

Report No. 051048

Prepared for:  
Town of Middleton

## Main Street Traffic Study

November 2005

### FINAL REPORT



**ISO 9001**  
Registered Company

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## Chapter 1    **Introduction**

CBCL Limited was retained by the Town of Middleton to investigate the existing traffic conditions at three intersections on Main Street (Trunk 1) in the downtown area. The study area, as depicted on Figure 1.1, included the intersections of:

- Main Street at Bridge Street (Trunk 10)
- Main Street at School Street
- Main Street at Commercial Street

A kick-off meeting was held with Ray Rice, CAO of the Town of Middleton to discuss the history of traffic problems in the area, any possible future development plans, and any other notable issues. Reference information to be used in the study included the Town of Middleton Downtown Traffic and Parking Study (2000), by the Annapolis District Planning Commission, and other miscellaneous correspondence from past years.

It was agreed that the study would not consider any future major development in the nearby areas, nor would background traffic be increased for the future condition.

Current traffic counts were obtained by CBCL Limited at the three intersections. General field information and photographs were obtained at the intersections, and the remainder of the study area. The study corridor was analyzed using Synchro v6.0 software such that the group effects of all three intersections would be included.

It should be noted that the scope of work of this study was confined to “exploring capacity opportunities”. Accordingly, the discussion following is relative to **present** traffic volumes and associated traffic improvements. **Future** traffic growth has not been estimated. The effects of traffic growth and overall development of future transportation systems in the surrounding area have not been considered in this study.





## TOWN OF MIDDLETON - MAIN STREET INTERSECTION ANALYSIS

### FIGURE 1 - SITE PLAN

051048

SCALE

NTS

DATE

NOVEMBER 2005



### **2.1 Site Description**

**Main Street** in Middleton is also Provincial Trunk 1, the secondary highway route through the Annapolis Valley. The length of Main Street through the study area is approximately 125m. The study section of Main Street is considered the downtown central business district in Middleton, containing the banks, a post office, a grocery store and other businesses. There exists some on-street parking and left-hand turning lanes at the Commercial Street intersection. The posted speed limit is 50km/hr. Main Street has no traffic control within the study area. All minor streets are stop-controlled.

**Commercial Street** contains much of the downtown businesses and services in Middleton. It has on-street parking, as well as various adjacent parking lots. It intersects Main Street opposite the driveway to the Save-Easy grocery store. The Save-Easy driveway is a one-way entrance driveway at this intersection.

**School Street** is a local street that provides access to the Middleton Regional High School, the Macdonald Museum, parking lots, and adjacent residential areas.

**Bridge Street** is Provincial Trunk 10, which connects to Highway 103, near Bridgewater. Locally, it provides access across the Annapolis River to the communities of Nictaux, Bloomington, and others. Trunk 10 terminates at Main Street.

The area in the immediate vicinity of the three intersections is relatively flat. The most notable characteristic of the three intersections is their proximity to each other. School Street is approximately 42m from Bridge Street and 80m from Commercial Street.

### **2.2 Notable Traffic Problems**

**AM peak** hour traffic does not appear to present any major traffic problems in the study area. There are minor delays turning left from the minor legs of the three intersections to the major leg (Main Street). These delays are considered minimal, and traffic queues are acceptable.

In the **PM peak**, some minor queuing does occur at Bridge Street and at Commercial Street. The left turns become even more difficult from the

minor legs to Main Street. The relatively large pedestrian presence at Commercial Street results in further delays and congestion.

## 2.3 Data Collected and Reviewed

Traffic counts were collected on August 9, 2005. Counts were taken from 7:00am to 9:00am, 11:00am to 1:00pm, and 4:00pm to 6:00pm. Historical information was available for Main Street (Trunk 1) from the Nova Scotia Department of Transportation was used to factor the traffic counts to ensure that the data best represented a “typical” day.

## 2.4 Analysis

### 2.4.1 Level of Service Criteria

The performance of a street intersection under a given traffic loading is a function of the following primary factors:

- Intersection configuration and street widths;
- Numbers, directions and relative volumes of turning movements;
- Type of traffic control (stop/yield/signals);
- Proportions of heavy vehicles in the traffic stream;
- Peaking characteristics of flows within the peak hour; and
- Presence of parked vehicles or transit stops near the intersection.

Intersection performance is rated on the basis of the “level of service” (LOS) provided on each leg. Level of service is generally defined in terms of the average delay experienced by drivers passing through the given approach to the intersection. Associated with increasing delay are motorist discomfort and frustration and increased vehicular fuel consumption.

As set out in U.S. Transportation Research Board’s “Highway Capacity Manual” (HCM), the levels of service may be denoted by simple alphabetic ratings as described in descending order in Table 1.

**Table 1 Intersection Level of Service Criteria**

LOS	LOS Description	Signalized Intersections Control Delay (sec/veh) <sup>(1)</sup>	Stop Controlled Intersections Control Delay (sec/veh) <sup>(1, 2)</sup>
<b>A</b>	<b>Excellent</b> ; free-flow conditions, little or no delays.	Less than 10	Less than 10
<b>B</b>	<b>Good</b> ; minor congestion only, short traffic delays.	Between 10-20	Between 10-15
<b>C</b>	<b>Fair</b> ; congestion is intermittent but noticeable, average delays.	Between 20-35	Between 15-25
<b>D</b>	<b>Tolerable</b> ; congestion is more continuous, some delays may be long. <i>(This level is the lowest that is generally considered acceptable for design purposes.)</i>	Between 35-55	Between 25-35
<b>E</b>	<b>Unsatisfactory</b> ; congestion is continuous, delays	Between 55-80	Between 35-50

	become very long.		
<b>F</b>	<b>Unacceptable;</b> plug flow, continuous congestion and very long delays.	Greater than 80	Greater than 50
<b>Note:</b> (1) Control delay as per the HCM include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. (2) Control delay as experienced by vehicles at the “stop” sign-controlled approaches to the intersection only. Uncontrolled approaches are free-flow.			

#### 2.4.2 Main Operational Issues

The intersections of Main Street with Bridge Street, School Street and Commercial Street play an integral role in the access of vehicular and pedestrian traffic around, and through, the Town of Middleton.

The study investigated the existing operation of the corridor with an emphasis on the possible signalization of one of the intersections.

**Existing conditions** for the three intersections indicate an acceptable Level of Service (LOS) for all legs of the intersections within the study corridor for the morning peak, midday peak and the afternoon peak. The highest delay was shown on Bridge Street (northbound) as a LOS ‘C’ at all times of the day. The results of the analysis are shown in Tables 2-4.

**Table 2 – Main Street Intersections Level of Service (AM Peak)**

	Commercial Street	School Street	Bridge Street
<b>NB</b>	N/A	N/A	C
<b>SB</b>	B	B	N/A
<b>EB</b>	A	A	A
<b>WB</b>	A	A	A

**Table 3 – Main Street Intersections Level of Service (Midday)**

	Commercial Street	School Street	Bridge Street
<b>NB</b>	N/A	N/A	C
<b>SB</b>	C	B	N/A
<b>EB</b>	A	A	A
<b>WB</b>	A	A	A

**Table 4 – Main Street Intersections Level of Service (PM Peak)**

	Commercial Street	School Street	Bridge Street
<b>NB</b>	N/A	N/A	C
<b>SB</b>	C	B	N/A
<b>EB</b>	A	A	A
<b>WB</b>	A	A	A

The three intersections in the study area were then checked for traffic **signal warrants**. Using the Canadian Traffic Signal Warrant Analysis, the scores are **68** for Main Street at Bridge Street, **42** for Main Street at School Street, and **100** for Main Street at Commercial Street. This method can be quite sensitive to the adjustment of numbers used in the calculations. However, the peak counts at Commercial Street indicate that traffic signals may be warranted with 100 priority points.

For comparison, using Exhibit 10-15 from the Highway Capacity Manual 2000, the traffic volume intersection points for Main/Commercial intersection were plotted for the PM peak. The points plotted on the graph were well outside the boundary area for signals being warranted, supporting the case for not installing traffic signals at the intersection.

Signalizing the intersection gives improved results, as described below. The signalized intersection runs comfortably under capacity during the PM peak traffic volumes with a critical vehicle to capacity ratio of 0.36 (with a value of 1.0 being the full capacity of the intersection). In the PM peak, the intersection was estimated to function efficiently with the existing lane configuration. In essence, the traffic signals are not overwhelmingly necessary, but will improve intersection capacity and pedestrian safety. The unsignalized intersection presently yields acceptable levels of service as it is operating within its capacity; a signalized installation will only allow for a modest improvement (refer to Table 5).

***Table 5 – Main Street Intersections Level of Service (PM Peak, Commercial Street Signalized)***

	<b>Commercial Street</b>	<b>School Street</b>	<b>Bridge Street</b>
<b>NB</b>	N/A	N/A	C
<b>SB</b>	A	B	N/A
<b>EB</b>	A	A	A
<b>WB</b>	A	A	A

## 2.5 Conclusions

While traffic signals would improve the overall level of service at the intersection of Main and Commercial, they are not absolutely necessary at this time. The main benefits would be seen by southbound traffic on Commercial Street. As well, the ability to queue pedestrians at the crossing is more favourable, rather than the uncontrolled pedestrian crossings that occur today. Improving the level of service for Commercial Street does not appear to have any dramatic negative effect on Main Street traffic. In addition, the new signal control would provide increased gaps



for left turning traffic from both School Street and Bridge Street wishing to enter Main Street.

The most significant drawback to a new traffic signal system is the cost. Estimated construction costs for these improvements are summarised in Table 5. Other possible negative impacts of new signals would include the draw of additional traffic that would normally use other intersections, including the possible switch of the Save-Easy driveway to a two-way entrance.

***Table 6 - Preliminary Construction Cost Estimate for Traffic Signals***

<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price (\$)</b>	<b>Amount (\$)</b>
Direct buried conduit	300	M	\$150	\$45,000
Traffic controller	1	Each	18,000	\$18,000
Signal pole bases	8	Each	\$1,500	\$12,000
Signal Poles	8	Each	\$1,500	\$12,000
Mast arms	4	Each	\$1,500	\$6,000
Traffic signal equipment	1	L.S.	N/a	\$50,000
Pavement markings	1	L.S.	\$2,000	\$2,000
Labour	1	L.S.	\$10,000	\$10,000
<b>SUB-TOTAL</b>				<b>\$155,000</b>
Engineering (~10%)				\$15,500
Contingencies (~15%)				\$23,250
<b>TOTAL</b>				<b>\$193,750</b>

## Appendix A

# **Traffic Data and Calculations**

## MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/BRIDGE STREET

WEATHER: SUNNY  
RECORDER: MSM

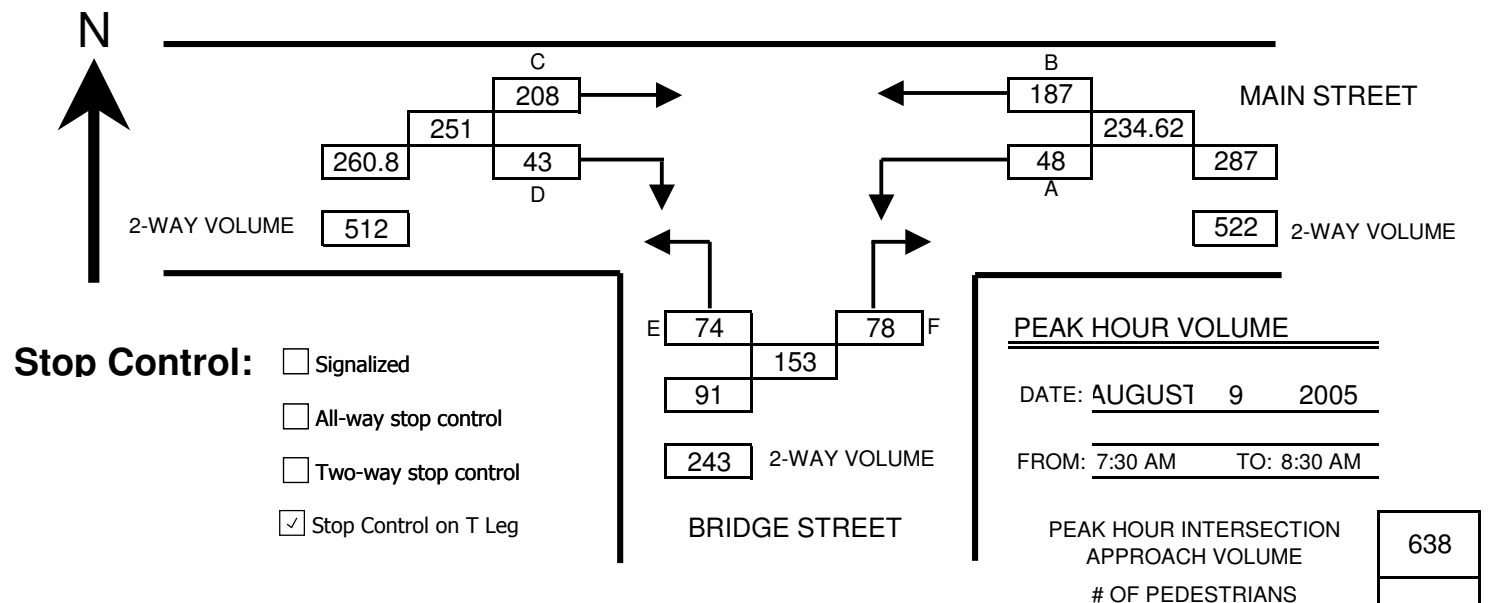
DAY	DATE	MONTH	YEAR
TUESDAY	9	AUGUST	2005

COUNT REFERENCE 15 MIN INTERVALS		STREET:		BRIDGE STREET						MAIN STREET						TOTAL
				NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
				E		F				A	B			C	D	
				L	S	R	L	S	R	L	S	R	L	S	R	
7:00 AM	7:15 AM	15	0	11	0	0	0	8	31	0	0	36	6	107		
7:15 AM	7:30 AM	21	0	19	0	0	0	7	43	0	0	45	9	144		
7:30 AM	7:45 AM	26	0	18	0	0	0	11	58	0	0	45	12	170		
7:45 AM	8:00 AM	30	0	32	0	0	0	13	56	0	0	69	10	210		
8:00 AM	8:15 AM	19	0	18	0	0	0	15	47	0	0	68	15	182		
8:15 AM	8:30 AM	10	0	22	0	0	0	16	53	0	0	57	12	170		
8:30 AM	8:45 AM	12	0	19	0	0	0	13	38	0	0	56	13	151		
8:45 AM	9:00 AM	21	0	30	0	0	0	24	79	0	0	60	11	225		
TOTAL		154	0	169	0	0	0	107	405	0	0	436	88	1359		

7:30 AM	8:30 AM	85	0	90	0	0	0	55	214	0	0	239	49	732
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		74	0	78	0	0	0	48	187	0	0	208	43	638
PEAK HOUR FACTOR		0.71		0.70				0.86	0.92			0.87	0.82	
TOTAL # OF TRUCKS		1	0	4	0	0	0	5	4	0	0	20	5	
%TRUCKS		1%	0%	2%	0%	0%	0%	5%	1%	0%	0%	5%	6%	

## TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/BRIDGE STREET



## MANUAL TRAFFIC COUNTS

INTERSECTION: **MAIN STREET/BRIDGE STREET**

WEATHER **SUNNY**  
RECORDER **MSM**

DAY	DATE	MONTH	YEAR
TUESDAY	9	AUGUST	2005

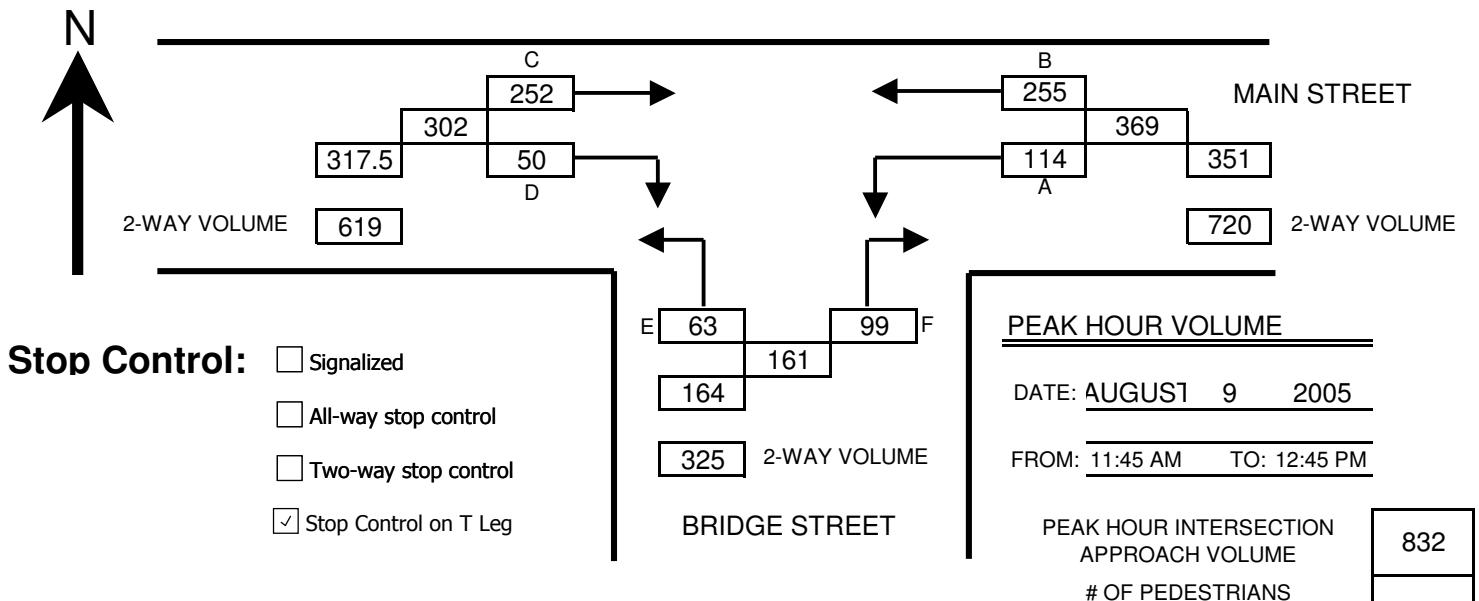
COUNT REFERENCE 15 MIN INTERVALS		BRIDGE STREET						MAIN STREET						TOTAL
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
		E		F				A	B			C	D	
		L	S	R	L	S	R	L	S	R	L	S	R	
11:00 AM	11:15 AM	18	0	31	0	0	0	34	55	0	0	58	10	206
11:15 AM	11:30 AM	10	0	34	0	0	0	38	54	0	0	59	17	212
11:30 AM	11:45 AM	13	0	14	0	0	0	30	71	0	0	68	9	205
<b>11:45 AM</b>	12:00 PM	13	0	20	0	0	0	39	77	0	0	66	14	229
12:00 PM	12:15 PM	22	0	29	0	0	0	42	68	0	0	89	20	270
12:15 PM	12:30 PM	23	0	32	0	0	0	25	64	0	0	71	14	229
12:30 PM	<b>12:45 PM</b>	14	0	32	0	0	0	25	83	0	0	63	9	226
12:45 PM	1:00 PM	17	0	40	0	0	0	12	68	0	0	57	16	210
TOTAL		130	0	232	0	0	0	245	540	0	0	531	109	1787

### PEAK HOUR TOTAL

11:45 AM	12:45 PM	72	0	113	0	0	0	131	292	0	0	289	57	954
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		63	0	99	0	0	0	114	255	0	0	252	50	832
PEAK HOUR FACTOR		0.78		0.88				0.78	0.88			0.81	0.71	
TOTAL # OF TRUCKS		8	0	4	0	0	0	4	11	0	0	12	1	
%TRUCKS		6%	0%	2%	0%	0%	0%	2%	2%	0%	0%	2%	1%	

## TURNING MOVEMENT SUMMARY

INTERSECTION: **MAIN STREET/BRIDGE STREET**



# MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/BRIDGE STREET

WEATHER: SUNNY  
RECORDER: MSM

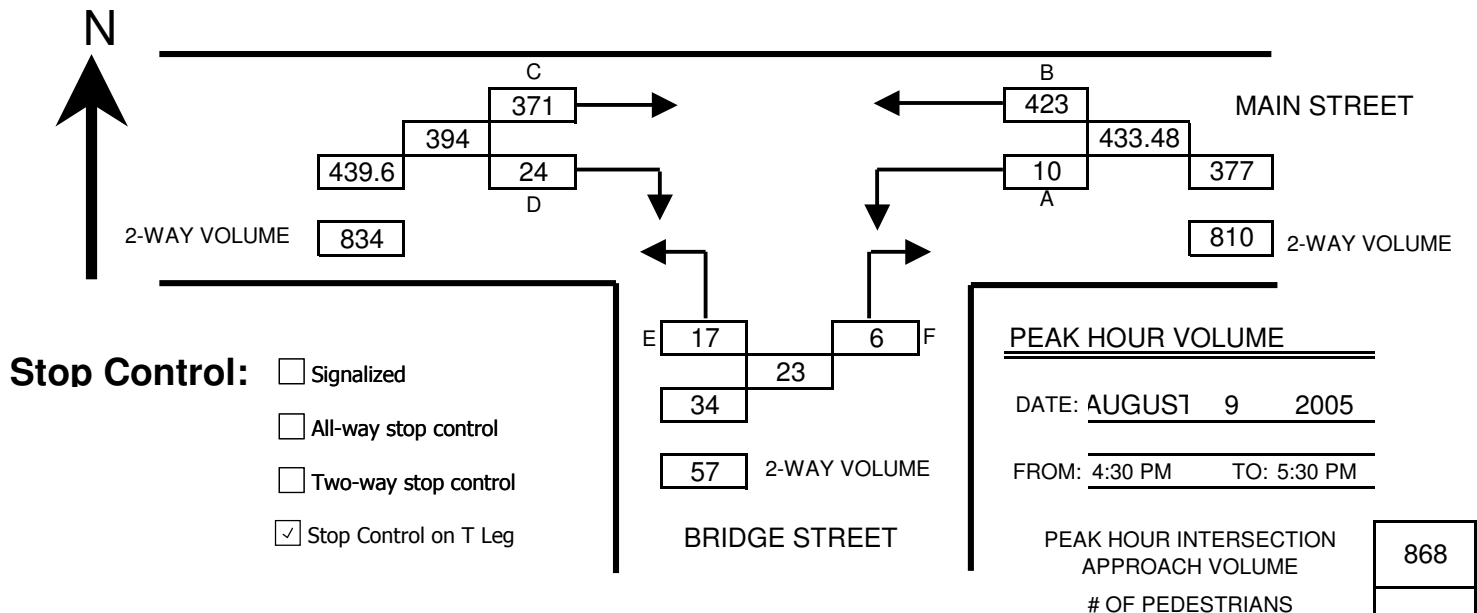
DAY	DATE	MONTH	YEAR
TUESDAY	9	AUGUST	2005

COUNT REFERENCE 15 MIN INTERVALS		BRIDGE STREET						MAIN STREET						TOTAL
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
		E		F				A	B			C	D	
		L	S	R	L	S	R	L	S	R	L	S	R	
4:00 PM	4:15 PM	2	0	3	0	0	0	1	104	2	0	110	1	223
4:15 PM	4:30 PM	6	0	1	0	0	0	2	92	1	0	115	6	223
4:30 PM	4:45 PM	7	0	0	0	0	0	1	119	5	0	103	8	243
4:45 PM	5:00 PM	5	0	1	0	0	0	3	125	3	0	102	7	246
5:00 PM	5:15 PM	3	0	5	0	0	0	6	130	7	0	109	7	267
5:15 PM	5:30 PM	4	0	1	0	0	0	2	111	5	0	111	5	239
5:30 PM	5:45 PM	3	0	0	0	0	0	2	76	0	0	108	3	192
5:45 PM	6:00 PM	5	0	2	0	0	0	2	61	0	0	85	4	159
TOTAL		35	0	13	0	0	0	19	818	23	0	843	41	1792

PEAK HOUR TOTAL		4:30 PM	5:30 PM	19	0	7	0	0	0	12	485	20	0	425	27	995
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		17	0	6	0	0	0	10	423	17	0	371	24	868		
PEAK HOUR FACTOR		0.68		0.35				0.50	0.93			0.96	0.84			
TOTAL # OF TRUCKS		3	0	1	1	0	8	1	11	0	7	12	1			
%TRUCKS		9%	0%	8%	0%	0%	0%	5%	1%	0%	0%	1%	2%			

## TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/BRIDGE STREET





## MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/SCHOOL STREET

WEATHER: SUNNY  
RECORDER: MSM

DAY	DATE	MONTH	YEAR
TUESDAY	9	AUG.	2005

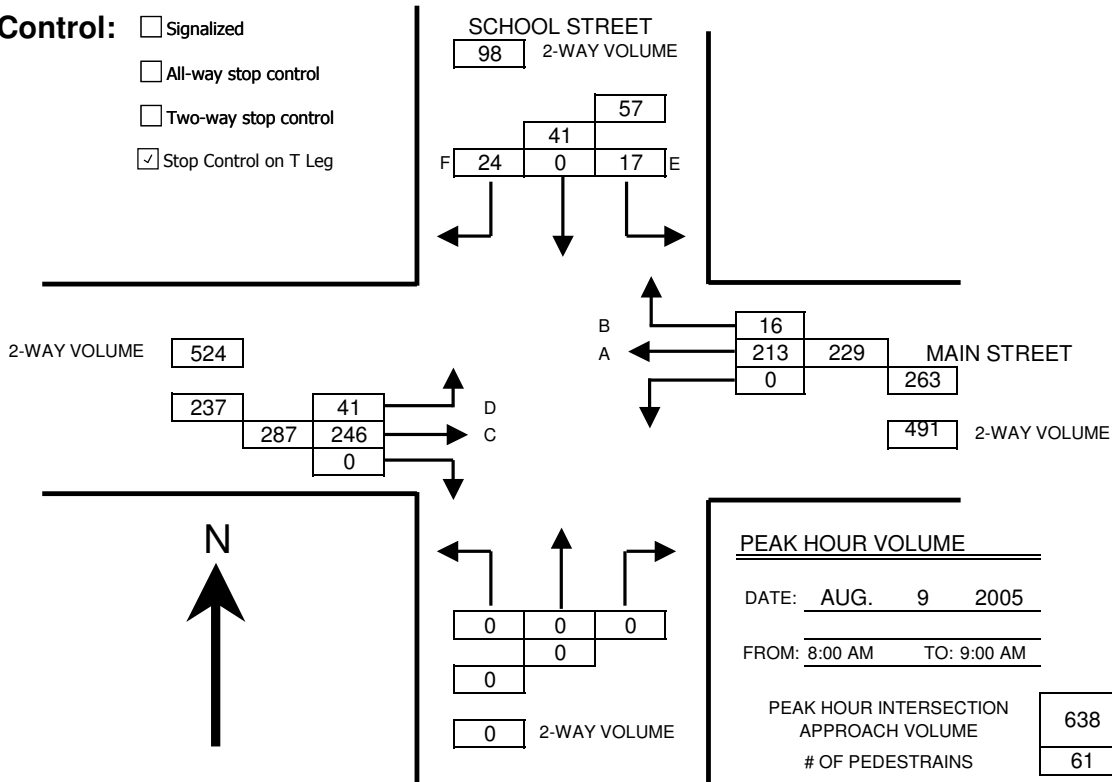
STREET:  COUNT REFERENCE 15 MIN INTERVALS		SCHOOL STREET						MAIN STREET						TOTAL
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
					E		F		A	B	D	C		
		L	S	R	L	S	R	L	S	R	L	S	R	
7:00 AM	7:15 AM	0	0	0	0	0	2	0	31	0	5	45	0	83
7:15 AM	7:30 AM	0	0	0	0	0	4	0	42	2	6	59	0	113
7:30 AM	7:45 AM	0	0	0	2	0	5	0	61	2	5	46	0	121
7:45 AM	8:00 AM	0	0	0	3	0	8	0	73	4	10	80	0	178
8:00 AM	8:15 AM	0	0	0	2	0	4	0	59	5	14	65	0	149
8:15 AM	8:30 AM	0	0	0	2	0	7	0	63	4	15	72	0	163
8:30 AM	8:45 AM	0	0	0	4	0	6	0	50	1	10	66	0	137
8:45 AM	9:00 AM	0	0	0	11	0	11	0	72	8	8	79	0	189
TOTAL		0	0	0	24	0	47	0	451	26	73	512	0	1133

PEAK HOUR TOTAL														
8:00 AM	9:00 AM	0	0	0	19	0	28	0	244	18	47	282	0	638
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		0	0	0	17	0	24	0	213	16	41	246	0	556
PEAK HOUR FACTOR		#####	#####	#####	0.43	#####	0.64	#####	0.85	0.56	0.78	0.89	#DIV/0!	
TOTAL # OF TRUCKS		0	0	0	0	0	0	0	9	0	1	19	0	
%TRUCKS		0%	0%	0%	0%	0%	0%	0%	2%	0%	1%	4%	0%	

## TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/SCHOOL STREET

Stop Control: ☐ Signalized  
☐ All-way stop control  
☐ Two-way stop control  
☒ Stop Control on T Leg



## MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/SCHOOL STREET

WEATHER: SUNNY  
RECORDER: MSM

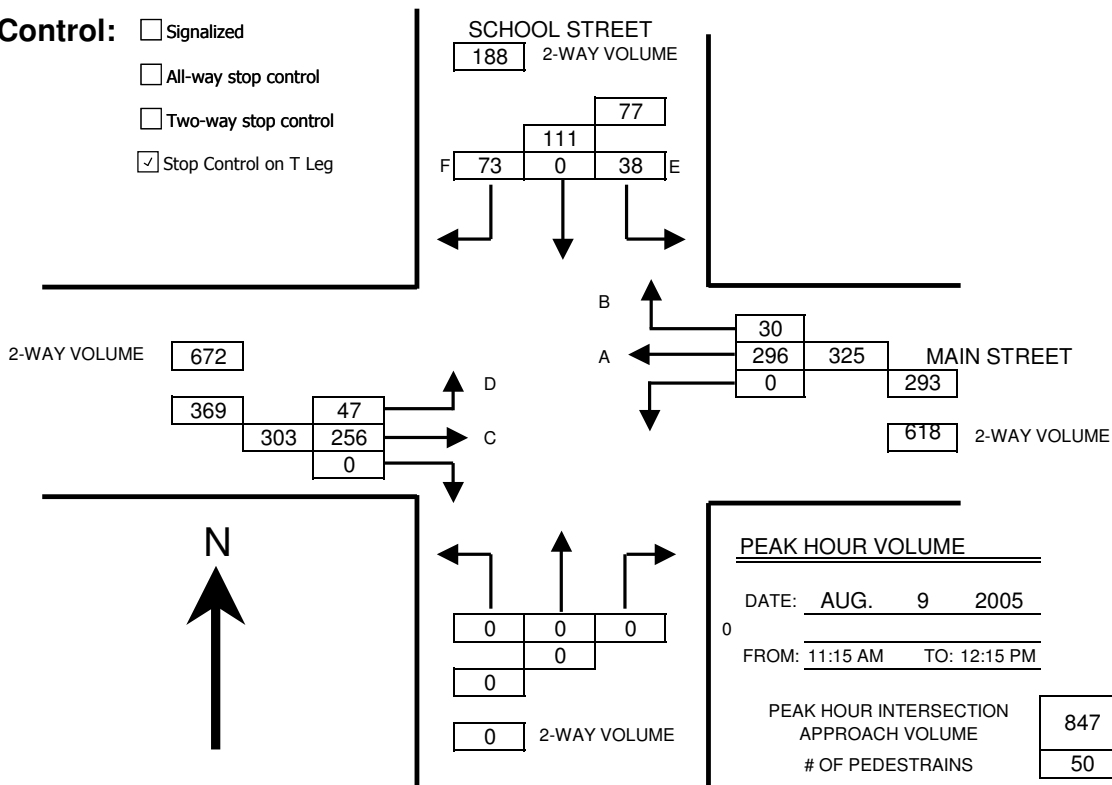
DAY	DATE	MONTH	YEAR
TUESDAY	9	AUG.	2005

COUNT REFERENCE 15 MIN INTERVALS		SCHOOL STREET						MAIN STREET						TOTAL
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
		L	S	R	L	S	R	L	S	R	L	S	R	
11:00 AM	11:15 AM	0	0	0	11	0	14	0	75	8	7	65	0	180
11:15 AM	11:30 AM	0	0	0	7	0	18	0	84	10	14	73	0	206
11:30 AM	11:45 AM	0	0	0	10	0	15	0	82	4	12	76	0	199
11:45 AM	12:00 PM	0	0	0	6	0	29	0	87	15	11	77	0	225
12:00 PM	12:15 PM	0	0	0	20	0	22	0	86	5	17	67	0	217
12:15 PM	12:30 PM	0	0	0	7	0	13	0	72	4	8	72	0	176
12:30 PM	12:45 PM	0	0	0	8	0	21	0	74	5	10	75	0	193
12:45 PM	1:00 PM	0	0	0	6	0	11	0	72	6	8	83	0	186
TOTAL		0	0	0	75	0	143	0	632	57	87	588	0	1582
PEAK HOUR TOTAL														
11:15 AM	12:15 PM	0	0	0	43	0	84	0	339	34	54	293	0	847
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		0	0	0	38	0	73	0	296	30	47	256	0	739
PEAK HOUR FACTOR		#####	#####	#####	0.54	#####	0.72	#####	0.97	0.57	0.79	0.95	#DIV/0!	
TOTAL # OF TRUCKS		0	0	0	0	0	0	0	18	0	0	10	0	
%TRUCKS		0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	2%	0%	

## TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/SCHOOL STREET

Stop Control: ☐ Signalized  
☐ All-way stop control  
☐ Two-way stop control  
☒ Stop Control on T Leg



## MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/SCHOOL STREET

WEATHER: SUNNY  
RECORDER: MSM

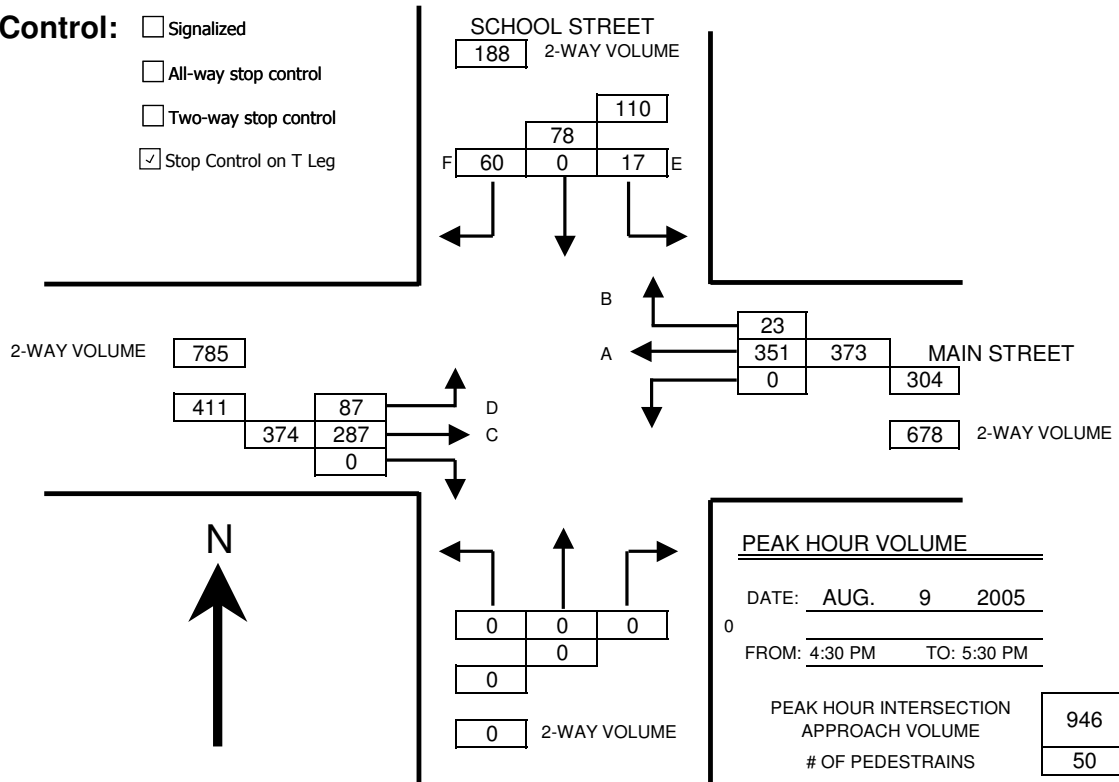
DAY	DATE	MONTH	YEAR
TUESDAY	9	AUG.	2005

COUNT REFERENCE 15 MIN INTERVALS		SCHOOL STREET						MAIN STREET						TOTAL
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
					E		F		A	B	D	C		
		L	S	R	L	S	R	L	S	R	L	S	R	
4:00 PM	4:15 PM	0	0	0	4	0	19	0	88	11	8	66	0	196
4:15 PM	4:30 PM	0	0	0	3	0	11	0	92	4	10	62	0	182
4:30 PM	4:45 PM	0	0	0	6	0	24	0	100	6	26	89	0	251
4:45 PM	5:00 PM	0	0	0	3	0	9	0	92	5	27	75	0	211
5:00 PM	5:15 PM	0	0	0	5	0	25	0	102	6	25	83	0	246
5:15 PM	5:30 PM	0	0	0	6	0	11	0	108	9	22	82	0	238
5:30 PM	5:45 PM	0	0	0	6	0	10	0	58	7	16	83	0	180
5:45 PM	6:00 PM	0	0	0	5	0	7	0	70	3	13	71	0	169
TOTAL		0	0	0	38	0	116	0	710	51	147	611	0	1673
PEAK HOUR TOTAL														
4:30 PM	5:30 PM	0	0	0	20	0	69	0	402	26	100	329	0	946
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	825
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		0	0	0	17	0	60	0	351	23	87	287	0	
PEAK HOUR FACTOR		#####	#####	#####	0.83	#####	0.69	#####	0.93	0.72	0.93	0.92	#DIV/0!	
TOTAL # OF TRUCKS		0	0	0	0	0	0	0	8	0	0	6	0	
%TRUCKS		0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	

## TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/SCHOOL STREET

Stop Control: ☐ Signalized  
☐ All-way stop control  
☐ Two-way stop control  
☒ Stop Control on T Leg



## MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/COMMERCIAL STREET

WEATHER: SUNNY  
RECORDER: MSM

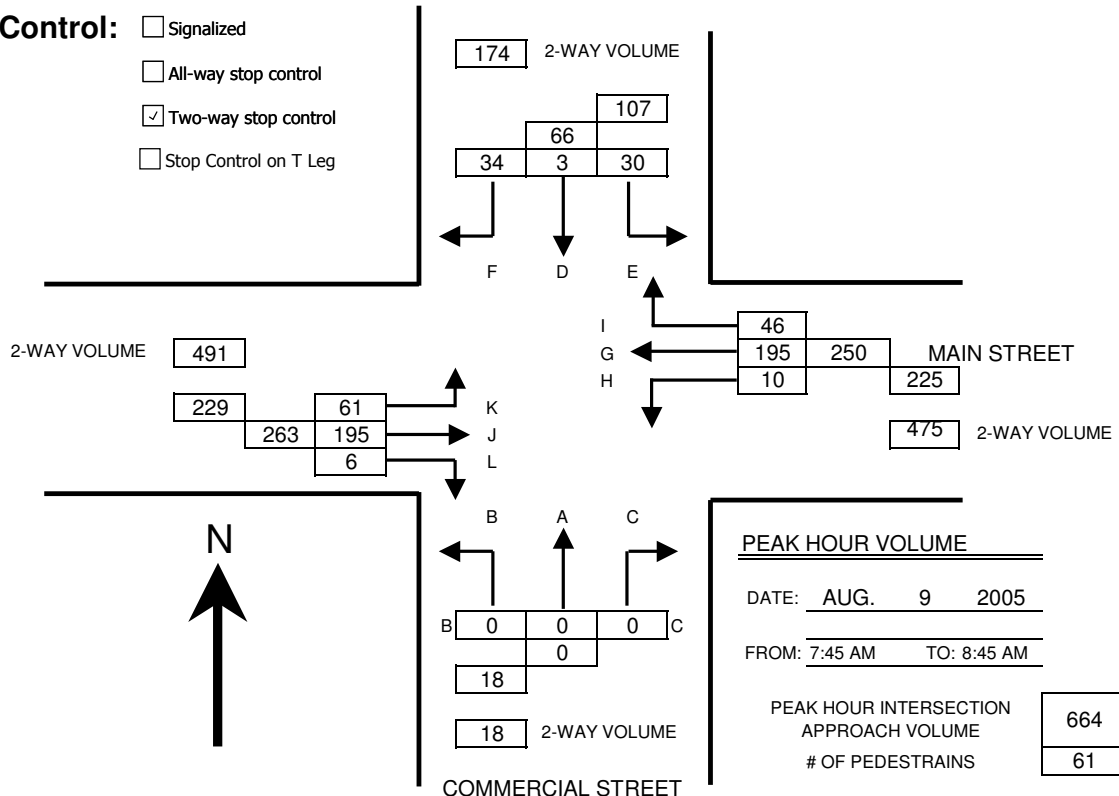
DAY	DATE	MONTH	YEAR
TUESDAY	9	AUG.	2005

COUNT REFERENCE 15 MIN INTERVALS		COMMERCIAL STREET						MAIN STREET						TOTAL
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
		B	A	C	E	D	F	H	G	I	K	J	L	
		L	S	R	L	S	R	L	S	R	L	S	R	
7:00 AM	7:15 AM	0	0	0	5	0	6	1	25	1	5	43	0	86
7:15 AM	7:30 AM	0	0	0	8	0	10	0	36	11	9	45	2	121
7:30 AM	7:45 AM	0	0	0	6	1	9	0	54	9	20	37	0	136
7:45 AM	8:00 AM	0	0	0	9	0	8	0	72	13	19	73	1	195
8:00 AM	8:15 AM	0	0	0	6	1	14	0	62	12	20	54	0	169
8:15 AM	8:30 AM	0	0	0	5	1	5	8	51	16	18	45	3	152
8:30 AM	8:45 AM	0	0	0	14	1	12	3	38	12	13	52	3	148
8:45 AM	9:00 AM	0	0	0	7	1	16	2	65	17	16	60	7	191
TOTAL		0	0	0	60	5	80	14	403	91	120	409	16	1198
PEAK HOUR TOTAL														
7:45 AM	8:45 AM	0	0	0	34	3	39	11	223	53	70	224	7	664
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	579
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		0	0	0	30	3	34	10	195	46	61	195	6	
PEAK HOUR FACTOR		#####	#####	#####	0.61	0.75	0.70	0.34	0.77	0.83	0.88	0.77	0.58	579
TOTAL # OF TRUCKS		0	0	0	3	0	0	5	13	2	3	19	0	
%TRUCKS		0%	0%	0%	5%	0%	0%	36%	3%	2%	3%	5%	0%	

### TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/COMMERCIAL STREET

Stop Control: ☐ Signalized  
☐ All-way stop control  
☒ Two-way stop control  
☐ Stop Control on T Leg



## MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/COMMERCIAL STREET

WEATHER: SUNNY  
RECORDER: MSM

DAY	DATE	MONTH	YEAR
TUESDAY	9	AUG.	2005

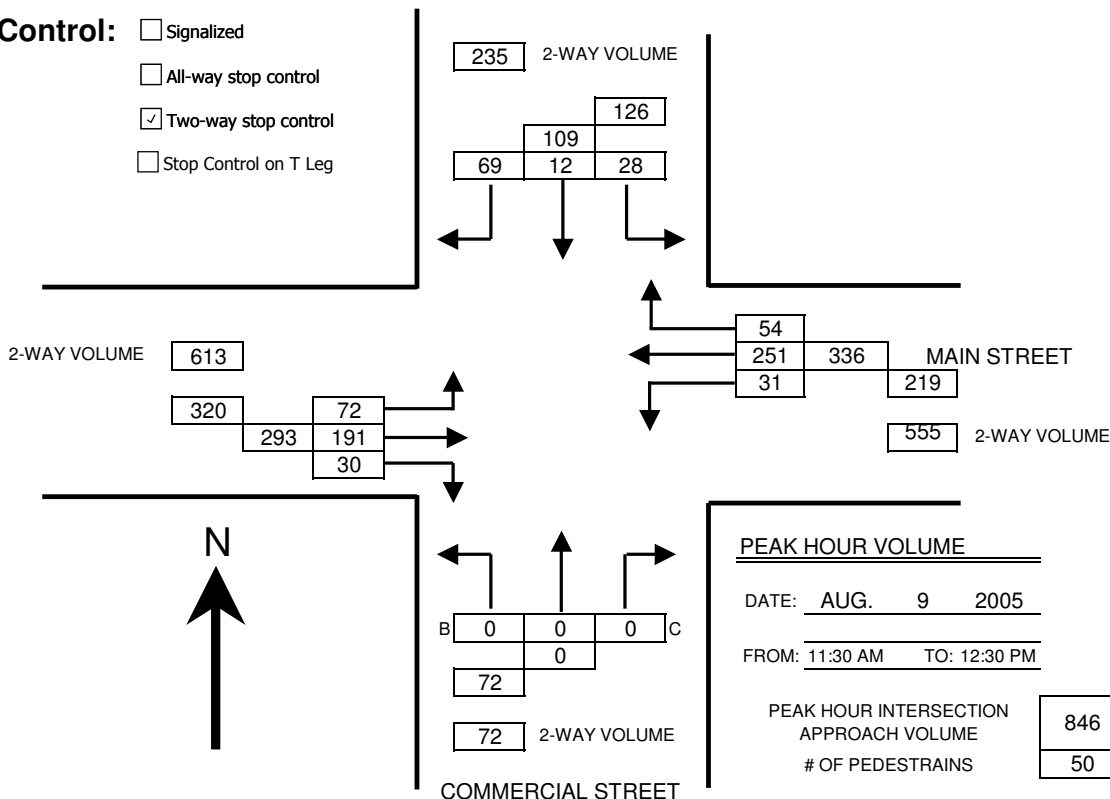
STREET:		COMMERCIAL STREET						MAIN STREET						
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
COUNT REFERENCE		B	A	C	E	D	F	H	G	I	K	J	L	
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	TOTAL
11:00 AM	11:15 AM	0	0	0	8	3	22	8	65	13	16	52	11	198
11:15 AM	11:30 AM	0	0	0	6	4	19	2	64	22	15	63	6	201
11:30 AM	11:45 AM	0	0	0	13	2	17	7	72	16	17	54	6	204
11:45 AM	12:00 PM	0	0	0	6	8	20	10	83	12	17	49	9	214
12:00 PM	12:15 PM	0	0	0	7	0	24	9	70	23	23	56	10	222
12:15 PM	12:30 PM	0	0	0	6	4	18	9	63	11	26	60	9	206
12:30 PM	12:45 PM	0	0	0	7	2	14	7	61	18	18	57	10	194
12:45 PM	1:00 PM	0	0	0	14	2	14	8	59	21	20	64	4	206
TOTAL		0	0	0	67	25	148	60	537	136	152	455	65	1645

PEAK HOUR TOTAL		11:30 AM	12:30 PM	0	0	0	32	14	79	35	288	62	83	219	34	846
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		0	0	0	28	12	69	31	251	54	72	191	30	738		
PEAK HOUR FACTOR		#####	#####	#####	0.62	0.44	0.82	0.88	0.87	0.67	0.80	0.91	0.85			
TOTAL # OF TRUCKS		0	0	0	3	2	2	1	18	1	2	15	1			
%TRUCKS		0%	0%	0%	4%	8%	1%	2%	3%	1%	1%	3%	2%			

## TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/COMMERCIAL STREET

Stop Control: ☐ Signalized  
☐ All-way stop control  
☒ Two-way stop control  
☐ Stop Control on T Leg





## MANUAL TRAFFIC COUNTS

INTERSECTION: MAIN STREET/COMMERCIAL STREET

WEATHER: SUNNY  
RECORDER: MSM

DAY	DATE	MONTH	YEAR
TUESDAY	9	AUG.	2005

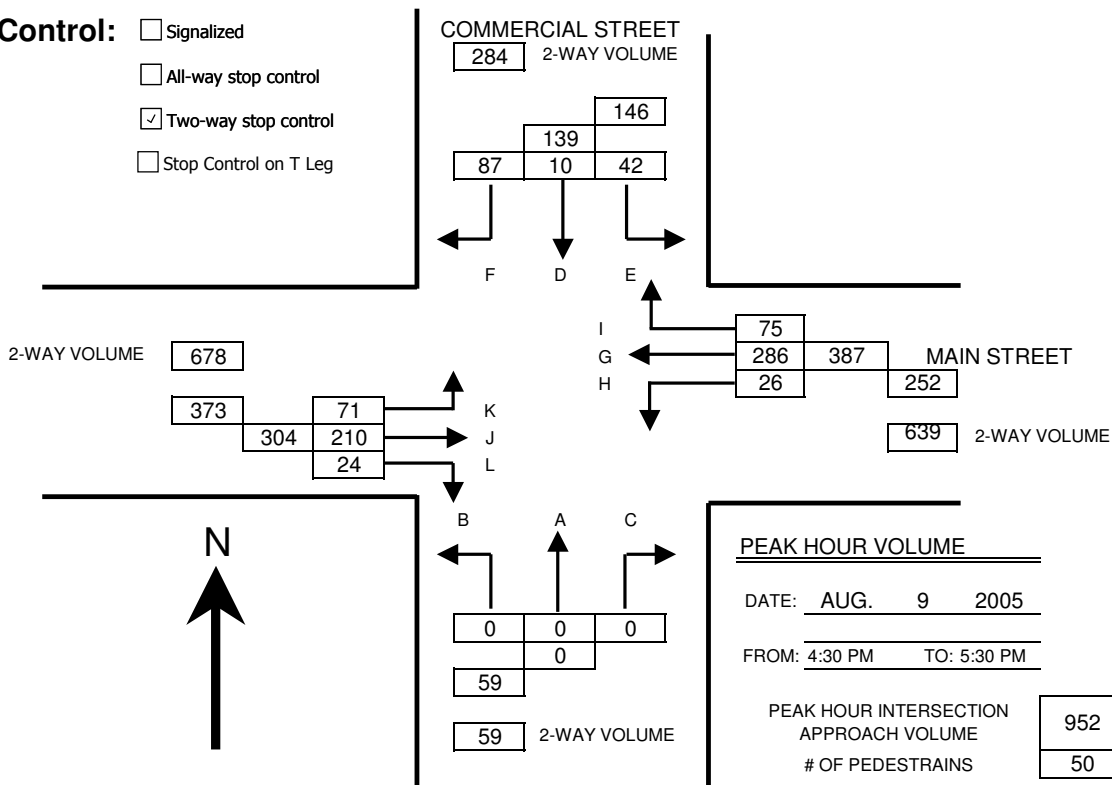
STREET:		COMMERCIAL STREET						MAIN STREET						
		NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND			
COUNT REFERENCE		B	A	C	E	D	F	H	G	I	K	J	L	
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	TOTAL
4:00 PM	4:15 PM	0	0	0	9	4	24	9	84	16	22	52	7	227
4:15 PM	4:30 PM	0	0	0	8	4	18	7	79	18	12	45	7	198
4:30 PM	4:45 PM	0	0	0	19	3	23	7	84	20	25	68	9	258
4:45 PM	5:00 PM	0	0	0	11	4	20	7	81	26	16	49	7	221
5:00 PM	5:15 PM	0	0	0	9	3	28	8	86	21	15	71	5	246
5:15 PM	5:30 PM	0	0	0	9	1	29	8	77	19	25	53	6	227
5:30 PM	5:45 PM	0	0	0	12	3	19	5	45	14	17	57	7	179
5:45 PM	6:00 PM	0	0	0	4	1	13	7	55	18	16	47	3	164
TOTAL		0	0	0	81	23	174	58	591	152	148	442	51	1720

PEAK HOUR TOTAL														
4:30 PM	5:30 PM	0	0	0	48	11	100	30	328	86	81	241	27	952
DAY FACTOR		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
TIME OF YEAR FACTOR		0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
FACTORED PEAK HOUR		0	0	0	42	10	87	26	286	75	71	210	24	830
PEAK HOUR FACTOR		#####	#####	#####	0.63	0.69	0.86	0.94	0.95	0.83	0.81	0.85	0.75	
TOTAL # OF TRUCKS		0	0	0	5	0	3	0	20	2	1	17	0	
%TRUCKS		0%	0%	0%	6%	0%	2%	0%	3%	1%	1%	4%	0%	

## TURNING MOVEMENT SUMMARY

INTERSECTION: MAIN STREET/COMMERCIAL STREET

Stop Control: ☐ Signalized  
☐ All-way stop control  
☒ Two-way stop control  
☐ Stop Control on T Leg





## Canadian Traffic Signal Warrant Analysis

### Main Street Side Street

MainStreet1Lanes (#)  
MainStreet2Lanes (#)  
MainStreet.LT.Lanes (#)  
SideStreet1Lanes (#)  
SideStreet2Lanes (#)  
MainStreetSpeedLimit (km/h)  
MainStreetTrucks/Buses (%)  
Refuge Width on Median (m)

MAIN STREET			
SCHOOL STREET			
Distance to next signal (m)	100,000		
Elementary School (y/n)	N		
Senior's Complex (y/n)	Y		
Pathway to School (y/n)	Y		
Metro Area Population (#)	2,000		
Side Street Bus Route (y/n)	N		
Side Street Trucks (%)	2.0%		
T or 1-Way Intersection (y/n)	Y		
Central Business District (y/n)	Y		

Date: February 2, 2006

City: MIDDLETON, NOVA SCOTIA

Vm = 658 (MainSt Vol Total)  
Vs = 74 (SideSt Vol Highest)  
Pc = 7 Peds Crossing Main  
K1 = 1,100 veh/veh const  
K2 = 2,000 veh/ped const  
L = 2.0 TotalMainStLanes  
F = 1.100 (PedDemoFactor)  
Vm1 = 658 (MainStVeh-Veh#)  
Cvp = 1.200 (product of Cs,Cmt,Cv,Cp)  
Ct1 = 0.667 T Int / one way Factor

Cs = 1.000 (Int SpacingFactor)  
Cmt = 1.000 (MainStTruckFactor)  
Cv = 1.000 (SpeedFactor)  
Cp = 1.200 (PopDemoFactor)  
Csb = 1.000 (SideStBusFactor)  
Cst = 1.000 (SideStTruckFactor)  
Vmx = 336 (MainStHighest)  
Vm2 = 658 (MainStVeh-Ped#)  
Cbt = 1.000 (maximum of Csb,Cst)

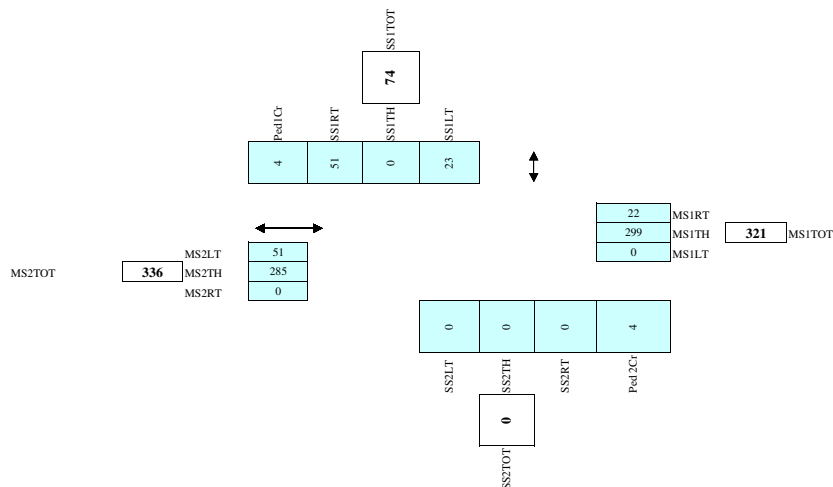
	MS1LT	MS1TH	MS1RT	MS2LT	MS2TH	MS2RT	SS1LT	SS1TH	SS1RT	SS2LT	SS2TH	SS2RT	PedC1	PedC2
7:00 - 8:00	0	207	8	26	230	0	5	0	19	0	0	0	0	0
8:00 - 9:00	0	244	18	47	282	0	19	0	28	0	0	0	4	3
11:00 - 12:00	0	328	37	44	291	0	34	0	76	0	0	0	6	5
12:00 - 13:00	0	304	20	43	297	0	41	0	67	0	0	0	4	5
16:00 - 17:00	0	372	26	71	292	0	16	0	63	0	0	0	5	6
17:00 - 18:00	0	338	25	76	319	0	22	0	53	0	0	0	3	3
Average	0	299	22	51	285	0	23	0	51	0	0	0	4	4

\*\*\* Enter the hourly turning movement counts averaged over the peak six hours of a typical week day

\*\*\* Enter the peak pedestrian volume crossing the main street averaged over the same hours

$$W = [Ct1xCbt(Vm1 \times Vs)/K1 + (F(Vm2 \times Pc)/K2)] \times Cvp$$

W = 42 35 6  
Not Warranted - Vs<75 Veh Ped



Roadway, Vehicle and Pedestrian Factors	Range			
	Min	@	Max	@
Cs = (Int SpacingFactor)	0.90	<200 m	1.10	isolated
Cmt = (MainStTruckFactor)	1.00	<5%	1.15	>20%
Cv = (SpeedFactor)	1.00	<60 km/h	1.10	>80 km/h
Cp = (PopDemoFactor)	1.00	>250,000	1.20	<10,000
Csb = (SideStBusFactor)	1.00	no	1.05	yes
Cst = (SideStTruckFactor)	1.00	<10%	1.05	>10%
F = (Ped DemoFactor)				
(max of )				
Elementary School	1.20			
Seniors Complex	1.10			
Path to School	1.10			

#### Explanation of Factors:

Cbt = 1.05 if the side street either is a bus route, or has more than 10% trucks, otherwise = 1.00.  
(it is assumed that these two factors only affect the side street vehicles trying to cross the main street, not the pedestrians)  
Ci = the product of the other 4 geographic factors  
(Cs = intersection spacing, Cmt = main street truck, Cv = Speed, Cp = Population)  
Vm1 = the main street volume - either the total of the two approaches or the highest single approach  
(if the median is >=10.0 metres) (averaged over 6 peak hours)  
Vm2 = the main street volume - either the total of the two approaches or the highest single approach  
(if the median is >=6.0 metres) (averaged over 6 peak hours)  
Vs = the highest side street approach volume (averaged over 6 peak hours)  
\*\*\* note: it has been determined that Vs must be > 75 for signals to be considered \*\*\*  
F = Pedestrian demographic factor - the maximum of the 3 individual pedestrian demographic factors  
Pc = the total pedestrian volume crossing the mainstreet  
(averaged over 6 peak hours)  
L = number of lanes that the pedestrians have to cross  
(only half the street if the median is >=5.0 metres)  
Kv = Vehicle - Vehicle denominator constant  
(Kv = 1,100 if L<=3, Kv = 1,400 if L >3)  
Kp = Vehicle - Pedestrian denominator constant  
(Kp = 2,000 if L<=3, Kp = 5,000 if L >3)



## Canadian Traffic Signal Warrant Analysis

### Main Street Side Street

MainStreet1Lanes (#)  
MainStreet2Lanes (#)  
MainStreet.LT.Lanes (#)  
SideStreet1Lanes (#)  
SideStreet2Lanes (#)  
MainStreetSpeedLimit (km/h)  
MainStreetTrucks/Buses (%)  
Refuge Width on Median (m)

(#)	1
(#)	1
(#)	0
(#)	0
(#)	2
(km/h)	50
(%)	2.0%
(m)	0.0



### MAIN STREET

### BRIDGE STREET

Distance to next signal (m)  
Elementary School (y/n)  
Senior's Complex (y/n)  
Pathway to School (y/n)  
Metro Area Population (#)  
Side Street Bus Route (y/n)  
Side Street Trucks (%)  
T or I-Way Intersection (y/n)  
Central Business District (y/n)

(m)	100,000
(y/n)	N
(y/n)	Y
(y/n)	Y
(#)	2,000
(y/n)	N
(%)	
(y/n)	Y
(y/n)	Y

Date: February 2, 2006

City: MIDDLETON, NOVA SCOTIA

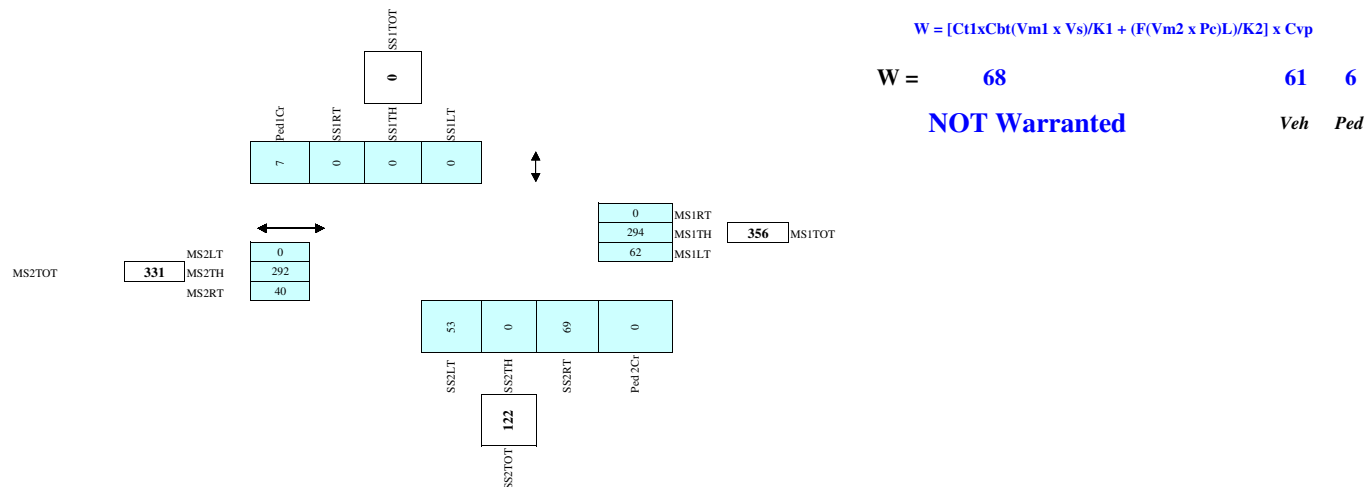
Vm = 687 (MainSt Vol Total)  
Vs = 122 (SideSt Vol Highest)  
Pc = 7 Peds Crossing Main  
K1 = 1,100 veh/veh const  
K2 = 2,000 veh/ped const  
L = 2.0 TotalMainStLanes  
F = 1.100 (PedDemoFactor)  
Vm1 = 687 (MainStVeh-Veh#)  
Cvp = 1.200 (product of Cs,Cmt,Cv,Cp)  
Ct1 = 0.667 T Int / one way Factor

Cs = 1.000 (Int SpacingFactor)  
Cmt = 1.000 (MainStTruckFactor)  
Cv = 1.000 (SpeedFactor)  
Cp = 1.200 (PopDemoFactor)  
Csb = 1.000 (SideStBusFactor)  
Cst = 1.000 (SideStTruckFactor)  
Vmx = 356 (MainStHighest)  
Vm2 = 687 (MainStVeh-Ped#)  
Cbt = 1.000 (maximum of Csb,Cst)

	MS1LT	MS1TH	MS1RT	MS2LT	MS2TH	MS2RT	SS1LT	SS1TH	SS1RT	SS2LT	SS2TH	SS2RT	PedC1	PedC2
7:00 - 8:00	39	188	0	0	195	37	0	0	0	92	0	80	2	0
8:00 - 9:00	68	217	0	0	241	51	0	0	0	62	0	89	7	0
11:00 - 12:00	141	257	0	0	191	50	0	0	0	54	0	99	14	0
12:00 - 13:00	104	283	0	0	280	59	0	0	0	76	0	133	6	0
16:00 - 17:00	7	440	0	0	430	22	0	0	0	20	0	5	8	0
17:00 - 18:00	12	378	0	0	413	19	0	0	0	15	0	8	6	0
Average	62	294	0	0	292	40	0	0	0	53	0	69	7	0

\*\*\* Enter the hourly turning movement counts averaged over the peak six hours of a typical week day

\*\*\* Enter the peak pedestrian volume crossing the main street averaged over the same hours



$$W = [Ct1xCbt(Vm1 \times Vs)/K1 + (F(Vm2 \times Pc)/L)/K2] \times Cvp$$

W = 68 61 6  
NOT Warranted Veh Ped

Roadway, Vehicle and Pedestrian Factors	Range			
	Min	@	Max	@
Cs = (Int SpacingFactor)	0.90	<200 m	1.10	isolated
Cmt = (MainStTruckFactor)	1.00	<5%	1.15	>20%
Cv = (SpeedFactor)	1.00	<60 km/h	1.10	>80 km/h
Cp = (PopDemoFactor)	1.00	>250,000	1.20	<10,000
Csb = (SideStBusFactor)	1.00	no	1.05	yes
Cst = (SideStTruckFactor)	1.00	<10%	1.05	>10%
F = (Ped DemoFactor)				
(max of )				
Elementary School	1.20			
Seniors Complex	1.10			
Path to School	1.10			

#### Explanation of Factors:

**Cbt** = 1.05 if the side street either is a bus route, or has more than 10% trucks, otherwise = 1.00.  
(it is assumed that these two factors only affect the side street vehicles trying to cross the main street, not the pedestrians)

**Ci** = the product of the other 4 geographic factors  
(Cs = intersection spacing, Cmt = main street truck, Cv = Speed, Cp = Population)

**Vm1** = the main street volume - either the total of the two approaches or the highest single approach  
(if the median is >=10.0 metres) (averaged over 6 peak hours)

**Vm2** = the main street volume - either the total of the two approaches or the highest single approach  
(if the median is >=6.0 metres) (averaged over 6 peak hours)

**Vs** = the highest side street approach volume (averaged over 6 peak hours)  
\*\*\* note: it has been determined that Vs must be > 75 for signals to be considered \*\*\*

**F** = Pedestrian demographic factor - the maximum of the 3 individual pedestrian demographic factors

**Pc** = the total pedestrian volume crossing the mainstreet  
(averaged over 6 peak hours)

**L** = number of lanes that the pedestrians have to cross  
(only half the street if the median is >=5.0 metres)

**Kv** = Vehicle - Vehicle denominator constant  
(Kv = 1,100 if L<=3, Kv = 1,400 if L >3)

**Kp** = Vehicle - Pedestrian denominator constant  
(Kp = 2,000 if L<=3, Kp = 5,000 if L >3)



## Canadian Traffic Signal Warrant Analysis

### Main Street Side Street

MainStreet1Lanes (#)  
MainStreet2Lanes (#)  
MainStreet.LT.Lanes (#)  
SideStreet1Lanes (#)  
SideStreet2Lanes (#)  
MainStreetSpeedLimit (km/h)  
MainStreetTrucks/Buses (%)  
Refuge Width on Median (m)

MAIN STREET			
COMMERCIAL STREET			
Distance to next signal (m)	100,000		
Elementary School (y/n)	N		
Senior's Complex (y/n)	Y		
Pathway to School (y/n)	Y		
Metro Area Population (#)	2,000		
Side Street Bus Route (y/n)	N		
Side Street Trucks (%)	4.0%		
T or 1-Way Intersection (y/n)	N		
Central Business District (y/n)	Y		

Date: February 2, 2006

City: MIDDLETON, NOVA SCOTIA

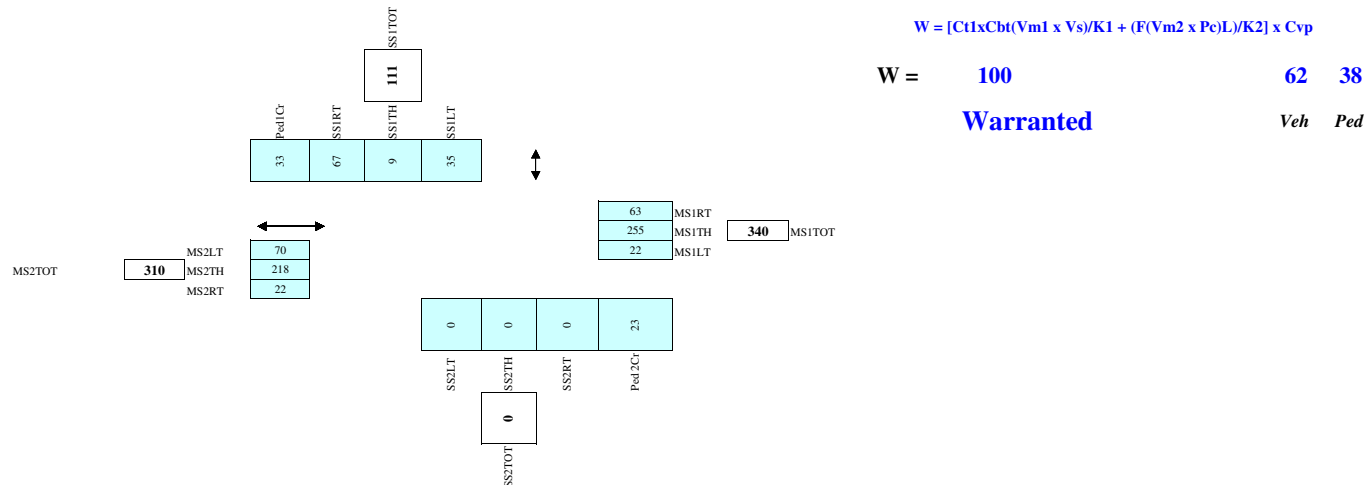
Vm = 650 (MainSt Vol Total)  
Vs = 111 (SideSt Vol Highest)  
Pc = 56 Peds Crossing Main  
K1 = 1,400 veh/veh const  
K2 = 5,000 veh/ped const  
L = 4.0 TotalMainStLanes  
F = 1.100 (PedDemoFactor)  
Vm1 = 650 (MainStVeh-Veh#)  
Cvp = 1.200 (product of Cs,Cmt,Cv,Cp)  
Ct1 = 1.000 T Int / one way Factor

Cs = 1.000 (Int SpacingFactor)  
Cmt = 1.000 (MainStTruckFactor)  
Cv = 1.000 (SpeedFactor)  
Cp = 1.200 (PopDemoFactor)  
Csb = 1.000 (SideStBusFactor)  
Cst = 1.000 (SideStTruckFactor)  
Vmx = 340 (MainStHighest)  
Vm2 = 650 (MainStVeh-Ped#)  
Cbt = 1.000 (maximum of Csb,Cst)

	MS1LT	MS1TH	MS1RT	MS2LT	MS2TH	MS2RT	SS1LT	SS1TH	SS1RT	SS2LT	SS2TH	SS2RT	PedC1	PedC2
7:00 - 8:00	1	187	34	53	198	3	28	1	33	0	0	0	5	2
8:00 - 9:00	13	216	57	67	211	13	32	4	47	0	0	0	21	11
11:00 - 12:00	27	284	63	65	218	32	33	17	78	0	0	0	33	34
12:00 - 13:00	33	253	73	87	237	33	34	8	70	0	0	0	92	41
16:00 - 17:00	30	328	80	75	214	30	47	15	85	0	0	0	29	28
17:00 - 18:00	28	263	72	73	228	21	34	8	89	0	0	0	20	20
Average	22	255	63	70	218	22	35	9	67	0	0	0	33	23

\*\*\* Enter the hourly turning movement counts averaged over the peak six hours of a typical week day

\*\*\* Enter the peak pedestrian volume crossing the main street averaged over the same hours



Roadway, Vehicle and Pedestrian Factors	Range			
	Min	@	Max	@
Cs = (Int SpacingFactor)	0.90	<200 m	1.10	isolated
Cmt = (MainStTruckFactor)	1.00	<5%	1.15	>20%
Cv = (SpeedFactor)	1.00	<60 km/h	1.10	>80 km/h
Cp = (PopDemoFactor)	1.00	>250,000	1.20	<10,000
Csb = (SideStBusFactor)	1.00	no	1.05	yes
Cst = (SideStTruckFactor)	1.00	<10%	1.05	>10%
F = (Ped DemoFactor)				
(max of )				
Elementary School	1.20			
Seniors Complex	1.10			
Path to School	1.10			

#### Explanation of Factors:

**Cbt** = 1.05 if the side street either is a bus route, or has more than 10% trucks, otherwise = 1.00.  
(it is assumed that these two factors only affect the side street vehicles trying to cross the main street, not the pedestrians)

**Ci** = the product of the other 4 geographic factors  
(Cs = intersection spacing, Cmt = main street truck, Cv = Speed, Cp = Population)

**Vm1** = the main street volume - either the total of the two approaches or the highest single approach  
(if the median is >=10.0 metres) (averaged over 6 peak hours)

**Vm2** = the main street volume - either the total of the two approaches or the highest single approach  
(if the median is >=6.0 metres) (averaged over 6 peak hours)

**Vs** = the highest side street approach volume (averaged over 6 peak hours)  
\*\*\* note: it has been determined that Vs must be > 75 for signals to be considered \*\*\*

**F** = Pedestrian demographic factor - the maximum of the 3 individual pedestrian demographic factors

**Pc** = the total pedestrian volume crossing the mainstreet  
(averaged over 6 peak hours)

**L** = number of lanes that the pedestrians have to cross  
(only half the street if the median is >=5.0 metres)

**Kv** = Vehicle - Vehicle denominator constant  
(Kv = 1,100 if L<=3, Kv = 1,400 if L >3)

**Kp** = Vehicle - Pedestrian denominator constant  
(Kp = 2,000 if L<=3, Kp = 5,000 if L >3)