	5	1263	0	0	0	0	0	17	1075	0	75	1167	3584
Apprch %	66.1	0	4.7	29.2		0	99.6	0	0.4		0	0	0	0		1.5	92.1	0	6.4		
Total %	21.3	0	1.5	9.4	32.2	0	35.1	0	0.1	35.2	0	0	0	0	0	0.5	30	0	2.1	32.6	
PCs and Peds	758	0	52	244	1054	0	1240	0	5	1245	0	0	0	0	0	16	1049	0	59	1124	3423
% PCs and Peds	99.3	0	96.3	72.4	91.3	0	98.6	0	100	98.6	0	0	0	0	0	94.1	97.6	0	78.7	96.3	95.5
HVs / Busses	4	0	2	93	99	0	2	0	0	2	0	0	0	0	0	1	7	0	16	24	125
% HVs / Busses	0.5	0	3.7	27.6	8.6	0	0.2	0	0	0.2	0	0	0	0	0	5.9	0.7	0	21.3	2.1	3.5
	1	0	0	0	1	0	16	0	0	16	0	0	0	0	0	0	19	0	0	19	36
%	0.1	0	0	0	0.1	0	1.3	0	0	1.3	0	0	0	0	0	0	1.8	0	0	1.6	1

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:45 PM																					
05:45 PM	63	0	5	38	106	0	109	0	**1**	110	0	0	0	0	0	0	101	0	6	107	323
06:00 PM	**70**	0	**6**	**48**	**124**	0	**125**	0	0	**125**	0	0	0	0	0	0	83	0	**14**	97	**346**
06:15 PM	57	0	1	44	102	0	116	0	0	116	0	0	0	0	0	0	**102**	0	7	**109**	327
06:30 PM	62	0	6	36	104	0	98	0	0	98	0	0	0	0	0	0	78	0	7	85	287
Total Volume	252	0	18	166	436	0	448	0	1	449	0	0	0	0	0	0	364	0	34	398	1283
% App. Total	57.8			38.1			99.8										91.5				
PHF	.900	.000	.750	.865	.879	.000	.896	.000	.250	.898	.000	.000	.000	.000	.000	.000	.892	.000	.607	.913	.927

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File Name : PM_Somerville @ Mossland
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Start Date : 12/16/2008

Groups Printed- HVs / Busses -

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	2	0	1	5	8	0	1	0	0	1	0	0	0	0	0	1	3	0	1	5	14
04:15 PM	0	0	0	6	6	0	3	0	0	3	0	0	0	0	0	0	3	0	2	5	14
04:30 PM	0	0	0	5	5	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	9
04:45 PM	0	0	0	8	8	0	1	0	0	1	0	0	0	0	0	0	3	0	2	5	14
Total	2	0	1	24	27	0	6	0	0	6	0	0	0	0	0	1	12	0	5	18	51
05:00 PM	0	0	0	4	4	0	2	0	0	2	0	0	0	0	0	0	1	0	2	3	9
05:15 PM	0	0	0	8	8	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	13
05:30 PM	0	0	1	9	10	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	16
05:45 PM	1	0	0	12	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
Total	1	0	1	33	35	0	7	0	0	7	0	0	0	0	0	0	7	0	2	9	51
06:00 PM	0	0	0	13	13	0	1	0	0	1	0	0	0	0	0	0	2	0	2	4	18
06:15 PM	1	0	0	8	9	0	2	0	0	2	0	0	0	0	0	0	1	0	3	4	15
06:30 PM	1	0	0	8	9	0	1	0	0	1	0	0	0	0	0	0	1	0	1	2	12
06:45 PM	0	0	0	7	7	0	1	0	0	1	0	0	0	0	0	0	3	0	3	6	14
Total	2	0	0	36	38	0	5	0	0	5	0	0	0	0	0	0	7	0	9	16	59
Grand Total	5	0	2	93	100	0	18	0	0	18	0	0	0	0	0	1	26	0	16	43	161
Apprch %	5	0	2	93		0	100	0	0		0	0	0	0		2.3	60.5	0	37.2		
Total %	3.1	0	1.2	57.8	62.1	0	11.2	0	0	11.2	0	0	0	0	0	0.6	16.1	0	9.9	26.7	
HVs / Busses	4	0	2	93	99	0	2	0	0	2	0	0	0	0	0	1	7	0	16	24	125
% HVs / Busses	80	0	100	100	99	0	11.1	0	0	11.1	0	0	0	0	0	100	26.9	0	100	55.8	77.6
	1	0	0	0	1	0	16	0	0	16	0	0	0	0	0	0	19	0	0	19	36
%	20	0	0	0	1	0	88.9	0	0	88.9	0	0	0	0	0	0	73.1	0	0	44.2	22.4

	Mossland Street From North					Somerville Avenue From East					None From South					Somerville Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:30 PM																					
05:30 PM	0	0	**1**	9	10	0	**2**	0	0	**2**	0	0	0	0	0	0	**4**	0	0	**4**	16
05:45 PM	**1**	0	0	12	**13**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
06:00 PM	0	0	0	**13**	13	0	1	0	0	1	0	0	0	0	0	0	2	0	2	4	**18**
06:15 PM	1	0	0	8	9	0	2	0	0	2	0	0	0	0	0	0	1	0	**3**	4	15
Total Volume	2	0	1	42	45	0	5	0	0	5	0	0	0	0	0	0	7	0	5	12	62
% App. Total				93.3													58.3		41.7		
PHF	.500	.000	.250	.808	.865	.000	.625	.000	.000	.625	.000	.000	.000	.000	.000	.000	.438	.000	.417	.750	.861

DATA, Inc.
Data Acquisition, Transformation, & Analysis

Somerville, MA

Date: 12/16/2008
Time: 6:30am - 9:30am, 4:00pm - 7:00pm

Int. Start Time	Pedestrian Signal Activation
6:30	2
6:45	1
7:00	1
7:15	2
7:30	3
7:45	2
8:00	2
8:15	2
8:30	3
8:45	3
9:00	1
9:15	3

Int. Start Time	Pedestrian Signal Activation
4:00	2
4:15	3
4:30	2
4:45	1
5:00	0
5:15	1
5:30	2
5:45	2
6:00	4
6:15	0
6:30	1
6:45	1

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Somerville, MA COUNT DATE : Average Month 2008

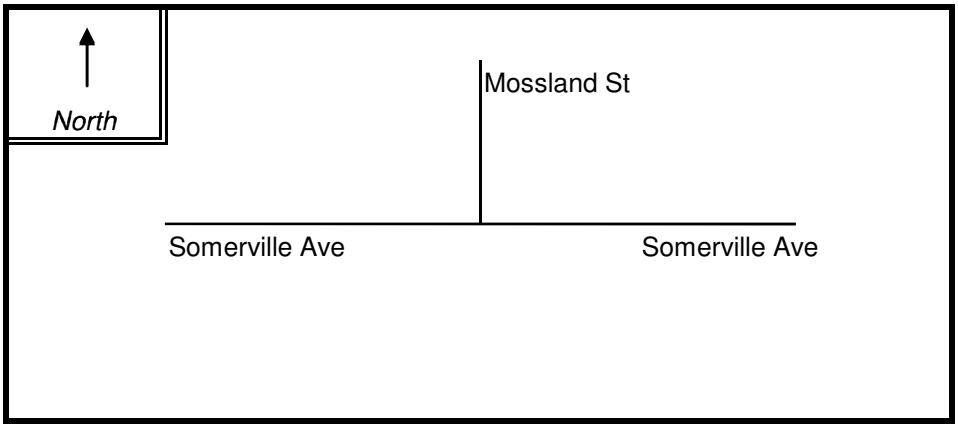
DISTRICT : 4 UNSIGNALIZED : [ ] SIGNALIZED : [X]

~ INTERSECTION DATA ~

MAJOR STREET : Somerville Avenue

MINOR STREET(S) : Mossland Street

INTERSECTION DIAGRAM (Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	SB			
VOLUMES (AM/PM) :	607	643	346			1,596

" K " FACTOR : **0.090** APPROACH ADT : **17,733** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 3 # OF YEARS : 3 AVERAGE # OF CRASHES (**A**) : **1.00**

CRASH RATE CALCULATION : **0.15** RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments :

Project Title & Date: 08-065 Beacon St Hotel, Somerville

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Somerville, MA COUNT DATE : Average Month 2008

DISTRICT : 4 UNSIGNALIZED : [ ] SIGNALIZED : [X]

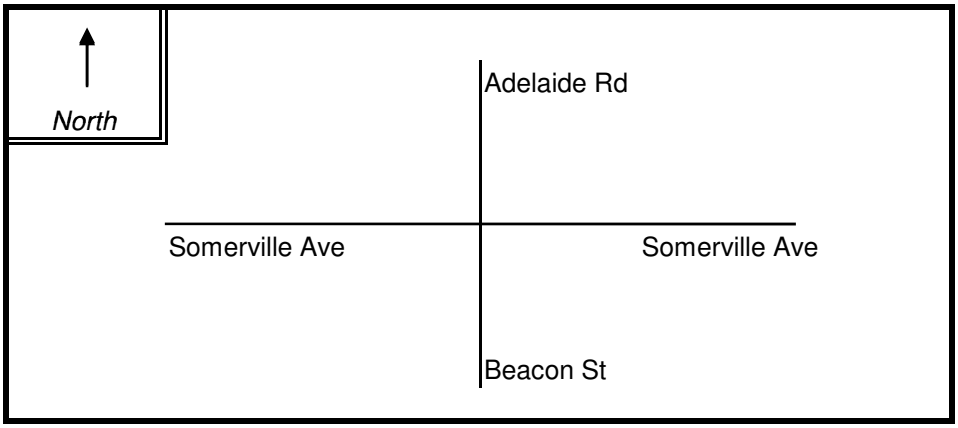
~ INTERSECTION DATA ~

MAJOR STREET : Somerville Avenue

MINOR STREET(S) : Beacon Street

Adelaide Road

INTERSECTION DIAGRAM (Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (AM/PM) :	1,056	596	643	4		2,299

" K " FACTOR : **0.090** APPROACH ADT : **25,544** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 1 # OF YEARS : 3 AVERAGE # OF CRASHES (**A**) : **0.33**

CRASH RATE CALCULATION : **0.04** RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments :

Project Title & Date: 08-065 Beacon St Hotel, Somerville

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Somerville, MA COUNT DATE : Average Month 2008

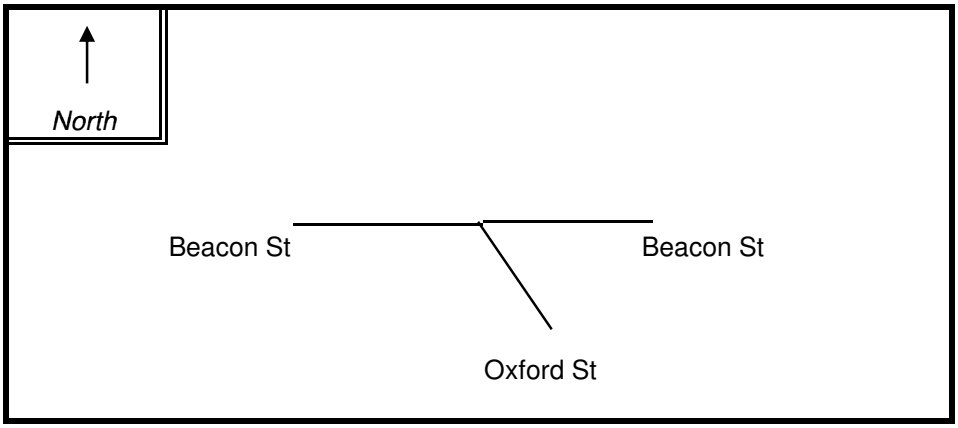
DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Beacon Street

MINOR STREET(S) : Oxford Street

INTERSECTION DIAGRAM (Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB			
VOLUMES (AM/PM) :	782	507	201			1,490

" K " FACTOR : 0.090 APPROACH ADT : 16,556 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 4 # OF YEARS : 3 AVERAGE # OF CRASHES (**A**) : 1.33

CRASH RATE CALCULATION : 0.22 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments :

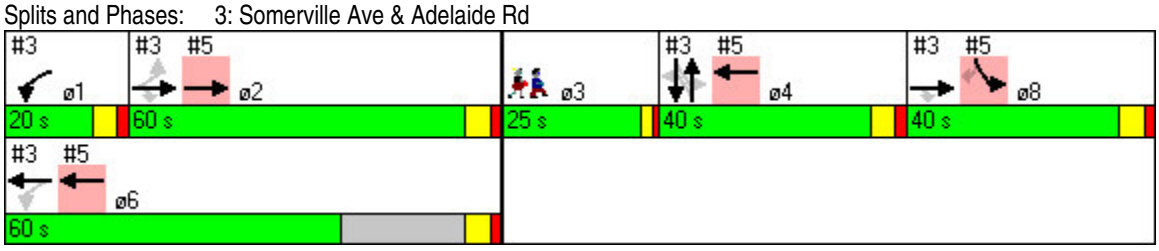
Project Title & Date: 08-065 Beacon St Hotel, Somerville

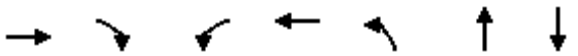
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø2	ø3	ø8
Lane Configurations										
Volume (vph)	322	726	334	267	306	0	4			
Turn Type		Perm	pm+pt		Perm					
Protected Phases	2 8		1	6		4	4	2	3	8
Permitted Phases		2 8	6		4					
Detector Phase	2 8	2 8	1	6	4	4	4			
Switch Phase										
Minimum Initial (s)			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)			10.0	10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	100.0	100.0	20.0	60.0	40.0	40.0	40.0	60.0	25.0	40.0
Total Split (%)	54.1%	54.1%	10.8%	32.4%	21.6%	21.6%	21.6%	32%	14%	22%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)			2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Lead/Lag			Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?			Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode			C-Min	C-Min	None	None	None	Min	None	None
Act Effct Green (s)	91.9	91.9	67.3	67.3	42.0	42.0	42.0			
Actuated g/C Ratio	0.50	0.50	0.36	0.36	0.23	0.23	0.23			
v/c Ratio	0.37	0.66	1.19	0.53	0.84	0.68	0.04			
Control Delay	3.0	10.8	154.5	49.2	91.2	64.7	48.2			
Queue Delay	0.8	6.5	0.0	0.0	0.0	0.0	0.0			
Total Delay	3.8	17.3	154.5	49.2	91.2	64.7	48.2			
LOS	A	B	F	D	F	E	D			
Approach Delay	13.2			104.2		78.4	48.2			
Approach LOS	B			F		E	D			

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 55.6 Intersection LOS: E
Intersection Capacity Utilization 81.8% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd





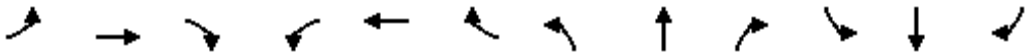
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	335	772	388	356	249	234	16
v/c Ratio	0.37	0.66	1.19	0.53	0.84	0.68	0.04
Control Delay	3.0	10.8	154.5	49.2	91.2	64.7	48.2
Queue Delay	0.8	6.5	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	17.3	154.5	49.2	91.2	64.7	48.2
Queue Length 50th (ft)	11	253	~476	342	298	224	11
Queue Length 95th (ft)	m27	267	#667	340	#543	#391	11
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	1015	1218	327	738	297	346	419
Starvation Cap Reductn	405	390	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.93	1.19	0.48	0.84	0.68	0.04

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.

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	322	726	334	267	0	306	0	135	0	4	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.91			0.97	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.98			1.00	
Satd. Flow (prot)		1845	1583	1770	1845		1665	1568			1836	
Flt Permitted		1.00	1.00	0.32	1.00		0.75	0.87			1.00	
Satd. Flow (perm)		1845	1583	600	1845		1309	1391			1836	
Peak-hour factor, PHF	0.92	0.96	0.94	0.86	0.75	0.92	0.91	0.92	0.92	0.92	0.33	0.25
Adj. Flow (vph)	0	335	772	388	356	0	336	0	147	0	12	4
RTOR Reduction (vph)	0	0	389	0	0	0	0	31	0	0	3	0
Lane Group Flow (vph)	0	335	383	388	356	0	249	203	0	0	13	0
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	3%	0%	2%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		91.9	91.9	65.5	65.5		42.0	42.0			42.0	
Effective Green, g (s)		91.9	91.9	65.5	65.5		42.0	42.0			42.0	
Actuated g/C Ratio		0.50	0.50	0.35	0.35		0.23	0.23			0.23	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		917	786	309	653		297	316			417	
v/s Ratio Prot		0.18		c0.10	0.19						0.01	
v/s Ratio Perm			c0.24	c0.34			c0.19	0.15				
v/c Ratio		0.37	0.49	1.26	0.55		0.84	0.64			0.03	
Uniform Delay, d1		28.6	30.9	57.5	47.8		68.3	64.7			55.7	
Progression Factor		0.13	7.87	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.1	0.1	138.8	3.3		17.6	3.3			0.0	
Delay (s)		3.7	243.5	196.3	51.1		85.8	68.0			55.7	
Level of Service		A	F	F	D		F	E			E	
Approach Delay (s)		170.9			126.8			77.2			55.7	
Approach LOS		F			F			E			E	

Intersection Summary			
HCM Average Control Delay	136.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		

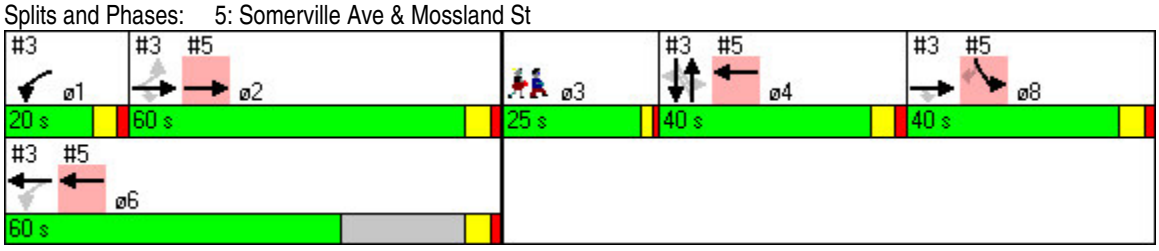
c Critical Lane Group

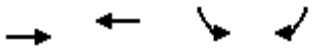
Lane Group	EBT	WBT	SBL	SBR	ø1	ø3	ø4	ø6
Lane Configurations								
Volume (vph)	656	562	350	16				
Turn Type				Perm				
Protected Phases	2	6 4	8		1	3	4	6
Permitted Phases				8				
Detector Phase	2	6 4	8	8				
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	10.0	25.0	10.0	10.0
Total Split (s)	60.0	100.0	40.0	40.0	20.0	25.0	40.0	60.0
Total Split (%)	32.4%	54.1%	21.6%	21.6%	11%	14%	22%	32%
Yellow Time (s)	4.0		4.0	4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0	6.0				
Lead/Lag	Lag				Lead	Lead	Lag	
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	
Recall Mode	Min		None	None	C-Min	None	None	C-Min
Act Effct Green (s)	44.2	112.9	47.7	47.7				
Actuated g/C Ratio	0.24	0.61	0.26	0.26				
v/c Ratio	0.82	0.28	0.82	0.06				
Control Delay	74.7	2.3	77.5	29.8				
Queue Delay	1.4	0.6	0.0	0.0				
Total Delay	76.1	2.8	77.5	29.8				
LOS	E	A	E	C				
Approach Delay	76.1	2.8	74.7					
Approach LOS	E	A	E					

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 49.3 Intersection LOS: D
Intersection Capacity Utilization 47.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Somerville Ave & Mossland St

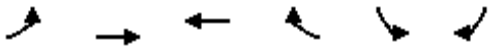




Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	691	618	376	24
v/c Ratio	0.82	0.28	0.82	0.06
Control Delay	74.7	2.3	77.5	29.8
Queue Delay	1.4	0.6	0.0	0.0
Total Delay	76.1	2.8	77.5	29.8
Queue Length 50th (ft)	424	8	415	6
Queue Length 95th (ft)	470	33	#756	24
Internal Link Dist (ft)	381	126	315	
Turn Bay Length (ft)				
Base Capacity (vph)	1033	2207	461	429
Starvation Cap Reductn	0	1123	0	0
Spillback Cap Reductn	167	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.80	0.57	0.82	0.06

Intersection Summary

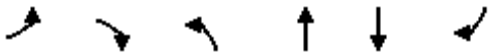
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Volume (vph)	0	656	562	0	350	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3539	3574		1787	1615
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3539	3574		1787	1615
Peak-hour factor, PHF	0.92	0.95	0.91	0.92	0.93	0.67
Adj. Flow (vph)	0	691	618	0	376	24
RTOR Reduction (vph)	0	0	0	0	0	13
Lane Group Flow (vph)	0	691	618	0	376	11
Heavy Vehicles (%)	2%	2%	1%	2%	1%	0%
Turn Type						Perm
Protected Phases		2	6 4		8	
Permitted Phases						8
Actuated Green, G (s)		44.2	107.5		47.7	47.7
Effective Green, g (s)		44.2	107.5		47.7	47.7
Actuated g/C Ratio		0.24	0.58		0.26	0.26
Clearance Time (s)		6.0			6.0	6.0
Vehicle Extension (s)		2.0			2.0	2.0
Lane Grp Cap (vph)		846	2077		461	416
v/s Ratio Prot		c0.20	c0.17		c0.21	
v/s Ratio Perm						0.01
v/c Ratio		0.82	0.30		0.82	0.03
Uniform Delay, d1		66.6	19.6		64.5	51.3
Progression Factor		1.00	0.16		1.00	1.00
Incremental Delay, d2		5.8	0.0		10.1	0.0
Delay (s)		72.4	3.1		74.6	51.3
Level of Service		E	A		E	D
Approach Delay (s)		72.4	3.1		73.2	
Approach LOS		E	A		E	

Intersection Summary			
HCM Average Control Delay	47.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	79	441	874	191
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	86	479	950	208
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1705	1054	1158			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1750	955	1082			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	84			
cM capacity (veh/h)	65	257	528			

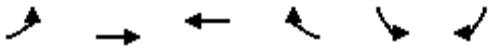
Direction, Lane #	NB 1	SB 1
Volume Total	565	1158
Volume Left	86	0
Volume Right	0	208
cSH	528	1700
Volume to Capacity	0.16	0.68
Queue Length 95th (ft)	14	0
Control Delay (s)	4.5	0.0
Lane LOS	A	
Approach Delay (s)	4.5	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	458	414	9	411	108	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.89	0.56	0.91	0.72	0.34
Hourly flow rate (vph)	487	465	16	452	150	32
Pedestrians	109			109	109	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			1061		1422	938
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			971		1405	822
tC, single (s)			4.2		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			97		0	87
cM capacity (veh/h)			506		102	242

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	952	468	182
Volume Left	0	16	150
Volume Right	465	0	32
cSH	1700	506	113
Volume to Capacity	0.56	0.03	1.61
Queue Length 95th (ft)	0	2	341
Control Delay (s)	0.0	0.9	377.3
Lane LOS		A	F
Approach Delay (s)	0.0	0.9	377.3
Approach LOS			F

Intersection Summary			
Average Delay	43.2		
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	12	861	506	13	11	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	936	550	14	12	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.83	
vC, conflicting volume	564				1519	557
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	564				1523	557
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				89	97
cM capacity (veh/h)	1007				106	530

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	949	564	27
Volume Left	13	0	12
Volume Right	0	14	15
cSH	1007	1700	192
Volume to Capacity	0.01	0.33	0.14
Queue Length 95th (ft)	1	0	12
Control Delay (s)	0.4	0.0	26.8
Lane LOS	A		D
Approach Delay (s)	0.4	0.0	26.8
Approach LOS			D

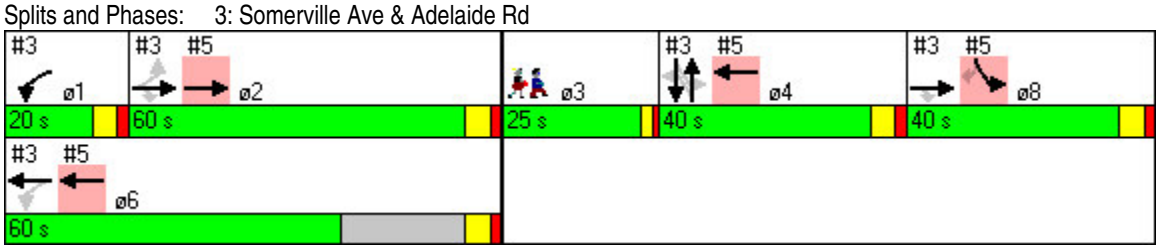
Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		64.9%	ICU Level of Service C
Analysis Period (min)		15	

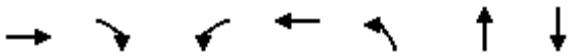
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø2	ø3	ø8
Lane Configurations										
Volume (vph)	330	744	343	273	313	0	4			
Turn Type		Perm	pm+pt		Perm					
Protected Phases	2 8		1	6		4	4	2	3	8
Permitted Phases		2 8	6		4					
Detector Phase	2 8	2 8	1	6	4	4	4			
Switch Phase										
Minimum Initial (s)			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)			10.0	10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	100.0	100.0	20.0	60.0	40.0	40.0	40.0	60.0	25.0	40.0
Total Split (%)	54.1%	54.1%	10.8%	32.4%	21.6%	21.6%	21.6%	32%	14%	22%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)			2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Lead/Lag			Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?			Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode			C-Min	C-Min	None	None	None	Min	None	None
Act Effct Green (s)	93.6	93.6	65.5	65.5	43.3	43.3	43.3			
Actuated g/C Ratio	0.51	0.51	0.35	0.35	0.23	0.23	0.23			
v/c Ratio	0.37	0.66	1.32	0.56	0.83	0.67	0.04			
Control Delay	3.0	10.9	207.4	51.0	88.7	64.2	48.4			
Queue Delay	0.9	7.6	0.0	0.0	0.0	0.0	0.0			
Total Delay	3.9	18.6	207.4	51.0	88.7	64.2	48.4			
LOS	A	B	F	D	F	E	D			
Approach Delay	14.1			132.8		76.8	48.4			
Approach LOS	B			F		E	D			

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 64.8 Intersection LOS: E
Intersection Capacity Utilization 83.4% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd





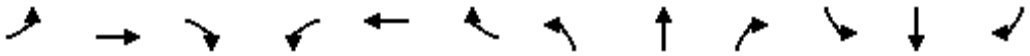
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	344	791	399	364	255	240	16
v/c Ratio	0.37	0.66	1.32	0.56	0.83	0.67	0.04
Control Delay	3.0	10.9	207.4	51.0	88.7	64.2	48.4
Queue Delay	0.9	7.6	0.0	0.0	0.0	0.0	0.0
Total Delay	3.9	18.6	207.4	51.0	88.7	64.2	48.4
Queue Length 50th (ft)	12	262	~560	357	303	229	11
Queue Length 95th (ft)	m28	271	#695	346	#565	#414	11
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	1019	1228	302	738	307	356	433
Starvation Cap Reductn	409	392	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.95	1.32	0.49	0.83	0.67	0.04

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.

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	330	744	343	273	0	313	0	139	0	4	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.91			0.97	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.98			1.00	
Satd. Flow (prot)		1845	1583	1770	1845		1665	1568			1836	
Flt Permitted		1.00	1.00	0.32	1.00		0.75	0.87			1.00	
Satd. Flow (perm)		1845	1583	600	1845		1309	1391			1836	
Peak-hour factor, PHF	0.92	0.96	0.94	0.86	0.75	0.92	0.91	0.92	0.92	0.92	0.33	0.25
Adj. Flow (vph)	0	344	791	399	364	0	344	0	151	0	12	4
RTOR Reduction (vph)	0	0	390	0	0	0	0	31	0	0	3	0
Lane Group Flow (vph)	0	344	401	399	364	0	255	209	0	0	13	0
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	3%	0%	2%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		93.7	93.7	63.7	63.7		43.3	43.3			43.3	
Effective Green, g (s)		93.7	93.7	63.7	63.7		43.3	43.3			43.3	
Actuated g/C Ratio		0.51	0.51	0.34	0.34		0.23	0.23			0.23	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		934	802	284	635		306	326			430	
v/s Ratio Prot		0.19		c0.09	0.20						0.01	
v/s Ratio Perm			c0.25	c0.39			c0.19	0.15				
v/c Ratio		0.37	0.50	1.40	0.57		0.83	0.64			0.03	
Uniform Delay, d1		27.7	30.2	60.0	49.5		67.4	63.9			54.7	
Progression Factor		0.13	8.21	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.1	0.1	202.1	3.7		16.7	3.2			0.0	
Delay (s)		3.6	247.6	262.1	53.3		84.1	67.1			54.7	
Level of Service		A	F	F	D		F	E			D	
Approach Delay (s)		173.7			162.5			75.9			54.7	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM Average Control Delay	149.2	HCM Level of Service	F
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

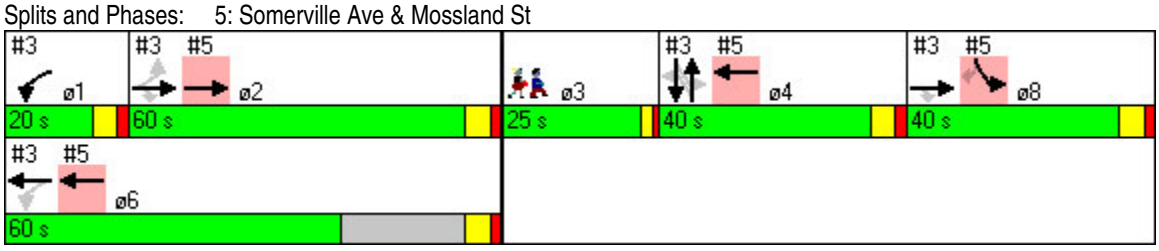
c Critical Lane Group

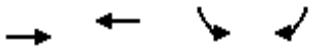
Lane Group	EBT	WBT	SBL	SBR	ø1	ø3	ø4	ø6
Lane Configurations								
Volume (vph)	673	576	358	17				
Turn Type				Perm				
Protected Phases	2	6 4	8		1	3	4	6
Permitted Phases				8				
Detector Phase	2	6 4	8	8				
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	10.0	25.0	10.0	10.0
Total Split (s)	60.0	100.0	40.0	40.0	20.0	25.0	40.0	60.0
Total Split (%)	32.4%	54.1%	21.6%	21.6%	11%	14%	22%	32%
Yellow Time (s)	4.0		4.0	4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0	6.0				
Lead/Lag	Lag				Lead	Lead	Lag	
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	
Recall Mode	Min		None	None	C-Min	None	None	C-Min
Act Effct Green (s)	45.5	112.4	48.2	48.2				
Actuated g/C Ratio	0.25	0.61	0.26	0.26				
v/c Ratio	0.81	0.29	0.83	0.06				
Control Delay	73.5	2.3	78.0	30.6				
Queue Delay	1.6	0.6	0.0	0.0				
Total Delay	75.2	3.0	78.0	30.6				
LOS	E	A	E	C				
Approach Delay	75.2	3.0	75.2					
Approach LOS	E	A	E					

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 49.1 Intersection LOS: D
Intersection Capacity Utilization 48.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Somerville Ave & Mossland St

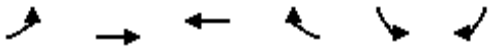




Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	708	633	385	25
v/c Ratio	0.81	0.29	0.83	0.06
Control Delay	73.5	2.3	78.0	30.6
Queue Delay	1.6	0.6	0.0	0.0
Total Delay	75.2	3.0	78.0	30.6
Queue Length 50th (ft)	431	8	428	7
Queue Length 95th (ft)	480	34	#779	25
Internal Link Dist (ft)	381	126	315	
Turn Bay Length (ft)				
Base Capacity (vph)	1033	2190	465	433
Starvation Cap Reductn	0	1121	0	0
Spillback Cap Reductn	169	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.59	0.83	0.06

Intersection Summary

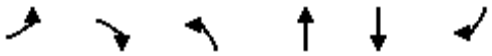
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	673	576	0	358	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3539	3574		1787	1615
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3539	3574		1787	1615
Peak-hour factor, PHF	0.92	0.95	0.91	0.92	0.93	0.67
Adj. Flow (vph)	0	708	633	0	385	25
RTOR Reduction (vph)	0	0	0	0	0	13
Lane Group Flow (vph)	0	708	633	0	385	12
Heavy Vehicles (%)	2%	2%	1%	2%	1%	0%
Turn Type						Perm
Protected Phases		2	6 4		8	
Permitted Phases						8
Actuated Green, G (s)		45.5	107.0		48.2	48.2
Effective Green, g (s)		45.5	107.0		48.2	48.2
Actuated g/C Ratio		0.25	0.58		0.26	0.26
Clearance Time (s)		6.0			6.0	6.0
Vehicle Extension (s)		2.0			2.0	2.0
Lane Grp Cap (vph)		870	2067		466	421
v/s Ratio Prot		c0.20	c0.18		c0.22	
v/s Ratio Perm						0.01
v/c Ratio		0.81	0.31		0.83	0.03
Uniform Delay, d1		65.8	20.0		64.5	51.0
Progression Factor		1.00	0.16		1.00	1.00
Incremental Delay, d2		5.6	0.0		10.9	0.0
Delay (s)		71.3	3.2		75.3	51.0
Level of Service		E	A		E	D
Approach Delay (s)		71.3	3.2		73.9	
Approach LOS		E	A		E	

Intersection Summary			
HCM Average Control Delay	47.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	81	452	896	195
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	88	491	974	212
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.81	0.81	0.81			
vC, conflicting volume	1747	1080	1186			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1805	981	1112			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	83			
cM capacity (veh/h)	58	245	508			

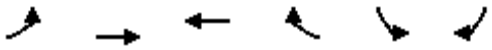
Direction, Lane #	NB 1	SB 1
Volume Total	579	1186
Volume Left	88	0
Volume Right	0	212
cSH	508	1700
Volume to Capacity	0.17	0.70
Queue Length 95th (ft)	16	0
Control Delay (s)	4.9	0.0
Lane LOS	A	
Approach Delay (s)	4.9	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	470	425	9	421	111	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.89	0.56	0.91	0.72	0.34
Hourly flow rate (vph)	500	478	16	463	154	35
Pedestrians	109			109	109	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			1087		1452	957
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			995		1441	837
tC, single (s)			4.2		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			97		0	85
cM capacity (veh/h)			489		96	234

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	978	479	189
Volume Left	0	16	154
Volume Right	478	0	35
cSH	1700	489	107
Volume to Capacity	0.58	0.03	1.76
Queue Length 95th (ft)	0	3	375
Control Delay (s)	0.0	1.0	446.7
Lane LOS		A	F
Approach Delay (s)	0.0	1.0	446.7
Approach LOS			F

Intersection Summary			
Average Delay		51.7	
Intersection Capacity Utilization		73.5%	ICU Level of Service D
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	13	883	519	13	11	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	960	564	14	12	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.82	
vC, conflicting volume	578				1559	571
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	578				1573	571
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				88	97
cM capacity (veh/h)	995				98	520

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	974	578	27
Volume Left	14	0	12
Volume Right	0	14	15
cSH	995	1700	179
Volume to Capacity	0.01	0.34	0.15
Queue Length 95th (ft)	1	0	13
Control Delay (s)	0.4	0.0	28.7
Lane LOS	A		D
Approach Delay (s)	0.4	0.0	28.7
Approach LOS			D

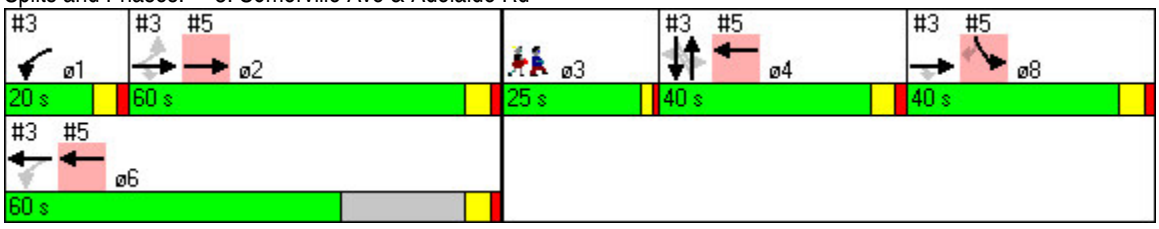
Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		66.9%	ICU Level of Service C
Analysis Period (min)		15	

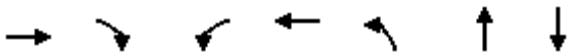
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø2	ø3	ø8
Lane Configurations										
Volume (vph)	330	747	344	273	314	0	4			
Turn Type		Perm	pm+pt		Perm					
Protected Phases	2 8		1	6		4	4	2	3	8
Permitted Phases		2 8	6		4					
Detector Phase	2 8	2 8	1	6	4	4	4			
Switch Phase										
Minimum Initial (s)			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)			10.0	10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	100.0	100.0	20.0	60.0	40.0	40.0	40.0	60.0	25.0	40.0
Total Split (%)	54.1%	54.1%	10.8%	32.4%	21.6%	21.6%	21.6%	32%	14%	22%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)			2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Lead/Lag			Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?			Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode			C-Min	C-Min	None	None	None	Min	None	None
Act Effct Green (s)	93.7	93.7	65.6	65.6	43.3	43.3	43.3			
Actuated g/C Ratio	0.51	0.51	0.35	0.35	0.23	0.23	0.23			
v/c Ratio	0.37	0.67	1.32	0.56	0.83	0.68	0.04			
Control Delay	3.0	11.0	208.0	50.9	88.7	64.5	48.4			
Queue Delay	0.9	8.1	0.0	0.0	0.0	0.0	0.0			
Total Delay	3.8	19.2	208.0	50.9	88.7	64.5	48.4			
LOS	A	B	F	D	F	E	D			
Approach Delay	14.5			133.2		77.0	48.4			
Approach LOS	B			F		E	D			

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 65.1 Intersection LOS: E
Intersection Capacity Utilization 83.6% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd





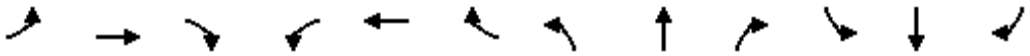
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	344	795	400	364	255	242	16
v/c Ratio	0.37	0.67	1.32	0.56	0.83	0.68	0.04
Control Delay	3.0	11.0	208.0	50.9	88.7	64.5	48.4
Queue Delay	0.9	8.1	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	19.2	208.0	50.9	88.7	64.5	48.4
Queue Length 50th (ft)	12	264	~560	356	303	231	11
Queue Length 95th (ft)	m28	272	#697	346	#565	#422	11
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	1019	1230	302	738	306	356	433
Starvation Cap Reductn	410	394	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.95	1.32	0.49	0.83	0.68	0.04

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.

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	330	747	344	273	0	314	0	140	0	4	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.91			0.97	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.98			1.00	
Satd. Flow (prot)		1845	1583	1770	1845		1665	1568			1836	
Flt Permitted		1.00	1.00	0.32	1.00		0.75	0.87			1.00	
Satd. Flow (perm)		1845	1583	601	1845		1309	1391			1836	
Peak-hour factor, PHF	0.92	0.96	0.94	0.86	0.75	0.92	0.91	0.92	0.92	0.92	0.33	0.25
Adj. Flow (vph)	0	344	795	400	364	0	345	0	152	0	12	4
RTOR Reduction (vph)	0	0	392	0	0	0	0	31	0	0	3	0
Lane Group Flow (vph)	0	344	403	400	364	0	255	211	0	0	13	0
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	3%	0%	2%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		93.7	93.7	63.8	63.8		43.3	43.3			43.3	
Effective Green, g (s)		93.7	93.7	63.8	63.8		43.3	43.3			43.3	
Actuated g/C Ratio		0.51	0.51	0.34	0.34		0.23	0.23			0.23	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		934	802	284	636		306	326			430	
v/s Ratio Prot		0.19		c0.09	0.20						0.01	
v/s Ratio Perm			c0.25	c0.39			c0.19	0.15				
v/c Ratio		0.37	0.50	1.41	0.57		0.83	0.65			0.03	
Uniform Delay, d1		27.7	30.2	59.9	49.5		67.4	64.0			54.7	
Progression Factor		0.13	8.34	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.1	0.1	203.5	3.7		16.7	3.3			0.0	
Delay (s)		3.6	251.9	263.5	53.2		84.1	67.3			54.7	
Level of Service		A	F	F	D		F	E			D	
Approach Delay (s)		176.9			163.3			75.9			54.7	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM Average Control Delay	151.0	HCM Level of Service	F
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

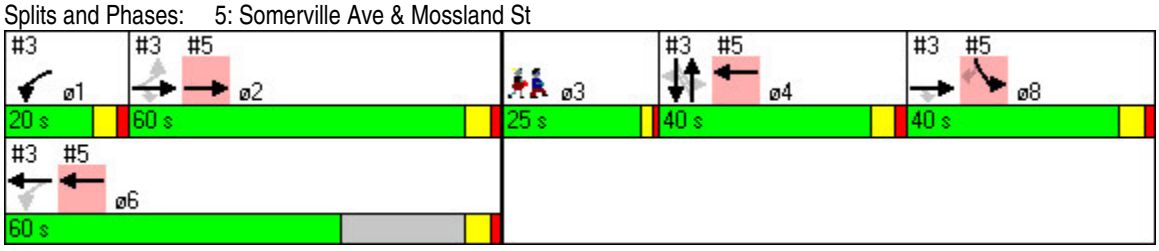
c Critical Lane Group

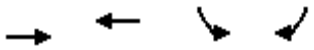
Lane Group	EBT	WBT	SBL	SBR	ø1	ø3	ø4	ø6
Lane Configurations								
Volume (vph)	675	577	360	17				
Turn Type				Perm				
Protected Phases	2	6 4	8		1	3	4	6
Permitted Phases				8				
Detector Phase	2	6 4	8	8				
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	10.0	25.0	10.0	10.0
Total Split (s)	60.0	100.0	40.0	40.0	20.0	25.0	40.0	60.0
Total Split (%)	32.4%	54.1%	21.6%	21.6%	11%	14%	22%	32%
Yellow Time (s)	4.0		4.0	4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0	6.0				
Lead/Lag	Lag				Lead	Lead	Lag	
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	
Recall Mode	Min		None	None	C-Min	None	None	C-Min
Act Effct Green (s)	45.6	112.5	48.1	48.1				
Actuated g/C Ratio	0.25	0.61	0.26	0.26				
v/c Ratio	0.82	0.29	0.83	0.06				
Control Delay	73.6	2.3	78.4	30.6				
Queue Delay	1.7	0.6	0.0	0.0				
Total Delay	75.3	3.0	78.4	30.6				
LOS	E	A	E	C				
Approach Delay	75.3	3.0	75.5					
Approach LOS	E	A	E					

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 49.2 Intersection LOS: D
Intersection Capacity Utilization 48.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Somerville Ave & Mossland St

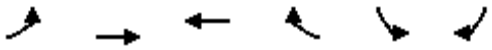




Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	711	634	387	25
v/c Ratio	0.82	0.29	0.83	0.06
Control Delay	73.6	2.3	78.4	30.6
Queue Delay	1.7	0.6	0.0	0.0
Total Delay	75.3	3.0	78.4	30.6
Queue Length 50th (ft)	433	8	432	7
Queue Length 95th (ft)	483	34	#787	25
Internal Link Dist (ft)	381	126	315	
Turn Bay Length (ft)				
Base Capacity (vph)	1033	2190	465	433
Starvation Cap Reductn	0	1122	0	0
Spillback Cap Reductn	170	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.59	0.83	0.06

Intersection Summary

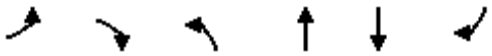
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Volume (vph)	0	675	577	0	360	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3539	3574		1787	1615
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3539	3574		1787	1615
Peak-hour factor, PHF	0.92	0.95	0.91	0.92	0.93	0.67
Adj. Flow (vph)	0	711	634	0	387	25
RTOR Reduction (vph)	0	0	0	0	0	13
Lane Group Flow (vph)	0	711	634	0	387	12
Heavy Vehicles (%)	2%	2%	1%	2%	1%	0%
Turn Type						Perm
Protected Phases		2	6 4		8	
Permitted Phases						8
Actuated Green, G (s)		45.6	107.1		48.1	48.1
Effective Green, g (s)		45.6	107.1		48.1	48.1
Actuated g/C Ratio		0.25	0.58		0.26	0.26
Clearance Time (s)		6.0			6.0	6.0
Vehicle Extension (s)		2.0			2.0	2.0
Lane Grp Cap (vph)		872	2069		465	420
v/s Ratio Prot		c0.20	c0.18		c0.22	
v/s Ratio Perm						0.01
v/c Ratio		0.82	0.31		0.83	0.03
Uniform Delay, d1		65.7	19.9		64.6	51.0
Progression Factor		1.00	0.16		1.00	1.00
Incremental Delay, d2		5.6	0.0		11.6	0.0
Delay (s)		71.3	3.2		76.2	51.1
Level of Service		E	A		E	D
Approach Delay (s)		71.3	3.2		74.7	
Approach LOS		E	A		E	

Intersection Summary			
HCM Average Control Delay	47.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	81	454	899	195
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	88	493	977	212
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.81	0.81	0.81			
vC, conflicting volume	1753	1083	1189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1812	985	1116			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	83			
cM capacity (veh/h)	58	244	506			

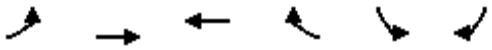
Direction, Lane #	NB 1	SB 1
Volume Total	582	1189
Volume Left	88	0
Volume Right	0	212
cSH	506	1700
Volume to Capacity	0.17	0.70
Queue Length 95th (ft)	16	0
Control Delay (s)	4.9	0.0
Lane LOS	A	
Approach Delay (s)	4.9	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	471	426	9	424	112	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.89	0.56	0.91	0.72	0.34
Hourly flow rate (vph)	501	479	16	466	156	35
Pedestrians	109			109	109	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			1089		1456	958
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			997		1447	838
tC, single (s)			4.2		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			97		0	85
cM capacity (veh/h)			488		95	234

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	980	482	191
Volume Left	0	16	156
Volume Right	479	0	35
cSH	1700	488	106
Volume to Capacity	0.58	0.03	1.79
Queue Length 95th (ft)	0	3	381
Control Delay (s)	0.0	1.0	460.3
Lane LOS		A	F
Approach Delay (s)	0.0	1.0	460.3
Approach LOS			F

Intersection Summary			
Average Delay		53.4	
Intersection Capacity Utilization		73.6%	ICU Level of Service D
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	7	893	530	7	4	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	971	576	8	4	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.82	
vC, conflicting volume	584				1566	580
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	584				1581	580
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				96	99
cM capacity (veh/h)	991				97	514

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	978	584	10
Volume Left	8	0	4
Volume Right	0	8	5
cSH	991	1700	177
Volume to Capacity	0.01	0.34	0.06
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.2	0.0	26.6
Lane LOS	A		D
Approach Delay (s)	0.2	0.0	26.6
Approach LOS			D

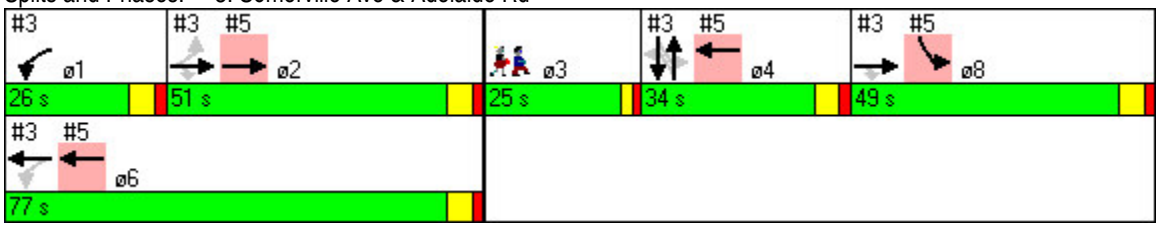
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

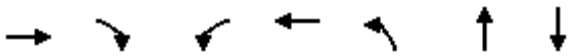
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø2	ø3	ø8
Lane Configurations										
Volume (vph)	330	747	344	273	314	0	4			
Turn Type		Perm	pm+pt		Perm					
Protected Phases	2 8		1	6		4	4	2	3	8
Permitted Phases		2 8	6		4					
Detector Phase	2 8	2 8	1	6	4	4	4			
Switch Phase										
Minimum Initial (s)			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)			10.0	10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	100.0	100.0	26.0	77.0	34.0	34.0	34.0	51.0	25.0	49.0
Total Split (%)	54.1%	54.1%	14.1%	41.6%	18.4%	18.4%	18.4%	28%	14%	26%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)			2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Lead/Lag			Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?			Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode			C-Min	C-Min	None	None	None	Min	None	None
Act Effct Green (s)	71.9	71.9	82.2	82.2	45.4	45.4	45.4			
Actuated g/C Ratio	0.39	0.39	0.44	0.44	0.25	0.25	0.25			
v/c Ratio	0.48	0.74	0.90	0.44	0.79	0.65	0.04			
Control Delay	4.6	15.1	62.5	38.1	80.6	61.8	51.8			
Queue Delay	0.6	29.4	0.0	0.0	0.0	0.0	0.0			
Total Delay	5.2	44.5	62.5	38.1	80.6	61.8	51.8			
LOS	A	D	E	D	F	E	D			
Approach Delay	32.6			50.9		71.4	51.8			
Approach LOS	C			D		E	D			

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 46.5 Intersection LOS: D
Intersection Capacity Utilization 83.6% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd

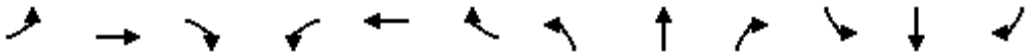




Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	344	795	400	364	255	242	16
v/c Ratio	0.48	0.74	0.90	0.44	0.79	0.65	0.04
Control Delay	4.6	15.1	62.5	38.1	80.6	61.8	51.8
Queue Delay	0.6	29.4	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	44.5	62.5	38.1	80.6	61.8	51.8
Queue Length 50th (ft)	12	263	337	296	291	224	11
Queue Length 95th (ft)	m42	269	#539	335	#622	#482	12
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	878	1148	444	820	322	371	454
Starvation Cap Reductn	239	386	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	1.04	0.90	0.44	0.79	0.65	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	330	747	344	273	0	314	0	140	0	4	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.91			0.97	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.98			1.00	
Satd. Flow (prot)		1845	1583	1770	1845		1665	1568			1836	
Flt Permitted		1.00	1.00	0.25	1.00		0.75	0.87			1.00	
Satd. Flow (perm)		1845	1583	465	1845		1309	1391			1836	
Peak-hour factor, PHF	0.92	0.96	0.94	0.86	0.75	0.92	0.91	0.92	0.92	0.92	0.33	0.25
Adj. Flow (vph)	0	344	795	400	364	0	345	0	152	0	12	4
RTOR Reduction (vph)	0	0	461	0	0	0	0	29	0	0	3	0
Lane Group Flow (vph)	0	344	334	400	364	0	255	213	0	0	13	0
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	3%	0%	2%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		71.9	71.9	80.5	80.5		45.4	45.4			45.4	
Effective Green, g (s)		71.9	71.9	80.5	80.5		45.4	45.4			45.4	
Actuated g/C Ratio		0.39	0.39	0.44	0.44		0.25	0.25			0.25	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		717	615	427	803		321	341			451	
v/s Ratio Prot		0.19		c0.16	0.20						0.01	
v/s Ratio Perm			c0.21	c0.25			c0.19	0.15				
v/c Ratio		0.48	0.54	0.94	0.45		0.79	0.62			0.03	
Uniform Delay, d1		42.5	43.8	41.3	36.8		65.4	62.2			53.0	
Progression Factor		0.14	6.93	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.1	0.4	30.3	1.8		11.9	2.5			0.0	
Delay (s)		5.9	304.3	71.5	38.6		77.3	64.7			53.1	
Level of Service		A	F	E	D		E	E			D	
Approach Delay (s)		214.1			55.9			71.2			53.1	
Approach LOS		F			E			E			D	

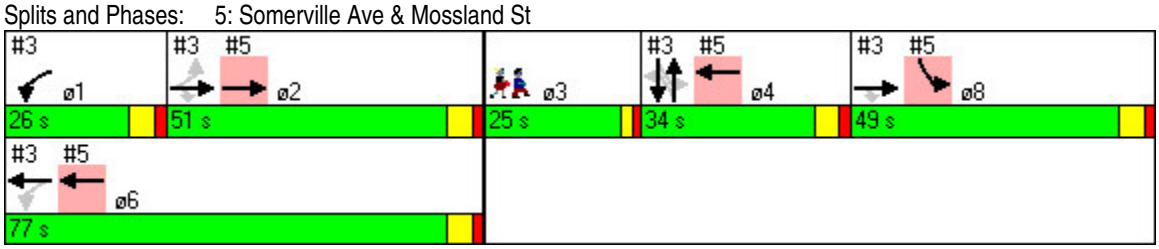
Intersection Summary			
HCM Average Control Delay	133.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	SBL	ø1	ø3	ø4	ø6
Lane Configurations							
Volume (vph)	675	577	360				
Turn Type							
Protected Phases	2	6 4	8	1	3	4	6
Permitted Phases							
Detector Phase	2	6 4	8				
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	25.0	10.0	10.0
Total Split (s)	51.0	111.0	49.0	26.0	25.0	34.0	77.0
Total Split (%)	27.6%	60.0%	26.5%	14%	14%	18%	42%
Yellow Time (s)	4.0		4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0				
Lead/Lag	Lag			Lead	Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	
Recall Mode	Min		None	C-Min	None	None	C-Min
Act Effct Green (s)	42.6	131.3	29.3				
Actuated g/C Ratio	0.23	0.71	0.16				
v/c Ratio	0.87	0.25	0.75				
Control Delay	81.1	2.4	82.2				
Queue Delay	10.9	0.5	0.0				
Total Delay	92.0	2.9	82.2				
LOS	F	A	F				
Approach Delay	92.0	2.9	82.2				
Approach LOS	F	A	F				

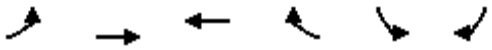
Intersection Summary	
Cycle Length: 185	
Actuated Cycle Length: 185	
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 57.5	Intersection LOS: E
Intersection Capacity Utilization 39.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Somerville Ave & Mossland St



Lane Group	EBT	WBT	SBL
Lane Group Flow (vph)	711	634	412
v/c Ratio	0.87	0.25	0.75
Control Delay	81.1	2.4	82.2
Queue Delay	10.9	0.5	0.0
Total Delay	92.0	2.9	82.2
Queue Length 50th (ft)	435	7	249
Queue Length 95th (ft)	517	41	297
Internal Link Dist (ft)	381	126	315
Turn Bay Length (ft)			
Base Capacity (vph)	861	2536	806
Starvation Cap Reductn	0	1353	0
Spillback Cap Reductn	134	0	12
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.98	0.54	0.52

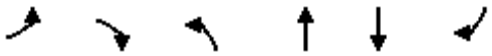
Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	675	577	0	360	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	
Lane Util. Factor		0.95	0.95		0.97	
Frt		1.00	1.00		0.99	
Flt Protected		1.00	1.00		0.96	
Satd. Flow (prot)		3539	3574		3456	
Flt Permitted		1.00	1.00		0.96	
Satd. Flow (perm)		3539	3574		3456	
Peak-hour factor, PHF	0.92	0.95	0.91	0.92	0.93	0.67
Adj. Flow (vph)	0	711	634	0	387	25
RTOR Reduction (vph)	0	0	0	0	3	0
Lane Group Flow (vph)	0	711	634	0	409	0
Heavy Vehicles (%)	2%	2%	1%	2%	1%	0%
Turn Type						
Protected Phases		2	6 4		8	
Permitted Phases						
Actuated Green, G (s)		42.6	125.9		29.3	
Effective Green, g (s)		42.6	125.9		29.3	
Actuated g/C Ratio		0.23	0.68		0.16	
Clearance Time (s)		6.0			6.0	
Vehicle Extension (s)		2.0			2.0	
Lane Grp Cap (vph)		815	2432		547	
v/s Ratio Prot		c0.20	c0.18		c0.12	
v/s Ratio Perm						
v/c Ratio		0.87	0.26		0.75	
Uniform Delay, d1		68.6	11.5		74.3	
Progression Factor		1.00	0.29		1.00	
Incremental Delay, d2		9.9	0.0		4.9	
Delay (s)		78.5	3.4		79.2	
Level of Service		E	A		E	
Approach Delay (s)		78.5	3.4		79.2	
Approach LOS		E	A		E	

Intersection Summary			
HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	81	454	899	195
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	88	493	977	212
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.84	0.84	0.84			
vC, conflicting volume	1400	977	1189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1381	877	1130			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	83			
cM capacity (veh/h)	94	245	516			

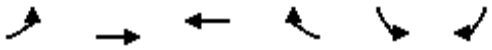
Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	253	329	977	212
Volume Left	88	0	0	0
Volume Right	0	0	0	212
cSH	516	1700	1700	1700
Volume to Capacity	0.17	0.19	0.57	0.12
Queue Length 95th (ft)	15	0	0	0
Control Delay (s)	6.3	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	2.7		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	471	426	9	424	112	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.89	0.56	0.91	0.72	0.34
Hourly flow rate (vph)	501	479	16	466	156	35
Pedestrians	109			109	109	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.84		0.84	0.84
vC, conflicting volume			1089		1456	958
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1013		1448	859
tC, single (s)			4.2		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			97		0	85
cM capacity (veh/h)			497		98	235

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	980	482	156	35
Volume Left	0	16	156	0
Volume Right	479	0	0	35
cSH	1700	497	98	235
Volume to Capacity	0.58	0.03	1.59	0.15
Queue Length 95th (ft)	0	3	302	13
Control Delay (s)	0.0	1.0	385.8	23.0
Lane LOS		A	F	C
Approach Delay (s)	0.0	1.0	318.7	
Approach LOS			F	

Intersection Summary			
Average Delay	37.1		
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	7	893	530	7	4	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	971	576	8	4	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.84	
vC, conflicting volume	584				1566	580
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	584				1578	580
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				96	99
cM capacity (veh/h)	991				101	514

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	978	584	10
Volume Left	8	0	4
Volume Right	0	8	5
cSH	991	1700	182
Volume to Capacity	0.01	0.34	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.2	0.0	25.9
Lane LOS	A		D
Approach Delay (s)	0.2	0.0	25.9
Approach LOS			D

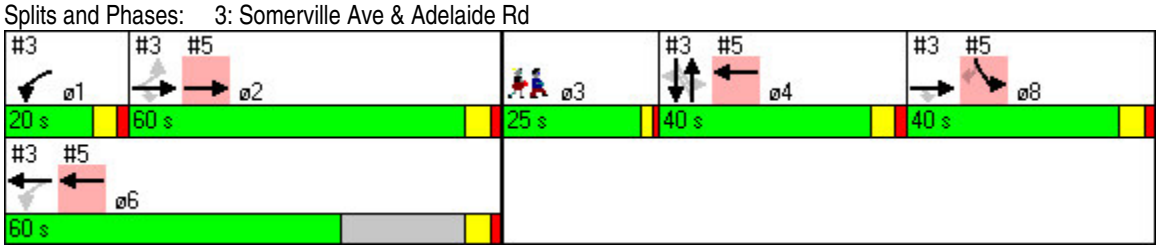
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

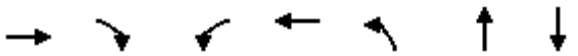
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø3	ø8
Lane Configurations										
Volume (vph)	1	494	568	266	322	491	2	1		
Turn Type	custom		Perm	pm+pt		Perm				
Protected Phases		2 8		1	6		4	4	3	8
Permitted Phases	2		2 8	6		4				
Detector Phase	2	2 8	2 8	1	6	4	4	4		
Switch Phase										
Minimum Initial (s)	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0			10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	60.0	100.0	100.0	20.0	60.0	40.0	40.0	40.0	25.0	40.0
Total Split (%)	32.4%	54.1%	54.1%	10.8%	32.4%	21.6%	21.6%	21.6%	14%	22%
Yellow Time (s)	4.0			4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	2.0			2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lead/Lag	Lag			Lead		Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes		Yes	Yes	Yes	Yes	
Recall Mode	Min			C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)		76.7	76.7	63.5	63.5	59.9	59.9	59.9		
Actuated g/C Ratio		0.41	0.41	0.34	0.34	0.32	0.32	0.32		
v/c Ratio		0.72	0.65	2.11	0.65	1.10	0.80	0.01		
Control Delay		9.8	5.4	545.8	55.7	126.1	53.0	41.0		
Queue Delay		0.9	1.9	0.0	0.0	0.0	0.0	0.0		
Total Delay		10.7	7.3	545.8	55.7	126.1	53.0	41.0		
LOS		B	A	F	E	F	D	D		
Approach Delay		8.9			289.7		91.2	41.0		
Approach LOS		A			F		F	D		

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.11
Intersection Signal Delay: 112.8 Intersection LOS: F
Intersection Capacity Utilization 89.3% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd





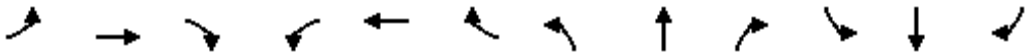
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	559	598	380	416	485	444	8
v/c Ratio	0.72	0.65	2.11	0.65	1.10	0.80	0.01
Control Delay	9.8	5.4	545.8	55.7	126.1	53.0	41.0
Queue Delay	0.9	1.9	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	7.3	545.8	55.7	126.1	53.0	41.0
Queue Length 50th (ft)	63	78	~688	429	602	369	3
Queue Length 95th (ft)	m66	m67	#633	435	#1150	235	3
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	892	997	180	751	440	556	577
Starvation Cap Reductn	128	244	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.79	2.11	0.55	1.10	0.80	0.01

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.

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	494	568	266	322	3	491	2	352	0	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.88			0.93	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.99			1.00	
Satd. Flow (prot)		1881	1615	1787	1876		1715	1555			1772	
Flt Permitted		1.00	1.00	0.08	1.00		0.75	0.94			1.00	
Satd. Flow (perm)		1876	1615	153	1876		1358	1478			1772	
Peak-hour factor, PHF	0.25	0.89	0.95	0.70	0.79	0.38	0.88	0.50	0.96	0.92	0.25	0.25
Adj. Flow (vph)	4	555	598	380	408	8	558	4	367	0	4	4
RTOR Reduction (vph)	0	0	256	0	1	0	0	77	0	0	3	0
Lane Group Flow (vph)	0	559	342	380	415	0	485	367	0	0	5	0
Heavy Vehicles (%)	0%	1%	0%	1%	0%	50%	0%	0%	1%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		76.7	76.7	61.7	61.7		59.9	59.9			59.9	
Effective Green, g (s)		76.7	76.7	61.7	61.7		59.9	59.9			59.9	
Actuated g/C Ratio		0.41	0.41	0.33	0.33		0.32	0.32			0.32	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		778	670	162	626		440	479			574	
v/s Ratio Prot				c0.16	0.22						0.00	
v/s Ratio Perm		c0.30	0.21	c0.62			c0.36	0.25				
v/c Ratio		0.72	0.51	2.35	0.66		1.10	0.77			0.01	
Uniform Delay, d1		45.1	40.2	53.1	52.8		62.6	56.2			42.4	
Progression Factor		0.18	0.42	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		2.1	0.2	624.3	5.5		73.6	6.5			0.0	
Delay (s)		10.1	17.2	677.5	58.2		136.1	62.7			42.4	
Level of Service		B	B	F	E		F	E			D	
Approach Delay (s)		13.8			353.9			101.1			42.4	
Approach LOS		B			F			F			D	

Intersection Summary			
HCM Average Control Delay	135.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

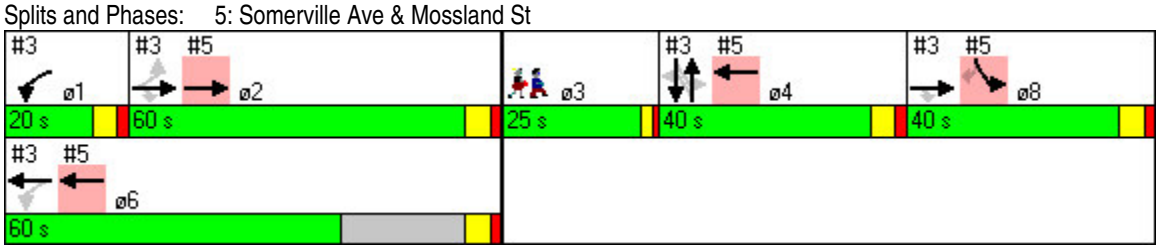
c Critical Lane Group

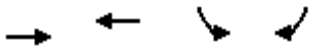
Lane Group	EBT	WBT	SBL	SBR	ø1	ø3	ø4	ø6
Lane Configurations								
Volume (vph)	559	725	284	41				
Turn Type				Perm				
Protected Phases	2	6 4	8		1	3	4	6
Permitted Phases				8				
Detector Phase	2	6 4	8	8				
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	10.0	25.0	10.0	10.0
Total Split (s)	60.0	100.0	40.0	40.0	20.0	25.0	40.0	60.0
Total Split (%)	32.4%	54.1%	21.6%	21.6%	11%	14%	22%	32%
Yellow Time (s)	4.0		4.0	4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0	6.0				
Lead/Lag	Lag				Lead	Lead	Lag	
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	
Recall Mode	Min		None	None	C-Min	None	None	C-Min
Act Effct Green (s)	43.1	127.0	33.6	33.6				
Actuated g/C Ratio	0.23	0.69	0.18	0.18				
v/c Ratio	0.80	0.32	0.91	0.15				
Control Delay	74.3	2.2	104.8	20.6				
Queue Delay	0.1	1.1	0.0	0.0				
Total Delay	74.4	3.3	104.8	20.6				
LOS	E	A	F	C				
Approach Delay	74.4	3.3	93.3					
Approach LOS	E	A	F					

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.11
Intersection Signal Delay: 46.9 Intersection LOS: D
Intersection Capacity Utilization 45.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Somerville Ave & Mossland St

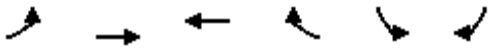




Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	665	788	299	47
v/c Ratio	0.80	0.32	0.91	0.15
Control Delay	74.3	2.2	104.8	20.6
Queue Delay	0.1	1.1	0.0	0.0
Total Delay	74.4	3.3	104.8	20.6
Queue Length 50th (ft)	405	10	361	6
Queue Length 95th (ft)	416	m42	#544	46
Internal Link Dist (ft)	381	126	315	
Turn Bay Length (ft)				
Base Capacity (vph)	1043	2515	332	319
Starvation Cap Reductn	0	1411	0	0
Spillback Cap Reductn	16	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.65	0.71	0.90	0.15

Intersection Summary

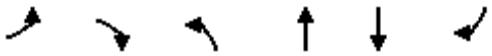
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Volume (vph)	0	559	725	0	284	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3574	3610		1805	1553
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3574	3610		1805	1553
Peak-hour factor, PHF	0.92	0.84	0.92	0.92	0.95	0.88
Adj. Flow (vph)	0	665	788	0	299	47
RTOR Reduction (vph)	0	0	0	0	0	34
Lane Group Flow (vph)	0	665	788	0	299	13
Heavy Vehicles (%)	2%	1%	0%	2%	0%	4%
Turn Type						Perm
Protected Phases		2	6 4		8	
Permitted Phases						8
Actuated Green, G (s)		43.1	121.6		33.6	33.6
Effective Green, g (s)		43.1	121.6		33.6	33.6
Actuated g/C Ratio		0.23	0.66		0.18	0.18
Clearance Time (s)		6.0			6.0	6.0
Vehicle Extension (s)		2.0			2.0	2.0
Lane Grp Cap (vph)		833	2373		328	282
v/s Ratio Prot		c0.19	c0.22		c0.17	
v/s Ratio Perm						0.01
v/c Ratio		0.80	0.33		0.91	0.05
Uniform Delay, d1		66.9	13.9		74.2	62.5
Progression Factor		1.00	0.23		1.00	1.00
Incremental Delay, d2		5.0	0.0		27.9	0.0
Delay (s)		71.9	3.3		102.1	62.5
Level of Service		E	A		F	E
Approach Delay (s)		71.9	3.3		96.7	
Approach LOS		E	A		F	

Intersection Summary			
HCM Average Control Delay	46.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	11	845	693	141
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	12	918	753	153
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1772	830	907			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1831	684	778			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	98			
cM capacity (veh/h)	68	368	689			

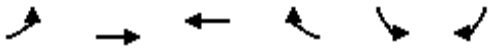
Direction, Lane #	NB 1	SB 1
Volume Total	930	907
Volume Left	12	0
Volume Right	0	153
cSH	689	1700
Volume to Capacity	0.02	0.53
Queue Length 95th (ft)	1	0
Control Delay (s)	0.5	0.0
Lane LOS	A	
Approach Delay (s)	0.5	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	461	231	10	584	271	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.86	0.42	0.83	0.92	0.69
Hourly flow rate (vph)	490	269	24	704	295	16
Pedestrians	108			108	108	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			867		1592	841
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			740		1610	708
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			96		0	95
cM capacity (veh/h)			664		77	295

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	759	727	311
Volume Left	0	24	295
Volume Right	269	0	16
cSH	1700	664	80
Volume to Capacity	0.45	0.04	3.89
Queue Length 95th (ft)	0	3	Err
Control Delay (s)	0.0	1.0	Err
Lane LOS		A	F
Approach Delay (s)	0.0	1.0	Err
Approach LOS			F

Intersection Summary			
Average Delay	1728.2		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	14	679	841	14	13	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	738	914	15	14	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.83	
vC, conflicting volume	929				1690	922
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	929				1730	922
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				82	95
cM capacity (veh/h)	736				79	328

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	753	929	32
Volume Left	15	0	14
Volume Right	0	15	17
cSH	736	1700	136
Volume to Capacity	0.02	0.55	0.23
Queue Length 95th (ft)	2	0	21
Control Delay (s)	0.6	0.0	39.4
Lane LOS	A		E
Approach Delay (s)	0.6	0.0	39.4
Approach LOS			E

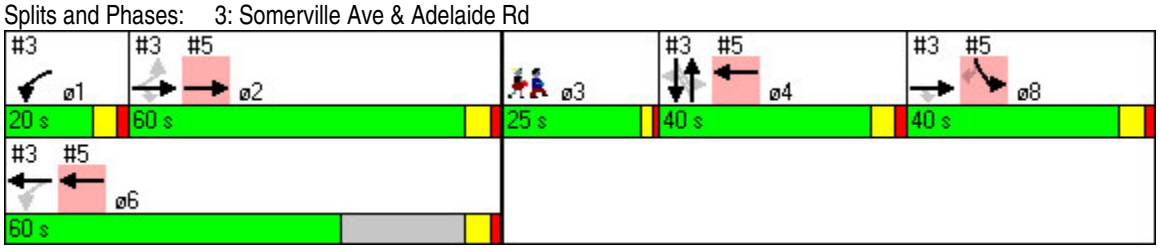
Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

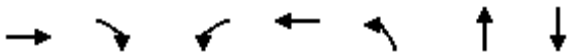
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø3	ø8
Lane Configurations										
Volume (vph)	1	507	582	272	330	504	2	1		
Turn Type	custom		Perm	pm+pt		Perm				
Protected Phases		2 8		1	6		4	4	3	8
Permitted Phases	2		2 8	6		4				
Detector Phase	2	2 8	2 8	1	6	4	4	4		
Switch Phase										
Minimum Initial (s)	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0			10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	60.0	100.0	100.0	20.0	60.0	40.0	40.0	40.0	25.0	40.0
Total Split (%)	32.4%	54.1%	54.1%	10.8%	32.4%	21.6%	21.6%	21.6%	14%	22%
Yellow Time (s)	4.0			4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	2.0			2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lead/Lag	Lag			Lead		Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes		Yes	Yes	Yes	Yes	
Recall Mode	Min			C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)		78.0	78.0	64.0	64.0	59.0	59.0	59.0		
Actuated g/C Ratio		0.42	0.42	0.35	0.35	0.32	0.32	0.32		
v/c Ratio		0.73	0.66	2.21	0.66	1.15	0.83	0.01		
Control Delay		9.8	5.5	587.8	55.6	142.9	55.2	42.0		
Queue Delay		1.0	2.1	0.0	0.0	0.0	0.0	0.0		
Total Delay		10.8	7.6	587.8	55.6	142.9	55.2	42.0		
LOS		B	A	F	E	F	E	D		
Approach Delay		9.1			309.7		101.2	42.0		
Approach LOS		A			F		F	D		

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.21
Intersection Signal Delay: 121.5 Intersection LOS: F
Intersection Capacity Utilization 91.0% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd





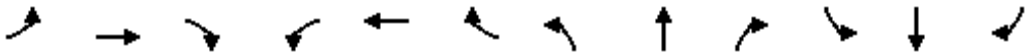
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	574	613	389	426	499	454	8
v/c Ratio	0.73	0.66	2.21	0.66	1.15	0.83	0.01
Control Delay	9.8	5.5	587.8	55.6	142.9	55.2	42.0
Queue Delay	1.0	2.1	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	7.6	587.8	55.6	142.9	55.2	42.0
Queue Length 50th (ft)	64	82	~711	439	634	386	3
Queue Length 95th (ft)	m67	m67	#649	440	#1203	246	3
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	892	997	176	751	433	550	567
Starvation Cap Reductn	127	239	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.81	2.21	0.57	1.15	0.83	0.01

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.

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	507	582	272	330	3	504	2	361	0	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.88			0.93	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.99			1.00	
Satd. Flow (prot)		1881	1615	1787	1877		1715	1555			1772	
Flt Permitted		1.00	1.00	0.08	1.00		0.75	0.94			1.00	
Satd. Flow (perm)		1876	1615	150	1877		1358	1478			1772	
Peak-hour factor, PHF	0.25	0.89	0.95	0.70	0.79	0.38	0.88	0.50	0.96	0.92	0.25	0.25
Adj. Flow (vph)	4	570	613	389	418	8	573	4	376	0	4	4
RTOR Reduction (vph)	0	0	252	0	1	0	0	78	0	0	3	0
Lane Group Flow (vph)	0	574	361	389	425	0	499	376	0	0	5	0
Heavy Vehicles (%)	0%	1%	0%	1%	0%	50%	0%	0%	1%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		78.0	78.0	62.2	62.2		59.0	59.0			59.0	
Effective Green, g (s)		78.0	78.0	62.2	62.2		59.0	59.0			59.0	
Actuated g/C Ratio		0.42	0.42	0.34	0.34		0.32	0.32			0.32	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		791	681	158	631		433	471			565	
v/s Ratio Prot				c0.16	0.23						0.00	
v/s Ratio Perm		c0.31	0.22	c0.66			c0.37	0.25				
v/c Ratio		0.73	0.53	2.46	0.67		1.15	0.80			0.01	
Uniform Delay, d1		44.6	39.8	52.7	52.7		63.0	57.5			43.0	
Progression Factor		0.18	0.41	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		2.2	0.3	676.6	5.7		92.0	8.5			0.0	
Delay (s)		10.1	16.6	729.2	58.4		155.0	66.1			43.0	
Level of Service		B	B	F	E		F	E			D	
Approach Delay (s)		13.5			378.6			112.7			43.0	
Approach LOS		B			F			F			D	

Intersection Summary			
HCM Average Control Delay	145.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		

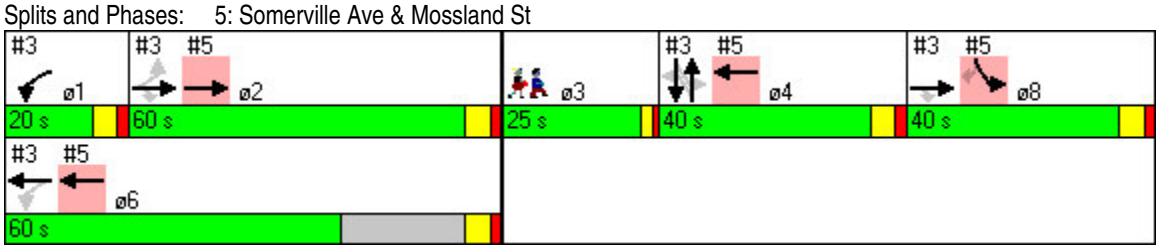
c Critical Lane Group

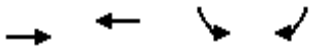
Lane Group	EBT	WBT	SBL	SBR	ø1	ø3	ø4	ø6
Lane Configurations								
Volume (vph)	573	743	291	42				
Turn Type				Perm				
Protected Phases	2	6 4	8		1	3	4	6
Permitted Phases				8				
Detector Phase	2	6 4	8	8				
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	10.0	25.0	10.0	10.0
Total Split (s)	60.0	100.0	40.0	40.0	20.0	25.0	40.0	60.0
Total Split (%)	32.4%	54.1%	21.6%	21.6%	11%	14%	22%	32%
Yellow Time (s)	4.0		4.0	4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0	6.0				
Lead/Lag	Lag				Lead	Lead	Lag	
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	
Recall Mode	Min		None	None	C-Min	None	None	C-Min
Act Effct Green (s)	44.0	126.6	34.0	34.0				
Actuated g/C Ratio	0.24	0.68	0.18	0.18				
v/c Ratio	0.80	0.33	0.92	0.15				
Control Delay	73.7	2.4	106.1	21.0				
Queue Delay	0.1	1.3	0.0	0.0				
Total Delay	73.8	3.7	106.1	21.0				
LOS	E	A	F	C				
Approach Delay	73.8	3.7	94.5					
Approach LOS	E	A	F					

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.21
Intersection Signal Delay: 47.1 Intersection LOS: D
Intersection Capacity Utilization 46.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Somerville Ave & Mossland St

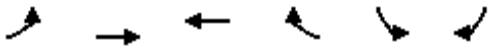




Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	682	808	306	48
v/c Ratio	0.80	0.33	0.92	0.15
Control Delay	73.7	2.4	106.1	21.0
Queue Delay	0.1	1.3	0.0	0.0
Total Delay	73.8	3.7	106.1	21.0
Queue Length 50th (ft)	415	18	371	7
Queue Length 95th (ft)	423	m43	#564	47
Internal Link Dist (ft)	381	126	315	
Turn Bay Length (ft)				
Base Capacity (vph)	1043	2498	332	319
Starvation Cap Reductn	0	1409	0	0
Spillback Cap Reductn	18	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.67	0.74	0.92	0.15

Intersection Summary

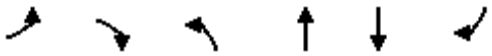
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Volume (vph)	0	573	743	0	291	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3574	3610		1805	1553
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3574	3610		1805	1553
Peak-hour factor, PHF	0.92	0.84	0.92	0.92	0.95	0.88
Adj. Flow (vph)	0	682	808	0	306	48
RTOR Reduction (vph)	0	0	0	0	0	33
Lane Group Flow (vph)	0	682	808	0	306	15
Heavy Vehicles (%)	2%	1%	0%	2%	0%	4%
Turn Type						Perm
Protected Phases		2	6 4		8	
Permitted Phases						8
Actuated Green, G (s)		44.0	121.2		34.0	34.0
Effective Green, g (s)		44.0	121.2		34.0	34.0
Actuated g/C Ratio		0.24	0.66		0.18	0.18
Clearance Time (s)		6.0			6.0	6.0
Vehicle Extension (s)		2.0			2.0	2.0
Lane Grp Cap (vph)		850	2365		332	285
v/s Ratio Prot		c0.19	c0.22		c0.17	
v/s Ratio Perm						0.01
v/c Ratio		0.80	0.34		0.92	0.05
Uniform Delay, d1		66.4	14.2		74.2	62.2
Progression Factor		1.00	0.25		1.00	1.00
Incremental Delay, d2		5.2	0.0		29.7	0.0
Delay (s)		71.6	3.5		103.9	62.2
Level of Service		E	A		F	E
Approach Delay (s)		71.6	3.5		98.2	
Approach LOS		E	A		F	

Intersection Summary			
HCM Average Control Delay	46.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	12	866	711	145
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	13	941	773	158
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1819	852	930			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1891	706	803			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	98			
cM capacity (veh/h)	62	356	671			

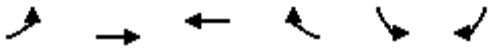
Direction, Lane #	NB 1	SB 1
Volume Total	954	930
Volume Left	13	0
Volume Right	0	158
cSH	671	1700
Volume to Capacity	0.02	0.55
Queue Length 95th (ft)	1	0
Control Delay (s)	0.6	0.0
Lane LOS	A	
Approach Delay (s)	0.6	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	473	237	11	599	278	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.86	0.42	0.83	0.92	0.69
Hourly flow rate (vph)	503	276	26	722	302	17
Pedestrians	108			108	108	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			887		1631	857
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			759		1658	723
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			96		0	94
cM capacity (veh/h)			649		71	288

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	779	748	320
Volume Left	0	26	302
Volume Right	276	0	17
cSH	1700	649	74
Volume to Capacity	0.46	0.04	4.31
Queue Length 95th (ft)	0	3	Err
Control Delay (s)	0.0	1.1	Err
Lane LOS		A	F
Approach Delay (s)	0.0	1.1	Err
Approach LOS			F

Intersection Summary			
Average Delay	1731.2		
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	14	696	862	15	13	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	757	937	16	14	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.82	
vC, conflicting volume	953				1732	945
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	953				1782	945
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				81	95
cM capacity (veh/h)	721				73	318

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	772	953	32
Volume Left	15	0	14
Volume Right	0	16	17
cSH	721	1700	126
Volume to Capacity	0.02	0.56	0.25
Queue Length 95th (ft)	2	0	23
Control Delay (s)	0.6	0.0	42.7
Lane LOS	A		E
Approach Delay (s)	0.6	0.0	42.7
Approach LOS			E

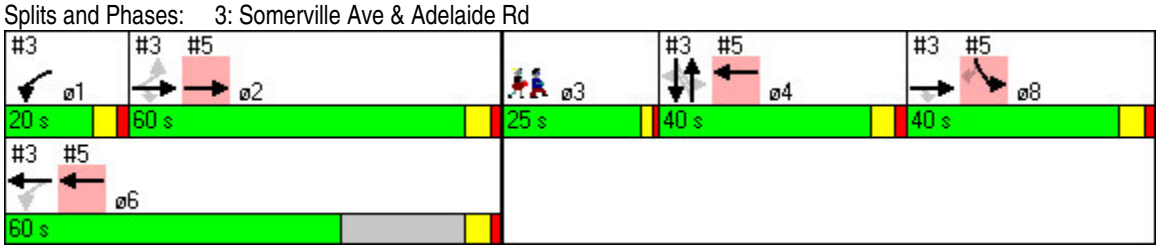
Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

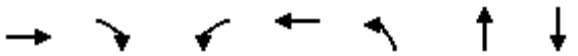
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø3	ø8
Lane Configurations										
Volume (vph)	1	507	585	274	330	504	2	1		
Turn Type	custom		Perm	pm+pt		Perm				
Protected Phases		2 8		1	6		4	4	3	8
Permitted Phases	2		2 8	6		4				
Detector Phase	2	2 8	2 8	1	6	4	4	4		
Switch Phase										
Minimum Initial (s)	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0			10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	60.0	100.0	100.0	20.0	60.0	40.0	40.0	40.0	25.0	40.0
Total Split (%)	32.4%	54.1%	54.1%	10.8%	32.4%	21.6%	21.6%	21.6%	14%	22%
Yellow Time (s)	4.0			4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	2.0			2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lead/Lag	Lag			Lead		Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes		Yes	Yes	Yes	Yes	
Recall Mode	Min			C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)		78.2	78.2	64.2	64.2	58.8	58.8	58.8		
Actuated g/C Ratio		0.42	0.42	0.35	0.35	0.32	0.32	0.32		
v/c Ratio		0.72	0.66	2.22	0.65	1.16	0.83	0.01		
Control Delay		9.6	5.6	591.6	55.4	144.1	55.5	42.0		
Queue Delay		1.0	2.1	0.0	0.0	0.0	0.0	0.0		
Total Delay		10.6	7.7	591.6	55.4	144.1	55.5	42.0		
LOS		B	A	F	E	F	E	D		
Approach Delay		9.1			312.0		101.9	42.0		
Approach LOS		A			F		F	D		

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.22
Intersection Signal Delay: 122.4 Intersection LOS: F
Intersection Capacity Utilization 91.0% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd





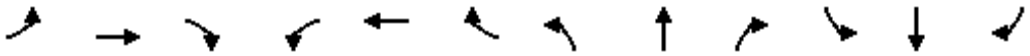
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	574	616	391	426	499	454	8
v/c Ratio	0.72	0.66	2.22	0.65	1.16	0.83	0.01
Control Delay	9.6	5.6	591.6	55.4	144.1	55.5	42.0
Queue Delay	1.0	2.1	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	7.7	591.6	55.4	144.1	55.5	42.0
Queue Length 50th (ft)	63	83	~716	438	635	387	3
Queue Length 95th (ft)	m65	m67	#653	440	#1204	246	3
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	892	998	176	751	431	548	565
Starvation Cap Reductn	129	241	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.81	2.22	0.57	1.16	0.83	0.01

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.

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	507	585	274	330	3	504	2	361	0	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.88			0.93	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.99			1.00	
Satd. Flow (prot)		1881	1615	1787	1877		1715	1555			1772	
Flt Permitted		1.00	1.00	0.08	1.00		0.75	0.94			1.00	
Satd. Flow (perm)		1876	1615	150	1877		1358	1478			1772	
Peak-hour factor, PHF	0.25	0.89	0.95	0.70	0.79	0.38	0.88	0.50	0.96	0.92	0.25	0.25
Adj. Flow (vph)	4	570	616	391	418	8	573	4	376	0	4	4
RTOR Reduction (vph)	0	0	253	0	1	0	0	78	0	0	3	0
Lane Group Flow (vph)	0	574	363	391	425	0	499	376	0	0	5	0
Heavy Vehicles (%)	0%	1%	0%	1%	0%	50%	0%	0%	1%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		78.2	78.2	62.4	62.4		58.8	58.8			58.8	
Effective Green, g (s)		78.2	78.2	62.4	62.4		58.8	58.8			58.8	
Actuated g/C Ratio		0.42	0.42	0.34	0.34		0.32	0.32			0.32	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		793	683	159	633		432	470			563	
v/s Ratio Prot				c0.16	0.23						0.00	
v/s Ratio Perm		c0.31	0.22	c0.67			c0.37	0.25				
v/c Ratio		0.72	0.53	2.46	0.67		1.16	0.80			0.01	
Uniform Delay, d1		44.4	39.8	53.0	52.5		63.1	57.7			43.2	
Progression Factor		0.18	0.42	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		2.2	0.3	675.2	5.6		93.1	8.6			0.0	
Delay (s)		10.0	17.1	728.1	58.1		156.2	66.3			43.2	
Level of Service		A	B	F	E		F	E			D	
Approach Delay (s)		13.6			378.8			113.4			43.2	
Approach LOS		B			F			F			D	

Intersection Summary			
HCM Average Control Delay	146.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.54		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		

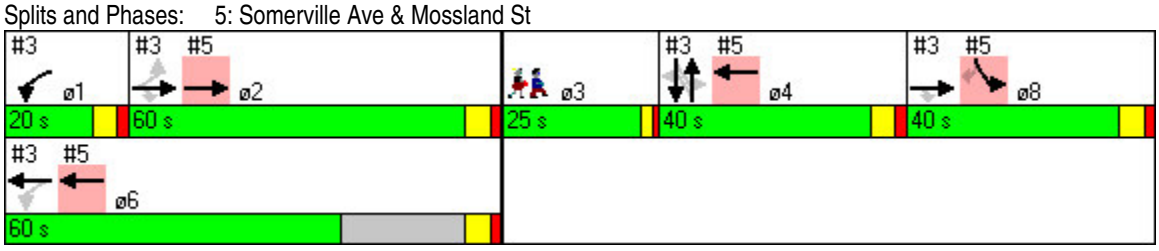
c Critical Lane Group

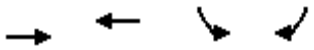
Lane Group	EBT	WBT	SBL	SBR	ø1	ø3	ø4	ø6
Lane Configurations								
Volume (vph)	576	744	293	42				
Turn Type				Perm				
Protected Phases	2	6 4	8		1	3	4	6
Permitted Phases				8				
Detector Phase	2	6 4	8	8				
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	10.0	25.0	10.0	10.0
Total Split (s)	60.0	100.0	40.0	40.0	20.0	25.0	40.0	60.0
Total Split (%)	32.4%	54.1%	21.6%	21.6%	11%	14%	22%	32%
Yellow Time (s)	4.0		4.0	4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0	6.0				
Lead/Lag	Lag				Lead	Lead	Lag	
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	
Recall Mode	Min		None	None	C-Min	None	None	C-Min
Act Effct Green (s)	44.2	126.6	34.0	34.0				
Actuated g/C Ratio	0.24	0.68	0.18	0.18				
v/c Ratio	0.80	0.33	0.93	0.15				
Control Delay	73.6	2.4	107.1	21.0				
Queue Delay	0.1	1.3	0.0	0.0				
Total Delay	73.7	3.7	107.1	21.0				
LOS	E	A	F	C				
Approach Delay	73.7	3.7	95.5					
Approach LOS	E	A	F					

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.22
Intersection Signal Delay: 47.3 Intersection LOS: D
Intersection Capacity Utilization 46.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Somerville Ave & Mossland St

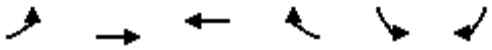




Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	686	809	308	48
v/c Ratio	0.80	0.33	0.93	0.15
Control Delay	73.6	2.4	107.1	21.0
Queue Delay	0.1	1.3	0.0	0.0
Total Delay	73.7	3.7	107.1	21.0
Queue Length 50th (ft)	418	19	374	7
Queue Length 95th (ft)	425	m44	#569	47
Internal Link Dist (ft)	381	126	315	
Turn Bay Length (ft)				
Base Capacity (vph)	1043	2497	332	319
Starvation Cap Reductn	0	1409	0	0
Spillback Cap Reductn	19	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.67	0.74	0.93	0.15

Intersection Summary

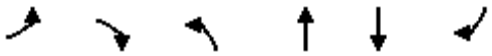
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Volume (vph)	0	576	744	0	293	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3574	3610		1805	1553
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3574	3610		1805	1553
Peak-hour factor, PHF	0.92	0.84	0.92	0.92	0.95	0.88
Adj. Flow (vph)	0	686	809	0	308	48
RTOR Reduction (vph)	0	0	0	0	0	33
Lane Group Flow (vph)	0	686	809	0	308	15
Heavy Vehicles (%)	2%	1%	0%	2%	0%	4%
Turn Type						Perm
Protected Phases		2	6 4		8	
Permitted Phases						8
Actuated Green, G (s)		44.2	121.2		34.0	34.0
Effective Green, g (s)		44.2	121.2		34.0	34.0
Actuated g/C Ratio		0.24	0.66		0.18	0.18
Clearance Time (s)		6.0			6.0	6.0
Vehicle Extension (s)		2.0			2.0	2.0
Lane Grp Cap (vph)		854	2365		332	285
v/s Ratio Prot		c0.19	c0.22		c0.17	
v/s Ratio Perm						0.01
v/c Ratio		0.80	0.34		0.93	0.05
Uniform Delay, d1		66.3	14.2		74.3	62.2
Progression Factor		1.00	0.25		1.00	1.00
Incremental Delay, d2		5.2	0.0		30.7	0.0
Delay (s)		71.5	3.6		105.0	62.2
Level of Service		E	A		F	E
Approach Delay (s)		71.5	3.6		99.2	
Approach LOS		E	A		F	

Intersection Summary			
HCM Average Control Delay	47.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	12	868	715	145
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	13	943	777	158
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1826	856	935			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1899	711	807			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	98			
cM capacity (veh/h)	61	353	667			

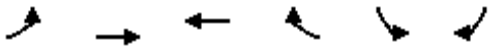
Direction, Lane #	NB 1	SB 1
Volume Total	957	935
Volume Left	13	0
Volume Right	0	158
cSH	667	1700
Volume to Capacity	0.02	0.55
Queue Length 95th (ft)	1	0
Control Delay (s)	0.6	0.0
Lane LOS	A	
Approach Delay (s)	0.6	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	475	237	11	602	279	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.86	0.42	0.83	0.92	0.69
Hourly flow rate (vph)	505	276	26	725	303	17
Pedestrians	108			108	108	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			889		1637	859
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			761		1666	724
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			96		0	94
cM capacity (veh/h)			647		70	287

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	781	751	321
Volume Left	0	26	303
Volume Right	276	0	17
cSH	1700	647	73
Volume to Capacity	0.46	0.04	4.38
Queue Length 95th (ft)	0	3	Err
Control Delay (s)	0.0	1.1	Err
Lane LOS		A	F
Approach Delay (s)	0.0	1.1	Err
Approach LOS			F

Intersection Summary			
Average Delay	1730.7		
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	7	708	875	7	4	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	770	951	8	4	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.82	
vC, conflicting volume	959				1740	955
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	959				1791	955
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				94	98
cM capacity (veh/h)	717				72	313

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	777	959	10
Volume Left	8	0	4
Volume Right	0	8	5
cSH	717	1700	126
Volume to Capacity	0.01	0.56	0.08
Queue Length 95th (ft)	1	0	6
Control Delay (s)	0.3	0.0	35.9
Lane LOS	A		E
Approach Delay (s)	0.3	0.0	35.9
Approach LOS			E

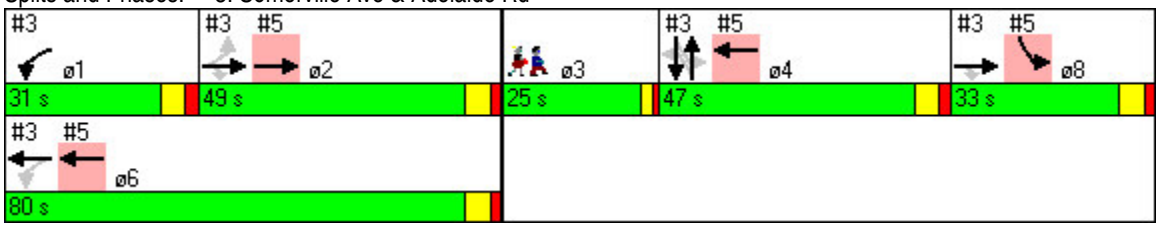
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

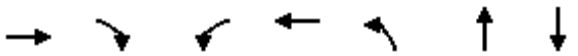
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	ø3	ø8
Lane Configurations										
Volume (vph)	1	507	585	274	330	504	2	1		
Turn Type	custom		Perm	pm+pt		Perm				
Protected Phases		2 8		1	6		4	4	3	8
Permitted Phases	2		2 8	6		4				
Detector Phase	2	2 8	2 8	1	6	4	4	4		
Switch Phase										
Minimum Initial (s)	4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0			10.0	10.0	10.0	10.0	10.0	25.0	10.0
Total Split (s)	49.0	82.0	82.0	31.0	80.0	47.0	47.0	47.0	25.0	33.0
Total Split (%)	26.5%	44.3%	44.3%	16.8%	43.2%	25.4%	25.4%	25.4%	14%	18%
Yellow Time (s)	4.0			4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	2.0			2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lead/Lag	Lag			Lead		Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes		Yes	Yes	Yes	Yes	
Recall Mode	Min			C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)		67.8	67.8	71.8	71.8	58.2	58.2	58.2		
Actuated g/C Ratio		0.37	0.37	0.39	0.39	0.31	0.31	0.31		
v/c Ratio		0.84	0.75	1.39	0.59	1.17	0.83	0.01		
Control Delay		15.5	9.6	237.0	48.2	149.0	55.6	40.0		
Queue Delay		1.4	3.8	0.0	0.0	0.0	0.0	0.0		
Total Delay		16.9	13.4	237.0	48.2	149.0	55.6	40.0		
LOS		B	B	F	D	F	E	D		
Approach Delay		15.1			138.6		104.5	40.0		
Approach LOS		B			F		F	D		

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.39
Intersection Signal Delay: 77.9 Intersection LOS: E
Intersection Capacity Utilization 91.0% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 3: Somerville Ave & Adelaide Rd



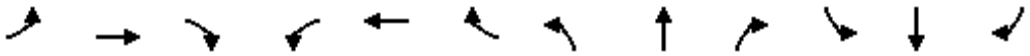


Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	574	616	391	426	499	454	8
v/c Ratio	0.84	0.75	1.39	0.59	1.17	0.83	0.01
Control Delay	15.5	9.6	237.0	48.2	149.0	55.6	40.0
Queue Delay	1.4	3.8	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	13.4	237.0	48.2	149.0	55.6	40.0
Queue Length 50th (ft)	63	85	~575	401	~680	389	3
Queue Length 95th (ft)	117	129	#532	437	#1142	227	3
Internal Link Dist (ft)	126			767		13	89
Turn Bay Length (ft)			350				
Base Capacity (vph)	710	841	282	751	427	548	560
Starvation Cap Reductn	40	147	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.89	1.39	0.57	1.17	0.83	0.01

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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	507	585	274	330	3	504	2	361	0	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		0.95	0.95			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.88			0.93	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.99			1.00	
Satd. Flow (prot)		1881	1615	1787	1877		1715	1555			1772	
Flt Permitted		1.00	1.00	0.09	1.00		0.75	0.94			1.00	
Satd. Flow (perm)		1876	1615	161	1877		1358	1478			1772	
Peak-hour factor, PHF	0.25	0.89	0.95	0.70	0.79	0.38	0.88	0.50	0.96	0.92	0.25	0.25
Adj. Flow (vph)	4	570	616	391	418	8	573	4	376	0	4	4
RTOR Reduction (vph)	0	0	234	0	1	0	0	83	0	0	3	0
Lane Group Flow (vph)	0	574	382	391	425	0	499	371	0	0	5	0
Heavy Vehicles (%)	0%	1%	0%	1%	0%	50%	0%	0%	1%	0%	0%	0%
Turn Type	custom		Perm	pm+pt			Perm			Perm		
Protected Phases		2 8		1	6			4			4	
Permitted Phases	2		2 8	6			4			4		
Actuated Green, G (s)		67.8	67.8	70.0	70.0		58.2	58.2			58.2	
Effective Green, g (s)		67.8	67.8	70.0	70.0		58.2	58.2			58.2	
Actuated g/C Ratio		0.37	0.37	0.38	0.38		0.31	0.31			0.31	
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)				2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		688	592	265	710		427	465			557	
v/s Ratio Prot				c0.19	0.23						0.00	
v/s Ratio Perm		c0.31	0.24	c0.37			c0.37	0.25				
v/c Ratio		0.83	0.64	1.48	0.60		1.17	0.80			0.01	
Uniform Delay, d1		53.5	48.6	61.2	46.2		63.4	58.0			43.6	
Progression Factor		0.18	0.44	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		6.3	1.4	233.3	3.7		98.4	8.7			0.0	
Delay (s)		16.1	22.6	294.5	49.9		161.8	66.7			43.6	
Level of Service		B	C	F	D		F	E			D	
Approach Delay (s)		19.4			167.0			116.5			43.6	
Approach LOS		B			F			F			D	

Intersection Summary			
HCM Average Control Delay	91.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	29.8
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		

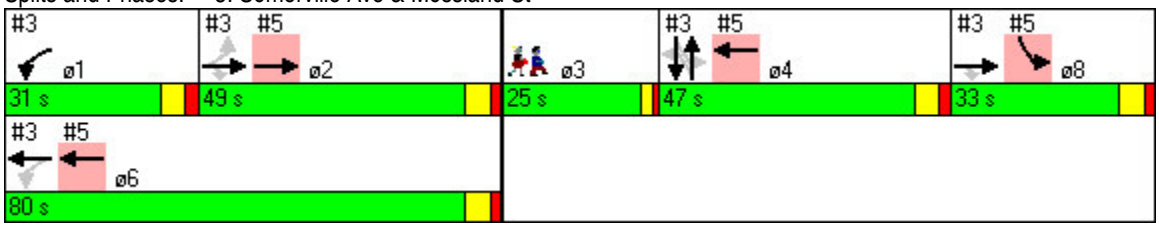
c Critical Lane Group

Lane Group	EBT	WBT	SBL	ø1	ø3	ø4	ø6
Lane Configurations							
Volume (vph)	576	744	293				
Turn Type							
Protected Phases	2	6 4	8	1	3	4	6
Permitted Phases							
Detector Phase	2	6 4	8				
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0		10.0	10.0	25.0	10.0	10.0
Total Split (s)	49.0	127.0	33.0	31.0	25.0	47.0	80.0
Total Split (%)	26.5%	68.6%	17.8%	17%	14%	25%	43%
Yellow Time (s)	4.0		4.0	4.0	2.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0				
Lead/Lag	Lag			Lead	Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	
Recall Mode	Min		None	C-Min	None	None	C-Min
Act Effct Green (s)	40.8	133.6	27.0				
Actuated g/C Ratio	0.22	0.72	0.15				
v/c Ratio	0.87	0.31	0.70				
Control Delay	82.2	2.0	81.5				
Queue Delay	0.2	1.2	0.3				
Total Delay	82.4	3.2	81.8				
LOS	F	A	F				
Approach Delay	82.4	3.2	81.8				
Approach LOS	F	A	F				

Intersection Summary

Cycle Length: 185
Actuated Cycle Length: 185
Offset: 0 (0%), Referenced to phase 1:WBL and 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.39
Intersection Signal Delay: 47.7 Intersection LOS: D
Intersection Capacity Utilization 40.2% ICU Level of Service A
Analysis Period (min) 15

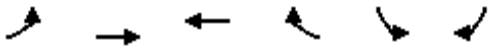
Splits and Phases: 5: Somerville Ave & Mossland St



Lane Group	EBT	WBT	SBL
Lane Group Flow (vph)	686	809	356
v/c Ratio	0.87	0.31	0.70
Control Delay	82.2	2.0	81.5
Queue Delay	0.2	1.2	0.3
Total Delay	82.4	3.2	81.8
Queue Length 50th (ft)	422	22	210
Queue Length 95th (ft)	461	m37	272
Internal Link Dist (ft)	381	126	315
Turn Bay Length (ft)			
Base Capacity (vph)	831	2596	510
Starvation Cap Reductn	0	1489	0
Spillback Cap Reductn	7	0	15
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.83	0.73	0.72

Intersection Summary

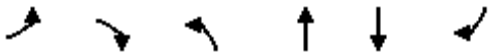
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	576	744	0	293	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	
Lane Util. Factor		0.95	0.95		0.97	
Frt		1.00	1.00		0.98	
Flt Protected		1.00	1.00		0.96	
Satd. Flow (prot)		3574	3610		3443	
Flt Permitted		1.00	1.00		0.96	
Satd. Flow (perm)		3574	3610		3443	
Peak-hour factor, PHF	0.92	0.84	0.92	0.92	0.95	0.88
Adj. Flow (vph)	0	686	809	0	308	48
RTOR Reduction (vph)	0	0	0	0	7	0
Lane Group Flow (vph)	0	686	809	0	349	0
Heavy Vehicles (%)	2%	1%	0%	2%	0%	4%
Turn Type						
Protected Phases		2	6 4		8	
Permitted Phases						
Actuated Green, G (s)		40.8	128.2		27.0	
Effective Green, g (s)		40.8	128.2		27.0	
Actuated g/C Ratio		0.22	0.69		0.15	
Clearance Time (s)		6.0			6.0	
Vehicle Extension (s)		2.0			2.0	
Lane Grp Cap (vph)		788	2502		502	
v/s Ratio Prot		c0.19	c0.22		c0.10	
v/s Ratio Perm						
v/c Ratio		0.87	0.32		0.70	
Uniform Delay, d1		69.6	11.2		75.1	
Progression Factor		1.00	0.27		1.00	
Incremental Delay, d2		10.0	0.0		3.4	
Delay (s)		79.6	3.0		78.5	
Level of Service		E	A		E	
Approach Delay (s)		79.6	3.0		78.5	
Approach LOS		E	A		E	

Intersection Summary			
HCM Average Control Delay	45.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	185.0	Sum of lost time (s)	35.8
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	12	868	715	145
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	13	943	777	158
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					93	
pX, platoon unblocked	0.83	0.83	0.83			
vC, conflicting volume	1275	777	935			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1229	630	820			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	98			
cM capacity (veh/h)	139	353	669			

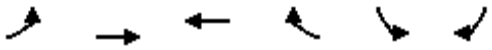
Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	328	629	777	158
Volume Left	13	0	0	0
Volume Right	0	0	0	158
cSH	669	1700	1700	1700
Volume to Capacity	0.02	0.37	0.46	0.09
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	0.7	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.2		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	475	237	11	602	279	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.86	0.42	0.83	0.92	0.69
Hourly flow rate (vph)	505	276	26	725	303	17
Pedestrians	108			108	108	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	9			9	9	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	242					
pX, platoon unblocked			0.84		0.84	0.84
vC, conflicting volume			889		1637	859
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			771		1663	735
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			96		0	94
cM capacity (veh/h)			650		71	286

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	781	751	303	17
Volume Left	0	26	303	0
Volume Right	276	0	0	17
cSH	1700	650	71	286
Volume to Capacity	0.46	0.04	4.25	0.06
Queue Length 95th (ft)	0	3	Err	5
Control Delay (s)	0.0	1.1	Err	18.4
Lane LOS		A	F	C
Approach Delay (s)	0.0	1.1	9457.7	
Approach LOS			F	

Intersection Summary			
Average Delay	1637.0		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	7	708	875	7	4	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	770	951	8	4	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		170				
pX, platoon unblocked					0.83	
vC, conflicting volume	959				1740	955
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	959				1787	955
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				94	98
cM capacity (veh/h)	717				74	313

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	777	959	10
Volume Left	8	0	4
Volume Right	0	8	5
cSH	717	1700	128
Volume to Capacity	0.01	0.56	0.08
Queue Length 95th (ft)	1	0	6
Control Delay (s)	0.3	0.0	35.4
Lane LOS	A		E
Approach Delay (s)	0.3	0.0	35.4
Approach LOS			E

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

Trip Generation Handbook

An ITE Recommended Practice

March 2001

Institute of Transportation Engineers

Table 5.10
Pass-By Trips and Diverted Linked Trips
Weekday, P.M. Peak Period

Land Use 843—Automobile Parts Sales

SIZE (1,000 SQ. FEET GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS-BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	SOURCE
15	Orlando, FL	1995	409	2-6 P.M.	44	-	13	43	n/a	TPD, Inc.

Table 5.11
Pass-By Trips and Diverted Linked Trips
Weekday, A.M. Peak Period

Land Use 844—Gasoline/Service Station

SIZE (1,000 SQ. FEET GFA)	VEHICLE FUELING POSITIONS	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS-BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	SOURCE
2.3	6	Gaithersburg, MD	1992	37	7-9 A.M.	41	-	27	32	2,080	RBA
2.1	6	Bethesda, MD	1992	26	7-9 A.M.	23	-	19	58	2,080	RBA
1.7	6	Wheaton, MD	1992	21	7-9 A.M.	14	-	19	67	900	RBA
2.0	8	Gaithersburg, MD	1992	46	7-9 A.M.	13	-	0	87	2,235	RBA
1.2	6	Damascus, MD	1992	21	7-9 A.M.	28	-	29	43	870	RBA
.3	12	Wheaton, MD	1992	36	7-9 A.M.	8	-	31	61	3,480	RBA

Average Pass-By Trip Percentage: 58

Table 5.12
Pass-By Trips and Diverted Linked Trips
Weekday, P.M. Peak Period

Land Use 844—Gasoline/Service Station

SIZE (1,000 SQ. FEET GFA)	VEHICLE FUELING POSITIONS	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS-BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	SOURCE
n/a	n/a	Chicago suburbs, IL	1987	48	3-7 P.M.	-	79	-	21	n/a	Kenig, O'Hara, Humes, Flock
n/a	n/a	Chicago suburbs, IL	1987	34	3-6 P.M.	-	75	-	25	n/a	Kenig, O'Hara, Humes, Flock
n/a	n/a	Chicago suburbs, IL	1987	42	3-6 P.M.	-	80	-	20	n/a	Kenig, O'Hara, Humes, Flock
2.3	6	Gaithersburg, MD	1992	55	4-6 P.M.	11	-	49	40	2,760	RBA
2.1	6	Bethesda, MD	1992	30	4-6 P.M.	20	-	27	53	1,060	RBA
1.7	6	Wheaton, MD	1992	18	4-6 P.M.	6	-	33	61	2,510	RBA
2.0	8	Gaithersburg, MD	1992	47	4-6 P.M.	23	-	15	62	2,635	RBA
1.2	6	Damascus, MD	1992	26	4-6 P.M.	11	-	31	58	1,020	RBA
.3	12	Wheaton, MD	1992	52	4-6 P.M.	10	-	52	38	3,835	RBA

Average Pass-By Trip Percentage: 42

SOMERVILLE
SOMERVILLE AVENUE

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	STP-0015(492)	2006	75	132
PROJECT FILE NO. 602109				

TRAFFIC & STREET LIGHTING PLAN (LOCATION 1)

DRAINAGE DETAILS
SEE SHEET 36

DETECTOR DATA

DETECTOR NO.	NO. & SIZE	NO. OF TURNS	OPERATION	DELAY	CALL PHASE	EXTEND PHASE	LOOP CONNECTION
D1	6-1.8mx1.8m 2-2.4mx2.4m	3	PRESENCE	0	ϕ4A	ϕ4A	SERIES
D2	7-1.8mx1.8m 1-2.4mx2.4m	3	PRESENCE	0	ϕ2	ϕ2	SERIES
D3	7-1.8mx1.8m 1-2.4mx2.4m	3	PRESENCE	0	ϕ6	ϕ6	SERIES

FOR MAJOR ITEMS REQUIRED SEE NEXT PLAN.

MERIDIAN OF THE MASSACHUSETTS COORDINATE SYSTEM

CAMBRIDGE
SOMERVILLE

Acadia Park

Beacon Terrace

Mossland Street
ONE WAY

Somerville Avenue

ELECTRICAL CONTROL CABINET #1 FOR PEDESTRAIN SIDEWALK LIGHTS WITH SERVICE FEED FROM U.P. 241/1

PROP. CONDUITS AND INTERCONNECT CABLE 1-75 mm, 1-50 mm

MEET EXIST. CENTER YELLOW LINE

CONSTRUCTION ℄

R1-1 R2-1 (30MPH) R3-7Ra R3-7R R3-8b R6-1 R5-1 R7-4 R7-107A R7-107B R10-22 D3-1 D3-2 D3-3 D3-4

PROP. ROADWAY LIGHT (TYP.)

PROP. CONDUIT 1-50 mm

LIMIT OF PROGRAMMED VISIBILITY FOR HEADS C&D

PROP. PRE-EMPTION RECEIVERS

PROP. PRE-EMPTION WHITE LENS STROBE

300mm WHITE THERMOPLASTIC (TYP.)

CITY LINE

SOMERVILLE
CAMBRIDGE

1 REVISION DATE: 6/17/2008

GRAPHIC SCALE
(IN METERS)
0 2.5 5 10 15 20 25
1 : 250

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DRAINAGE DETAILS
SEE SHEET 37

DETECTOR DATA

DETECTOR NO.	NO. & SIZE	NO. OF TURNS	OPERATION	DELAY	CALL PHASE	EXTEND PHASE	LOOP CONNECTION
D4	2–1.8mx1.8m 1–2.4mx2.4m	3	PRESENCE	0	ϕ4B	ϕ4B	SERIES
D5	6–1.8mx1.8m 2–2.4mx2.4m	3	PRESENCE	0	ϕ2	ϕ2	SERIES
D6	1–2.4mx2.4m 1–3.5mx2.4m USE EXIST.	3	PRESENCE	0	ϕ8	ϕ8	SERIES
D7	3–1.8mx1.8m 1–2.4mx2.4m	3	PRESENCE	0	ϕ1	ϕ1	SERIES
D8	3–1.8mx1.8m 1–3.5mx2.4m	3	PRESENCE	0	ϕ1+ϕ6 OVERLAP	ϕ1+ϕ6 OVERLAP	SERIES

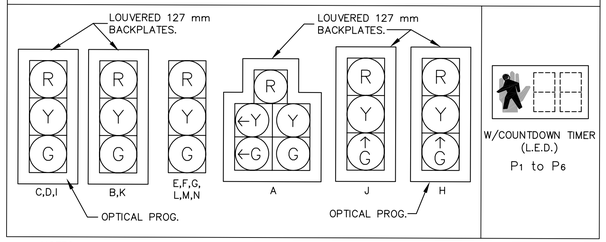
1

MAJOR ITEMS REQUIRED

QUAN.	DESCRIPTION
1	CONTROLLER TYPE TS2, TYPE 1 W/CAB. & FDN.
2	9.1 m BLACK FLUTED MAST ARM STRUCTURE, TYPE II W/FDN.
5	3 m BLACK FLUTED SIGNAL POST & BASE
3	2.5 m BLACK FLUTED SIGNAL POST & BASE
1	1 WAY 5 LENS VEHICLE HOUSING – 300 mm (GL,YL,R,Y,G)
5	1 WAY 3 LENS VEHICLE HOUSING – 300 mm (G,Y,R)
3	1 WAY 3 LENS OPT. PROG. VEHICLE HOUSING – 300 mm (G,Y,R)
1	1 WAY 3 LENS VEHICLE HOUSING – 300 mm (GV,Y,R)
1	1 WAY 3 LENS OPT. PROG. VEHICLE HOUSING – 300 mm (GV,Y,R)
1	2 WAY 3 LENS VEHICLE HOUSING – 300 mm (G,Y,R)
1	3 WAY 3 LENS VEHICLE HOUSING – 300 mm (G,Y,R)
10	COUNTDOWN PED. HOUSING
7	PEDESTRIAN PUSH BUTTON, SIGN & SADDLE
2 (33)	WIRE LOOP DETECTOR
11	TYPE D–2 LOOP DETECTOR
1 (12)	LOOP DETECTOR AMPLIFIER (TWO CHANNEL)
20	PULL BOX – 300 mm x 300 mm
2 (6)	HANDHOLE – 610 mm x 610 mm
4	PRE–EMPTION RECEIVER
1	4–CHANNEL PHASE SELECTOR
1	PHASE SELECTOR RACK
1	SERVICE CONNECTION (115V)
2	PRE–EMPTION WHITE LENS STROBE

NECESSARY DUCT, CABLE, LABOR MISCELLANEOUS MATERIAL & EQUIPMENT TO COMPLETE THE INSTALLATION

SIGNAL FACES

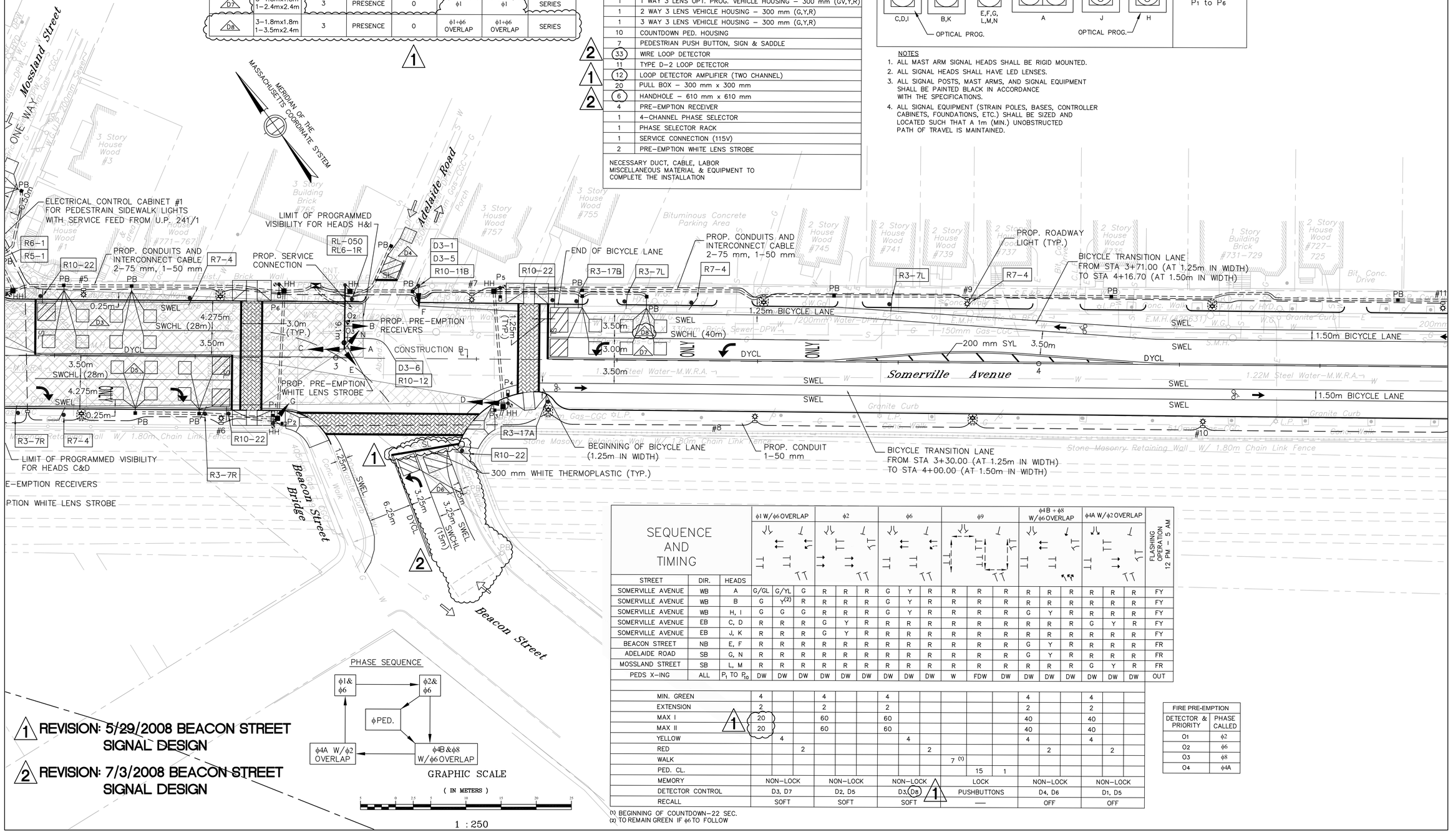


NOTES
1. ALL MAST ARM SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL HAVE LED LENSES.
3. ALL SIGNAL POSTS, MAST ARMS, AND SIGNAL EQUIPMENT SHALL BE PAINTED BLACK IN ACCORDANCE WITH THE SPECIFICATIONS.
4. ALL SIGNAL EQUIPMENT (STRAIN POLES, BASES, CONTROLLER CABINETS, FOUNDATIONS, ETC.) SHALL BE SIZED AND LOCATED SUCH THAT A 1m (MIN.) UNOBSTRUCTED PATH OF TRAVEL IS MAINTAINED.

SOMERVILLE
SOMERVILLE AVENUE

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	STP–0015(492)	2006	76	132
PROJECT FILE NO. 602109				

TRAFFIC & STREET LIGHTING PLAN
(LOCATION 1)



SEQUENCE AND TIMING

STREET	DIR.	HEADS	ϕ1 W/ϕ6 OVERLAP			ϕ2			ϕ6			ϕ9			ϕ4B + ϕ8 W/ϕ6 OVERLAP			ϕ4A W/ϕ2 OVERLAP			FLASHING OPERATION 12 PM – 5 AM
SOMERVILLE AVENUE	WB	A	G/GL	G/YL	G	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FY
SOMERVILLE AVENUE	WB	B	G	Y(2)	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FY
SOMERVILLE AVENUE	WB	H, I	G	G	G	R	R	R	G	Y	R	R	R	R	G	Y	R	R	R	R	FY
SOMERVILLE AVENUE	EB	C, D	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	G	Y	R	FY
SOMERVILLE AVENUE	EB	J, K	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
BEACON STREET	NB	E, F	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR
ADELAIDE ROAD	SB	G, N	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR
MOSSLAND STREET	SB	L, M	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	FR
PEDS X–ING	ALL	P_1 TO P_{10}	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	DW	DW	DW	DW	DW	DW	OUT
MIN. GREEN			4			4			4						4			4			
EXTENSION			2			2			2						2			2			
MAX I			20			60			60						40			40			
MAX II			20			60			60						40			40			
YELLOW				4						4					4			4			
RED					2						2					2			2		
WALK												7 (1)									
PED. CL.													15	1							
MEMORY			NON–LOCK			NON–LOCK			NON–LOCK			LOCK			NON–LOCK			NON–LOCK			
DETECTOR CONTROL			D3, D7			D2, D5			D3 (D8)			PUSHBUTTONS			D4, D6			D1, D5			
RECALL			SOFT			SOFT			SOFT			—			OFF			OFF			

(1) BEGINNING OF COUNTDOWN–22 SEC.
(2) TO REMAIN GREEN IF ϕ6 TO FOLLOW

PHASE SEQUENCE

FIRE PRE–EMPTION	
DETECTOR & PRIORITY	PHASE CALLED
O1	ϕ2
O2	ϕ6
O3	ϕ8
O4	ϕ4A

1 REVISION: 5/29/2008 BEACON STREET SIGNAL DESIGN

2 REVISION: 7/3/2008 BEACON STREET SIGNAL DESIGN

GRAPHIC SCALE
(IN METERS)
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1 : 250

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