


MEMORANDUM

DATE: September 13, 2022

TO: Mr. Peter Matchak, Town Planner/Director
Town of Ashland
101 Main Street
Ashland, MA 01721

FROM: Robert J. Michaud, P.E. – Managing Principal
Daniel A. Dumais, P.E. – Senior Project Manager

RE: **Proposed Multi-Use Residential Development – Response to Comments**
510 Pond Street, Ashland, Massachusetts



MDM Transportation Consultants, Inc. (MDM) has prepared the following responses to peer review comments listed under Traffic Impact Assessment (TIA) Memorandum as issued in letters from GCG Associates, Inc. dated August 16, 2022, and Ron Muller & Associates, Inc. dated August 25, 2022. To facilitate review, specific comments are paraphrased with corresponding responses.

GCG Associates, Inc. Comments

Comment GCG1: *“The report was based on August 2021 traffic volume count, during school summer break. Adjustment should be provided for the school traffic impacts during the weekday morning and evening peak hours.”*

Response: A review of area MassDOT permanent count station data indicates that August is an above average traffic month by approximately 4%. The TIA used no adjustment (reduction) for being an above average month and therefore represents conservative, above average traffic volumes. Trip generation for the proposed development represents a nominal increase of less than 1 vehicle trip per minute during the peak hours. The incremental traffic increases at the study intersections of 2% or less due to the proposed development result in inconsequential changes in intersection operations compared to No-Build conditions. MDM notes that there would be no material benefit from applying any school adjustment factors as the impact from the project between No-Build and Build conditions would remain nominal.

Comment GCG2: *“The commercial use trip generation was based on “Land Use Code (LUC) 712 – Small Office Building” use. Any uses by right in the Highway Commercial (CH) zoning district is permitted for the commercial portion (6,800 sf.) of this development. Hence, the actual commercial uses of this site may affect the total trip generation.”*

Response: The assumption of 6,800 sf of small office space based on a discussion with the Applicant regarding the targeted and viable commercial space for this project given its location within the first floor of a multi-family housing development in a suburban environment. That said, other by-right uses with the Highway Commercial (CH) zoning district include retail space and bank, medical office, and convenience store. A restaurant without drive through is allowed by special permit and limited industrial uses are permitted. While the end user has not been identified the type of uses will be low traffic generators with uses that may include ancillary neighborhood type uses such as a realtor’s office, small professional office, hairdresser, personal fitness trainer, specialty retail, artist space, shared/co-workspace. For reference purposes trip generation for the weekday morning and weekday evening peak hours for several potential ITE land use categories are summarized in the **Attachments** without reduction for internal trip capture. As shown, the most conservative use would be general retail uses during the peak hours. As such a sensitivity analysis for the was prepared for the study intersections with calculation sheets and trip tracing included in the **Attachments** and results summarized below in **Table R1** and **Table R2**.

**TABLE R1
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY MORNING PEAK HOUR**

Intersection	Approach	2028 No-Build			2028 Build TIA w/ all Office			2028 Build Sensitivity w/ all Retail		
		v/c ¹	Delay ²	LOS ³	v/c	Delay	LOS	v/c	Delay	LOS
Pond Street at Eliot Street	Eastbound	0.42	20	C	0.45	23	C	0.45	23	C
	Westbound	0.63	42	D	0.62	42	D	0.62	42	D
	Northbound	0.63	29	C	0.64	29	C	0.64	29	C
	<u>Southbound</u>	<u>0.58</u>	<u>23</u>	<u>C</u>	<u>0.59</u>	<u>23</u>	<u>C</u>	<u>0.59</u>	<u>23</u>	<u>C</u>
	OVERALL	0.63	26	C	0.64	27	C	0.64	27	C
Pond Street at Spyglass Hill Drive/ Shaw’s Plaza Driveway	Eastbound	0.06	6	A	0.07	6	A	0.06	6	A
	Westbound	0.13	7	A	0.14	7	A	0.14	7	A
	Northbound	0.45	9	A	0.48	10	A	0.48	10	A
	Southbound	0.33	7	A	0.35	7	A	0.34	7	A
Pond Street at Secondary Driveway	EB Exit	n/a	n/a	n/a	0.07	16	C	0.08	15	C
	Northbound	n/a	n/a	n/a	0.00	<5	A	0.00	<5	A
	Southbound	n/a	n/a	n/a	0.00	<5	A	0.00	<5	A
Pond Street at Converse Way	EB Exit	0.00	15	B	0.03	15	B	0.04	14	B
	Northbound	0.00	<5	A	0.00	<5	A	0.01	<5	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A

¹ Volume-to-capacity ratio

² Average control delay per vehicle (in seconds)

³ Level of service

⁴ n/a = not applicable

**TABLE R2
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY EVENING PEAK HOUR**

Intersection	Approach	2028 No-Build			2028 Build TIA w/ all Office			2028 Build Sensitivity w/ all Retail		
		v/c ¹	Delay ²	LOS ³	v/c	Delay	LOS	v/c	Delay	LOS
Pond Street at Eliot Street	Eastbound	0.86	40	D	0.88	41	D	0.88	42	D
	Westbound	0.82	50	D	0.82	50	D	0.83	50	D
	Northbound	0.63	29	C	0.64	30	C	0.65	30	C
	Southbound	<u>0.50</u>	<u>27</u>	<u>C</u>	<u>0.81</u>	<u>28</u>	<u>C</u>	<u>0.82</u>	<u>28</u>	<u>C</u>
	OVERALL	0.86	34	C	0.88	35	D	0.88	35	D
Pond Street at Spyglass Hill Drive/ Shaw's Plaza Driveway	Eastbound	0.25	9	A	0.26	10	A	0.26	10	A
	Westbound	0.15	8	A	0.15	8	A	0.15	8	A
	Northbound	0.60	12	B	0.63	13	B	0.63	13	B
	Southbound	0.65	13	B	0.68	14	B	0.69	15	B
Pond Street at Secondary Driveway	EB Exit	n/a	n/a	n/a	0.11	25	D	0.16	25	D
	Northbound	n/a	n/a	n/a	0.00	<5	A	0.01	<5	A
	Southbound	n/a	n/a	n/a	0.00	<5	A	0.00	<5	A
Pond Street at Converse Way	EB Exit	0.02	20	C	0.06	20	C	0.10	18	C
	Northbound	0.00	<5	A	0.00	<5	A	0.02	<5	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A

¹ Volume-to-capacity ratio

² Average control delay per vehicle (in seconds)

³ Level of service

⁴ n/a = not applicable

As summarized in **Table R1** and **Table R2**, incremental traffic increases at the study intersections due to the proposed development under the most conservative commercial scenario (6,800 sf of general retail) generally result in inconsequential changes in intersection operations compared to No-Build conditions and the 2028 Build conditions shown in the TIA. Therefore, no additional roadway improvements are warranted to accommodate the project and the results and conclusions of the May 5, 2022, TIA remain valid.

Comment GCG3: "The 'MEMO: Demographics report form Ashland Woods – requested by members of public at 4/28/22 Planning Board hearing' in file, estimated 0.167 school aged children per unit based on the Ashland Woods October 2021 leasing report which translates to 20.04 school aged children from the proposed 120 dwelling units."

Response: No further response necessary.

Comment GCG4: "Currently the Town of Ashland schools does not have any buses route through this part of Pond Street. New routes will be required to serve this development."

Response: No further response necessary.

Comment GCG5: *“The proposed two curb openings access would be subject to MassDOT State Highway Access Permit approval.”*

Response: MDM concurs, no further response necessary.

Comment GCG6: *“The latest MDM Memorandum dated August 3, 2022, only responded to the loading area comment and the standard spaces stall dimensions. GCG concurs that the commercial space may not require a dedicated loading area. GCG does not recommending the proposed 9’ x 18’ parking stall dimensions. Zoning By-Law’s definition of parking space is 9’ x 20’. The Board had recently enforced the David Mindess Elementary School in 2021 (a Town of Ashland public school project) to comply with the parking stall requirements.”*

Response: MDM concurs that a dedicated loading area is not required. The Town of Ashland Planning Board has officially agreed to allow 9’ x 18’ parking stalls with 24 foot aisles within the Site. MDM concurs with the board’s decision, no further response necessary.

Ron Muller & Associates, Inc. Comments

Comment RM1: *“Based on this information, it is recommended Table 3 be updated to include the most recent five-year period of completed data which would be 2015-2019.”*

Response: Review of MassDOT crash data indicates that nine (9) crashes were reported at the Pond Street at Eliot Street signalized intersection in 2015 resulting in a crash rate from 2015-2019 of 0.89 which is at the MassDOT district average of 0.89. There were no crashes reported at the Pond Street intersections with Spyglass Hill Drive/Shaw’s Plaza or Converse Way in 2015. The resulting crash rate from 2015-2019 for Pond Street at Spyglass Hill Drive/Shaw’s Plaza remains at 0.31 which is well below the MassDOT District average of 0.61. The supplemental 2015 crash data is included in the **Attachments**. The results and conclusions of the crash analysis provide in the traffic impact assessment (TIA) remain valid.

In summary, the study intersections between 2015 and 2019 experienced crash rates below the District 3 averages and no immediate safety countermeasures are warranted based on the crash history at the study intersections. None of the intersections are identified as a high crash location and are thus not eligible for HSIP funding. Crash records are provided in the **Attachments**. MDM notes that MassDOT project 604123 is currently being installed along the Pond Street (Route 126) corridor within Ashland between the Holliston Town Line and the Framingham City Line. These improvements include a complete streets roadway improvements project to provide roadway infrastructure, bicycle lanes, continuous sidewalks and enhanced pavement markings. MassDOT expects the project to be complete by April 2024.

Comment RM2: *“It is recommended that a collision diagram be developed to determine if any crash patterns exist and if modifications to the intersection might reduce the number of crashes.”*

Response: Intersection improvements are currently being implemented at the signalized Elliot Street at Pond Street intersection as part of the Pond Street Corridor improvements. MassDOT expects the project to be complete by April 2024. A collision diagram would not accurately reflect the implementation of safety improvements at the intersection are not warranted based on crash history and would not provide any meaningful benefit given the safety improvements underway by MassDOT. No further review or mitigation is warranted at this time at the study locations.

Comment RM3: *“Given the proximity of the site to Holliston, it is recommended that the applicant also contact the Town of Holliston to see if any developments there would have an impact on traffic volumes within the study area.”*

Response: As part of the project MEPA and Town records were reviewed and no potentially impactful background projects were identified for the study area. Holliston Planning Staff indicated that there is a four-lot subdivision and a ground mounted solar project that may have limited impact the study area but would not result in a substantial increase in traffic within the study area beyond the conservative 1% per year growth rate used over 7 years. The results and conclusions of the May 5, 2022, TIA remain valid.

Comment RM4: *“The applicant should update the capacity analysis tables to show results for all turning movements.”*

Response: The traffic report Appendices include detailed capacity analysis with result by lane group. For reference purposes, the capacity analysis tables have been updated for the No-Build and Build conditions to include the v/c ratio, delay, LOS designation, and 95th percentile queue length by lane group as shown in **Table R3** and **Table R4**.

**TABLE R3
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY MORNING PEAK HOUR**

Intersection	Approach	2028 No-Build				2028 Build TIA			
		v/c ¹	Delay ²	LOS ³	95 th Q ⁴	v/c	Delay	LOS	95 th Q
Pond Street at Eliot Street	Eastbound L	0.42	22	C	141	0.45	23	C	146
	Eastbound T	0.39	26	C	219	0.44	30	C	225
	Eastbound R	0.10	<5	A	<25	0.11	<5	A	27
	Westbound L	0.10	20	C	30	0.11	21	C	33
	Westbound T/R	0.63	46	D	170	0.62	46	D	172
	Northbound L	0.28	19	B	74	0.30	19	B	81
	Northbound T/R	0.63	32	C	299	0.64	32	C	318
	Southbound L	0.13	18	B	33	0.13	18	B	32
	Southbound T	0.58	38	D	187	0.59	34	D	195
	Southbound R	<u>0.19</u>	<u><5</u>	<u>A</u>	30	<u>0.19</u>	<u><5</u>	<u>A</u>	30
	OVERALL	0.63	26	C		0.64	27	C	
Pond Street at Spyglass Hill Drive/ Shaw's Plaza Driveway	Eastbound	0.06	6	A	<25	0.07	6	A	<25
	Westbound	0.13	7	A	<25	0.14	7	A	<25
	Northbound	0.45	9	A	60	0.48	10	A	68
	Southbound	0.33	7	A	39	0.35	7	A	42
Pond Street at Secondary Driveway	Eastbound L/R	n/a	n/a	n/a	n/a	0.07	16	C	<25
	Northbound L	n/a	n/a	n/a	n/a	0.00	8	A	<25
	Northbound T	n/a	n/a	n/a	n/a	0.00	<5	A	<25
	Southbound T	n/a	n/a	n/a	n/a	0.00	<5	A	<25
	Southbound R	n/a	n/a	n/a	n/a	0.00	<5	A	<25
Pond Street at Converse Way	Eastbound L/R	0.00	15	C	<25	0.03	15	B	<25
	Northbound L	0.00	<5	A	<25	0.00	8	A	<25
	Northbound T	0.00	<5	A	<25	0.00	<5	A	<25
	Southbound T	0.00	<5	A	<25	0.00	<5	A	<25
	Southbound R	0.00	<5	A	<25	0.00	<5	A	<25

¹ Volume-to-capacity ratio

² Average control delay per vehicle (in seconds)

³ Level of service

⁴ 95th Percentile Queue Length (in feet)

**TABLE R4
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY EVENING PEAK HOUR**

Intersection	Approach	2028 No-Build				2028 Build TIA			
		v/c ¹	Delay ²	LOS ³	95 th Q ⁴	v/c	Delay	LOS	95 th Q
Pond Street at Eliot Street	Eastbound L	0.86	54	D	301	0.88	57	E	301
	Eastbound T	0.36	39	D	170	0.37	40	D	170
	Eastbound R	0.13	<5	A	30	0.14	<5	A	37
	Westbound L	0.28	25	C	100	0.29	26	C	106
	Westbound T/R	0.82	59	E	348	0.82	60	E	184
	Northbound L	0.44	22	C	93	0.47	22	C	59
	Northbound T/R	0.63	32	C	391	0.64	32	C	287
	Southbound L	0.15	18	B	37	0.16	18	B	<25
	Southbound T	0.80	47	D	390	0.81	48	D	277
	Southbound R	<u>0.42</u>	<u>6</u>	<u>A</u>	90	<u>0.42</u>	<u>6</u>	<u>A</u>	32
	OVERALL	0.86	34	C		0.88	35	D	
Pond Street at Spyglass Hill Drive/ Shaw's Plaza Driveway	Eastbound	0.25	9	A	<25	0.26	10	A	<25
	Westbound	0.15	8	A	<25	0.15	8	A	<25
	Northbound	0.60	12	B	100	0.63	13	B	111
	Southbound	0.65	13	B	124	0.68	14	B	142
Pond Street at Secondary Driveway	Eastbound L/R	n/a	n/a	n/a	n/a	0.07	16	B	<25
	Northbound L	n/a	n/a	n/a	n/a	0.00	8	A	<25
	Northbound T	n/a	n/a	n/a	n/a	0.00	<5	A	<25
	Southbound T	n/a	n/a	n/a	n/a	0.00	<5	A	<25
	Southbound R	n/a	n/a	n/a	n/a	0.00	<5	A	<25
Pond Street at Converse Way	Eastbound L/R	0.02	20	C	<25	0.03	15	B	<25
	Northbound L	0.00	9	A	<25	0.00	8	A	<25
	Northbound T	0.00	<5	A	<25	0.00	<5	A	<25
	Southbound T	0.00	<5	A	<25	0.00	<5	A	<25
	Southbound R	0.00	<5	A	<25	0.00	<5	A	<25

¹ Volume-to-capacity ratio

² Average control delay per vehicle (in seconds)

³ Level of service

⁴ 95th Percentile Queue Length (in feet)

As shown in **Table R3** and **Table R4**, the results and conclusions of the traffic report remain valid and no off-site roadway improvements are warranted to accommodate the project.

Comment RM5: *"It is recommended that the applicant include a table to show the queue length results by movement at all intersections."*

Response: The capacity analysis Tables have been updated to reflect the 95th percentile queue lengths in feet by lane group (see **Response R4**).

Comment RM6: *"The applicant should confirm this with the Ashland Fire Department."*

Response: The Site Plan has been provided to the Ashland Fire Department for review. The proponent will continue to work with the Ashland Fire Department to ensure larger emergency vehicles can circulate the Site safely.

Comment RM7: *“It is recommended that ADA compliant wheelchair ramps be constructed across the site driveways.”*

Response: ADA compliant ramps will be included on the final site plan set by Bruce Saluk and Associates, Inc.

Comment RM8: *“The site driveway intersections with Pond Street should operate under STOP control with STOP signs (R1-1) and stop lines.”*

Response: A MUTCD compliant “STOP” sign (R1-1) and STOP line pavement markings on the proposed driveway approaches to Pond Street will be included on the final site plan set by Bruce Saluk and Associates, Inc.

Comment RM9: *“The site plan should show interior signage or striping. It is recommended that the drive aisle with parallel parking along the front of the building operate under STOP control at its intersections with the main drive aisles. Furthermore, the minigolf driveway should operate under STOP control at its intersection with the main drive aisle.”*

Response: Interior signage and striping as noted above will be included on the final site plan set by Bruce Saluk and Associates, Inc.

ATTACHMENTS

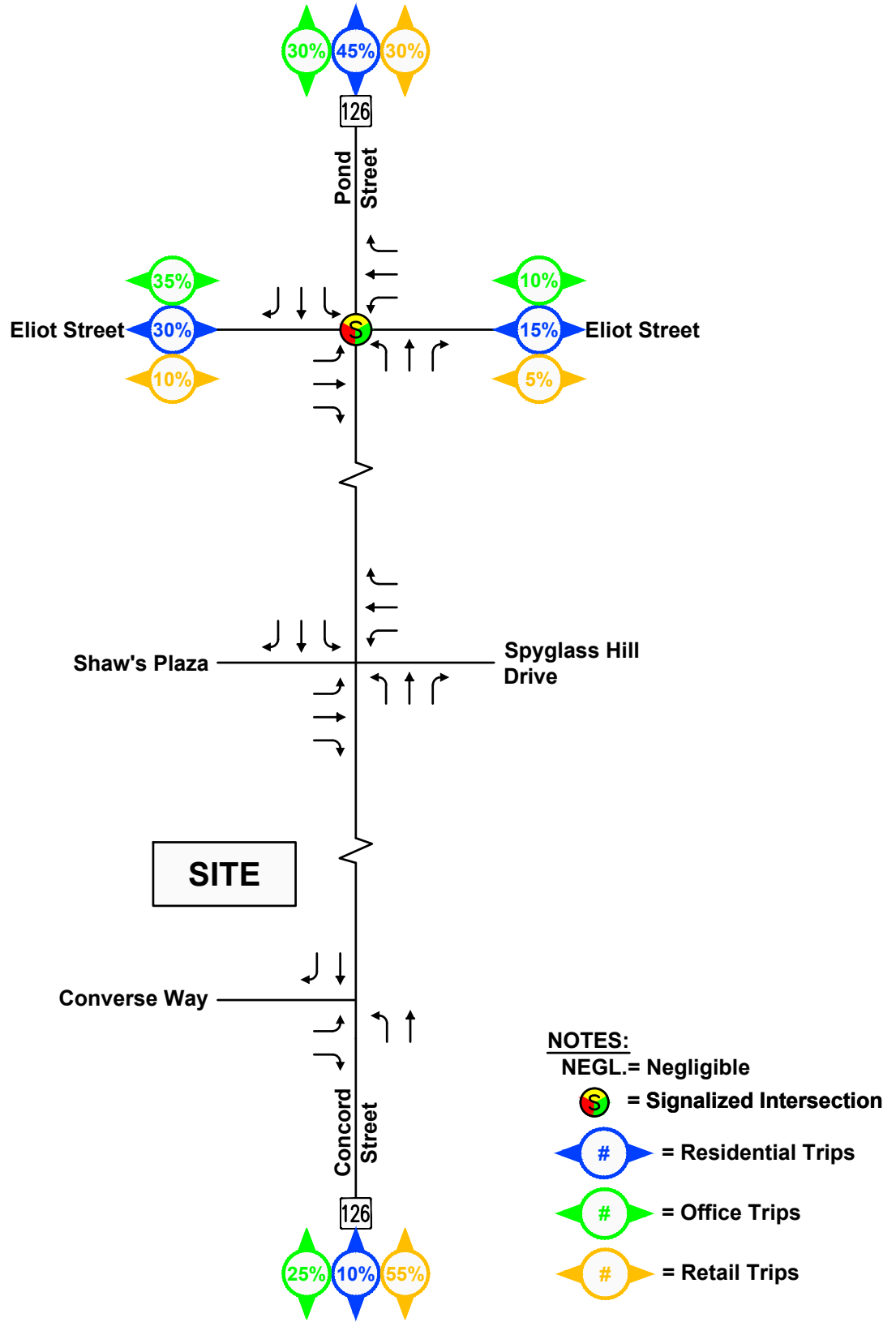
- Trip Generation
- Capacity Analysis
- Crash Data

□ Trip Generation

1163 - Trip Generation Comparison

		Potentienal Uses - New Trips						
		Hair Salon	Small Office	Health/Fitness	Retail	Apparel Store	Variety Store	Medical/Dental
		918	712	492	821	876	814	720
Size:		6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf
AM								
Entering	4	9	5	10	4	7	13	
Exiting	<u>4</u>	<u>2</u>	<u>4</u>	<u>4</u>	<u>1</u>	<u>6</u>	<u>0</u>	
Total	8	11	9	14	5	13	13	
PM								
Entering	2	5	13	17	9	14	3	
Exiting	<u>8</u>	<u>10</u>	<u>10</u>	<u>20</u>	<u>9</u>	<u>14</u>	<u>14</u>	
Total	10	15	23	37	18	28	17	

		Pass-By						
		Hair Salon	Small Office	Health/Fitness	Retail	Apparel Store	Variety Store	Medical/Dental
		918	712	492	821	876	814	720
Size:		6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf	6.8 ksf
AM								
Entering	0	0	0	5	1	4	4	
Exiting	<u>0</u>	<u>0</u>	<u>0</u>	<u>5</u>	<u>1</u>	<u>4</u>	<u>4</u>	
Total	0	0	0	10	2	8	8	
PM								
Entering	0	0	0	12	5	9	5	
Exiting	<u>0</u>	<u>0</u>	<u>0</u>	<u>12</u>	<u>5</u>	<u>9</u>	<u>5</u>	
Total	0	0	0	24	10	18	10	

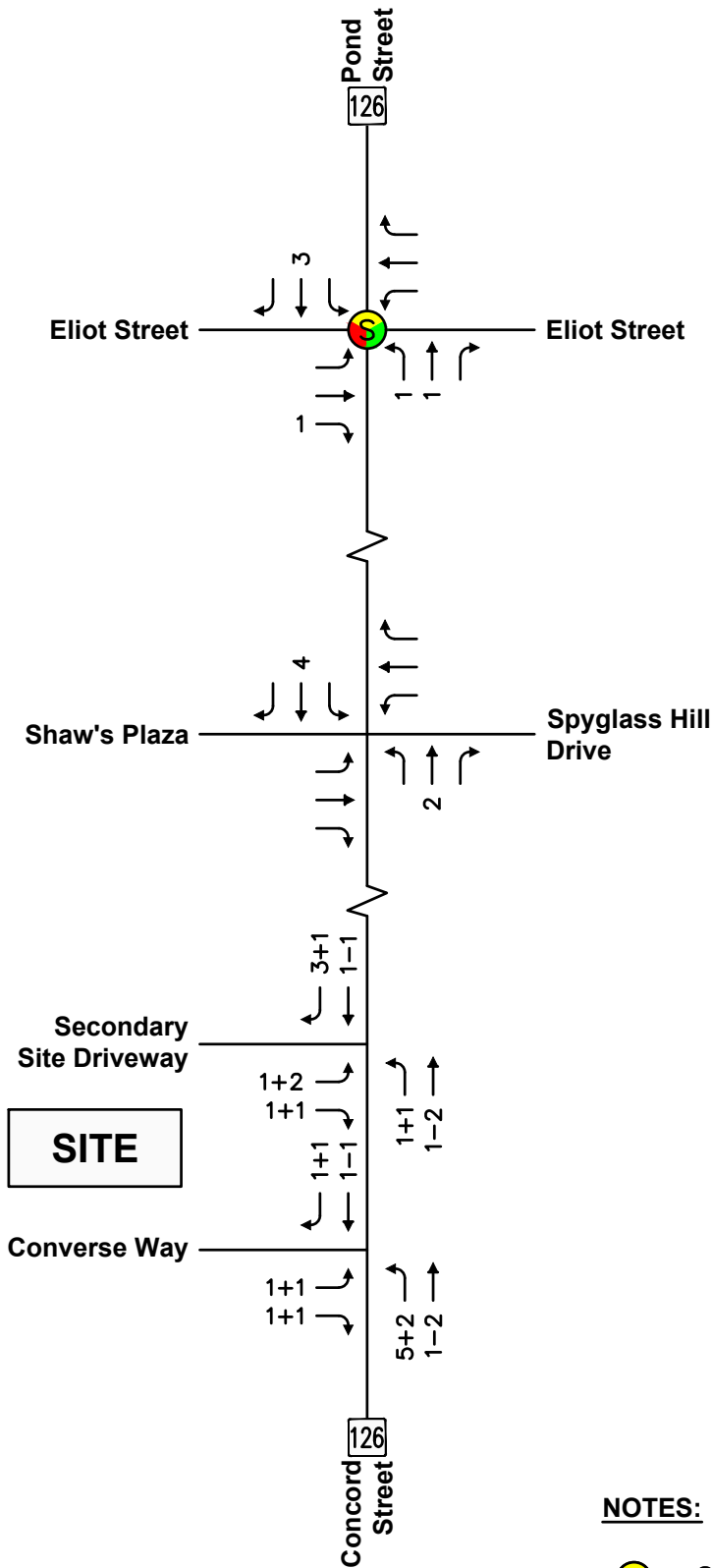


North
 Scale: Not to Scale

Figure 7R

Trip Distribution

SITE TRIPS		
	Net New	Pass-By
Enter	10	5
Exit	4	5
Total	14	10



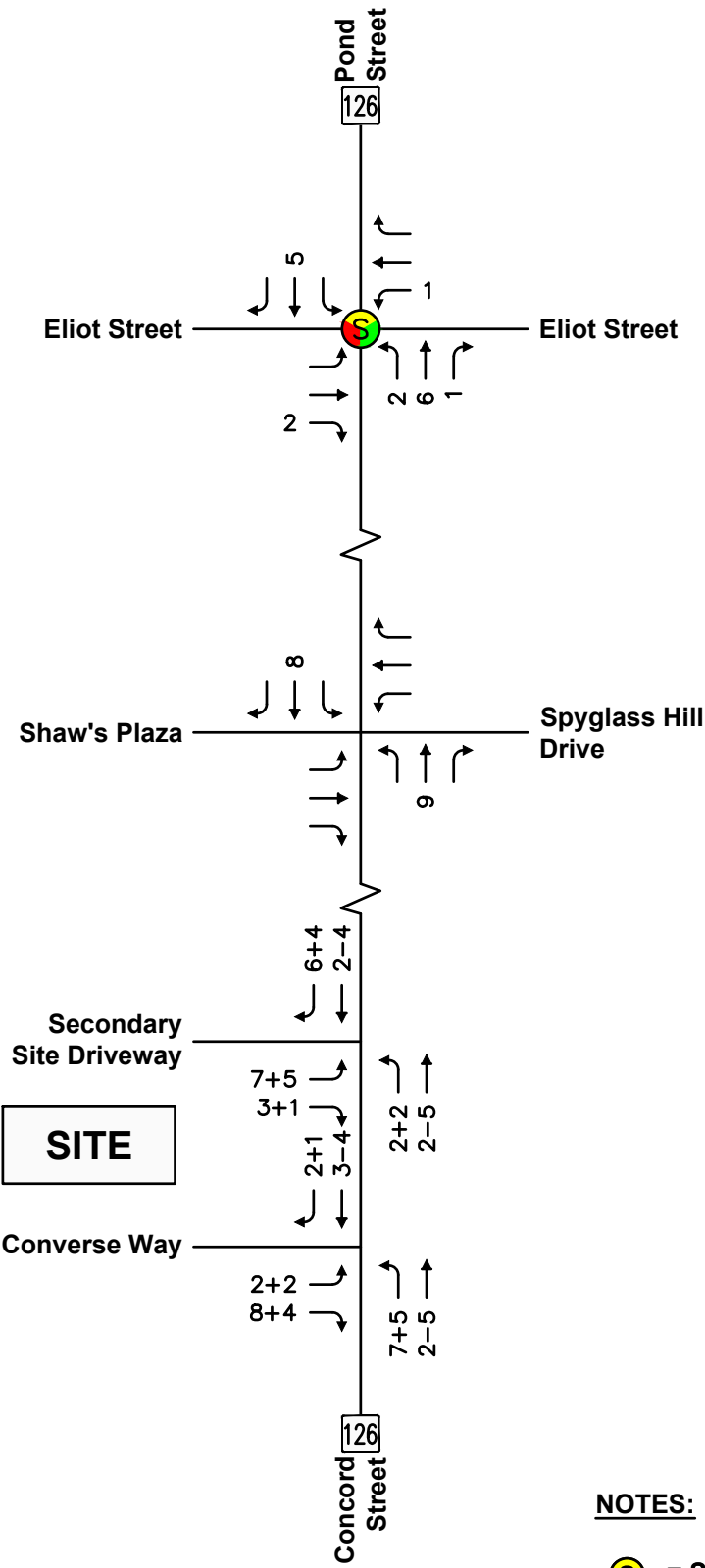
North

Scale: Not to Scale

NOTES:

 = Signalized Intersection

SITE TRIPS		
	Net New	Pass-By
Enter	17	12
Exit	20	12
Total	37	24

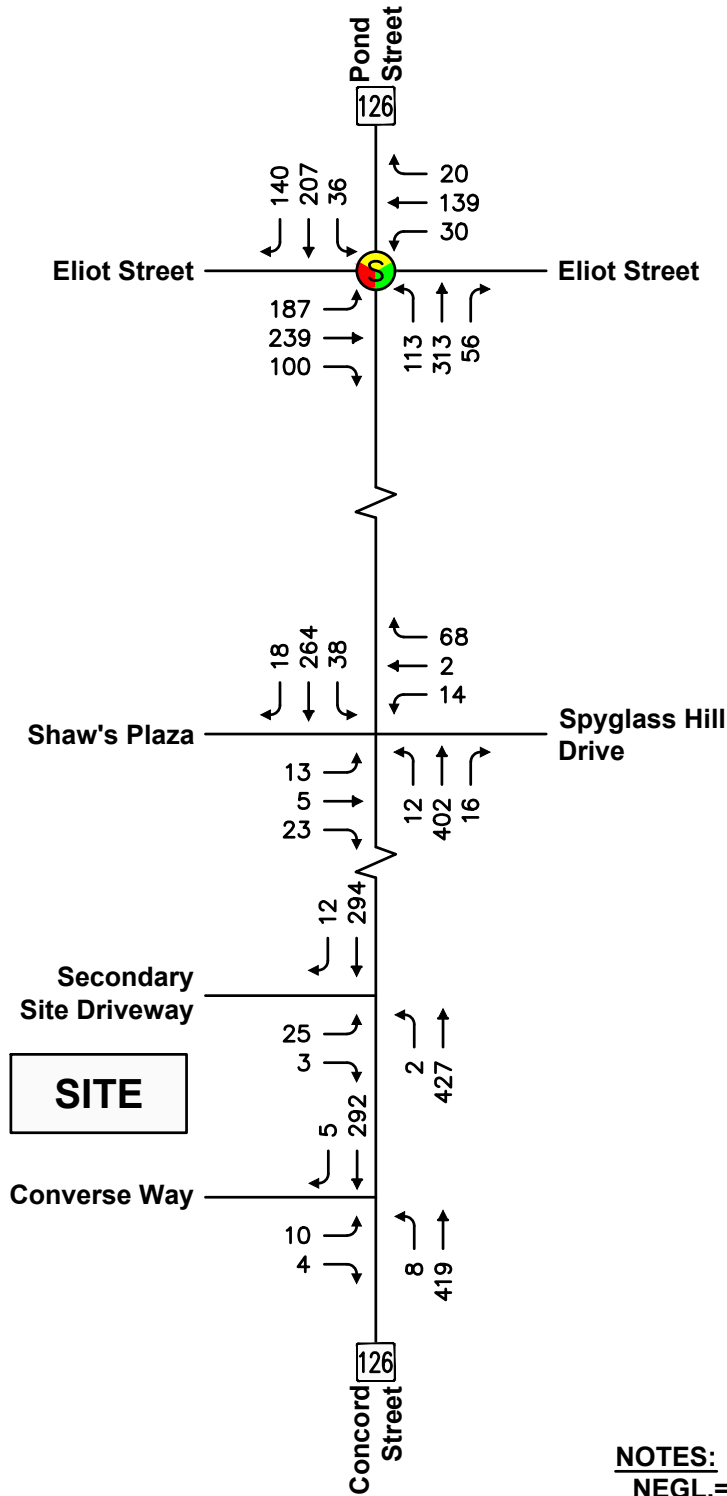


North

Scale: Not to Scale

NOTES:

 = Signalized Intersection



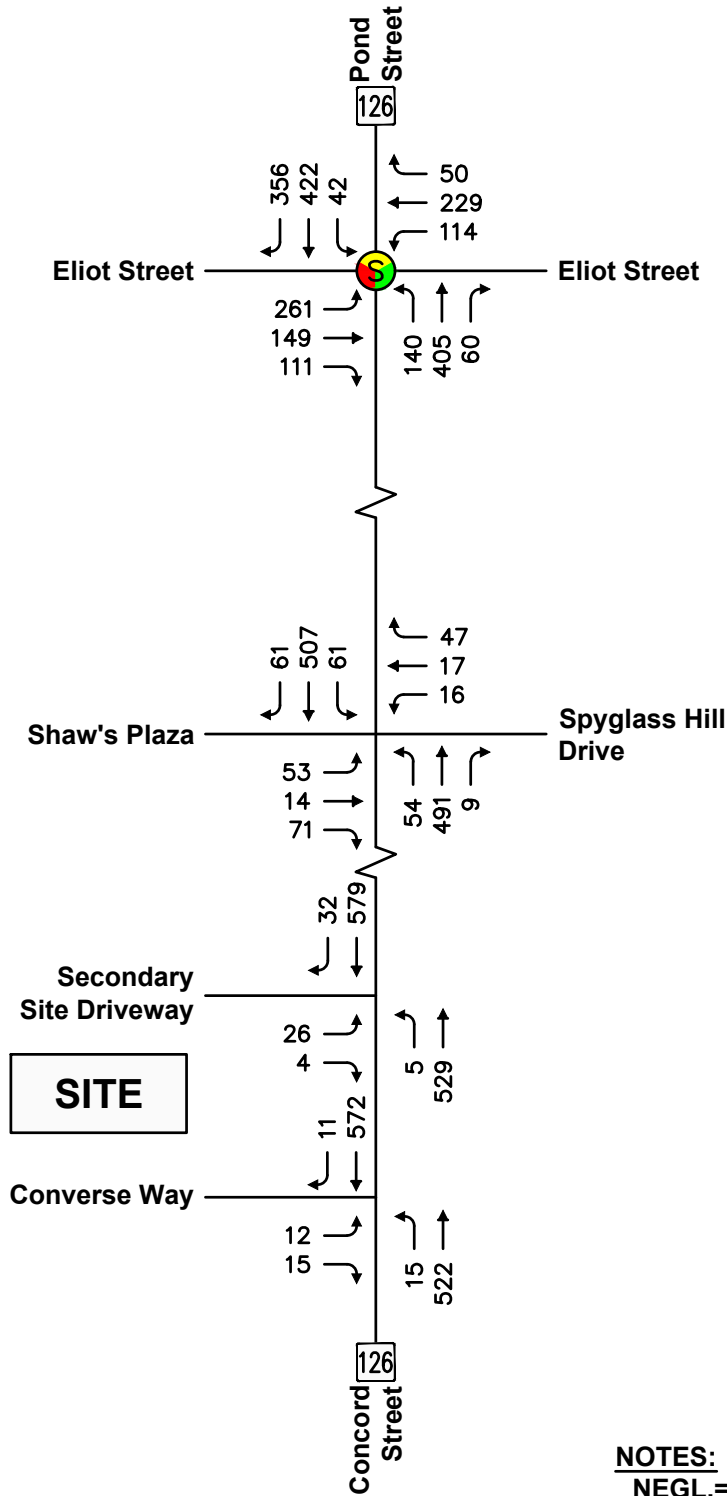
North

Scale: Not to Scale

NOTES:

NEGL.= Negligible

= Signalized Intersection



North

Scale: Not to Scale

NOTES:

NEGL.= Negligible























= Signalized Intersection

Attachment

□ Capacity Analysis













Lanes, Volumes, Timings
1: Pond Street & Eliot Street

2028 Build Condition w/ Retail
Weekday Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	187	239	100	30	139	20	113	313	56	36	207	140
Future Volume (vph)	187	239	100	30	139	20	113	313	56	36	207	140
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	16	12	12	10	11	13	13	12	12	11
Storage Length (ft)	150		60	100		0	200		0	150		200
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.981			0.977				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1783	1664	1805	1788	0	1601	1756	0	1687	1712	1459
Flt Permitted	0.416			0.605			0.423			0.450		
Satd. Flow (perm)	746	1783	1664	1150	1788	0	713	1756	0	799	1712	1459
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			113		5			9				146
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		250			250			600			250	
Travel Time (s)		6.8			6.8			9.1			3.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	6%	3%	10%	0%	4%	6%	9%	10%	5%	7%	11%	7%
Adj. Flow (vph)	195	249	104	31	145	21	118	326	58	38	216	146
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	249	104	31	166	0	118	384	0	38	216	146
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	0.85	1.00	1.00	1.09	1.04	0.96	0.96	1.00	1.00	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	pt+ov

Lanes, Volumes, Timings
1: Pond Street & Eliot Street

2028 Build Condition w/ Retail
Weekday Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4	4 1	3	8		1	6		5	2	2 7
Permitted Phases	4			8			6			2		
Detector Phase	7	4	4 1	3	8		1	6		5	2	2 7
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		8.0	10.0		6.0	10.0	
Minimum Split (s)	14.5	15.0		14.5	15.0		15.5	17.0		13.5	17.0	
Total Split (s)	25.5	35.0		14.5	24.0		20.5	58.0		13.5	51.0	
Total Split (%)	21.1%	28.9%		12.0%	19.8%		16.9%	47.9%		11.2%	42.1%	
Maximum Green (s)	17.0	28.0		6.0	17.0		13.0	51.0		6.0	44.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	5.5	4.0		5.5	4.0		4.5	3.0		4.5	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	8.5	7.0		8.5	7.0		7.5	7.0		7.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)	32.9	26.9	44.6	17.3	12.6		34.2	28.8		24.0	18.4	40.5
Actuated g/C Ratio	0.39	0.32	0.52	0.20	0.15		0.40	0.34		0.28	0.22	0.48
v/c Ratio	0.45	0.44	0.11	0.11	0.62		0.30	0.64		0.13	0.59	0.19
Control Delay	22.9	30.4	3.1	21.0	46.0		18.5	31.6		17.5	37.7	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	22.9	30.4	3.1	21.0	46.0		18.5	31.6		17.5	37.7	3.0
LOS	C	C	A	C	D		B	C		B	D	A
Approach Delay		22.5			42.0			28.5			23.1	
Approach LOS		C			D			C			C	
90th %ile Green (s)	17.0	28.0		6.0	17.0		13.0	35.5		6.0	28.5	
90th %ile Term Code	Max	Hold		Max	Max		Max	Gap		Max	Hold	
70th %ile Green (s)	15.7	25.5		6.0	15.8		11.1	28.5		6.0	23.4	
70th %ile Term Code	Gap	Hold		Max	Gap		Gap	Gap		Max	Hold	
50th %ile Green (s)	13.2	20.2		6.0	13.0		9.5	23.8		6.0	20.3	
50th %ile Term Code	Gap	Hold		Max	Gap		Gap	Gap		Max	Hold	
30th %ile Green (s)	12.1	31.0		0.0	10.4		8.1	28.4		0.0	12.8	
30th %ile Term Code	Gap	Hold		Skip	Gap		Gap	Hold		Skip	Gap	
10th %ile Green (s)	9.0	25.5		0.0	8.0		8.0	25.5		0.0	10.0	
10th %ile Term Code	Gap	Hold		Skip	Min		Min	Hold		Skip	Min	
Queue Length 50th (ft)	72	120	0	10	82		38	187		12	103	0
Queue Length 95th (ft)	146	225	26	33	172		81	318		32	195	30
Internal Link Dist (ft)		170			170			520			170	
Turn Bay Length (ft)	150		60	100			200			150		200
Base Capacity (vph)	487	619	952	280	371		434	1087		290	911	889
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.40	0.40	0.11	0.11	0.45		0.27	0.35		0.13	0.24	0.16

Intersection Summary

Area Type: Other
Cycle Length: 121

Lanes, Volumes, Timings
 1: Pond Street & Eliot Street

2028 Build Condition w/ Retail
 Weekday Morning Peak Hour

Actuated Cycle Length: 85.2
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 26.8
 Intersection Capacity Utilization 68.8%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 105.5
 70th %ile Actuated Cycle: 96
 50th %ile Actuated Cycle: 86
 30th %ile Actuated Cycle: 73.4
 10th %ile Actuated Cycle: 65

Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 1: Pond Street & Eliot Street



HCM 6th TWSC
 2: Pond Street & Secondary Site Driveway

2028 Build Condition w/ Retail
 Weekday Morning Peak Hour

Intersection

Int Delay, s/veh	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	3	2	427	294	12
Future Vol, veh/h	25	3	2	427	294	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	3	2	464	320	13

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	795	327	333	0	-	0
Stage 1	327	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	357	714	1226	-	-	-
Stage 1	731	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	356	714	1226	-	-	-
Mov Cap-2 Maneuver	356	-	-	-	-	-
Stage 1	730	-	-	-	-	-
Stage 2	630	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1226	-	376	-	-
HCM Lane V/C Ratio	0.002	-	0.081	-	-
HCM Control Delay (s)	7.9	0	15.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

HCM 6th TWSC
 3: Concord Street/Pond Street & Converse Way

2028 Build Condition w/ Retail
 Weekday Morning Peak Hour

Intersection

Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	4	8	419	292	5
Future Vol, veh/h	10	4	8	419	292	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	11	10	0
Mvmt Flow	11	4	9	466	324	6

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	811	327	330	0	-	0
Stage 1	327	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	352	719	1241	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	348	719	1241	-	-	-
Mov Cap-2 Maneuver	348	-	-	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.2	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1241	-	408	-	-
HCM Lane V/C Ratio	0.007	-	0.038	-	-
HCM Control Delay (s)	7.9	0	14.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

MOVEMENT SUMMARY

Site: Pond Street at Spyglass Hill Drive Build AM

Pond Street at Spyglass Hill Drive
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV %	v/c	sec		Vehicles	Distance		per veh	mph
		veh/h	%				veh	ft			
South: Pond Street											
3	L2	13	11.0	0.482	9.5	LOS A	2.5	67.8	0.27	0.14	32.3
8	T1	437	9.0	0.482	9.5	LOS A	2.5	67.8	0.27	0.14	32.5
18	R2	17	8.0	0.482	9.5	LOS A	2.5	67.8	0.27	0.14	31.6
Approach		467	9.0	0.482	9.5	LOS A	2.5	67.8	0.27	0.14	32.5
East: Spyglass Hill Drive											
1	L2	15	0.0	0.138	7.0	LOS A	0.5	12.1	0.50	0.48	33.4
6	T1	2	0.0	0.138	7.0	LOS A	0.5	12.1	0.50	0.48	33.4
16	R2	74	4.0	0.138	7.0	LOS A	0.5	12.1	0.50	0.48	32.4
Approach		91	3.2	0.138	7.0	LOS A	0.5	12.1	0.50	0.48	32.6
North: Pond Street											
7	L2	41	10.0	0.343	7.1	LOS A	1.5	41.1	0.15	0.05	33.3
4	T1	287	8.0	0.343	7.1	LOS A	1.5	41.1	0.15	0.05	33.5
14	R2	20	3.0	0.343	7.1	LOS A	1.5	41.1	0.15	0.05	32.6
Approach		348	8.0	0.343	7.1	LOS A	1.5	41.1	0.15	0.05	33.4
West: Shaw's Plaza											
5	L2	14	10.0	0.064	5.9	LOS A	0.2	5.4	0.42	0.33	33.3
2	T1	5	0.0	0.064	5.9	LOS A	0.2	5.4	0.42	0.33	33.6
12	R2	25	17.0	0.064	5.9	LOS A	0.2	5.4	0.42	0.33	32.3
Approach		45	12.7	0.064	5.9	LOS A	0.2	5.4	0.42	0.33	32.7
All Vehicles		951	8.2	0.482	8.2	LOS A	2.5	67.8	0.25	0.15	32.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.























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Organisation: MDM TRANSPORTATION CONSULTANTS | Processed: Tuesday, August 30, 2022 9:48:34 AM

Project: G:\Projects\1163 - Ashland (Trask Pond Street)\Synchro\Response to Comments\1163 Pond at Spyglass B AM.sip6













Lanes, Volumes, Timings
1: Pond Street & Eliot Street

2028 Build Condition w/ Retail
Weekday Evening Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	261	149	111	114	229	50	140	405	60	42	422	356
Future Volume (vph)	261	149	111	114	229	50	140	405	60	42	422	356
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	16	12	10	10	11	13	13	12	12	11
Storage Length (ft)	150		60	100		0	200		0	150		200
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.973			0.981				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1837	1812	1787	1684	0	1711	1893	0	1703	1863	1516
Flt Permitted	0.291			0.659			0.210			0.345		
Satd. Flow (perm)	517	1837	1812	1240	1684	0	378	1893	0	618	1863	1516
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			114		8			7				281
Link Speed (mph)		25			25			45				45
Link Distance (ft)		250			250			600				250
Travel Time (s)		6.8			6.8			9.1				3.8
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	7%	0%	1%	1%	3%	0%	2%	2%	0%	6%	2%	3%
Adj. Flow (vph)	269	154	114	118	236	52	144	418	62	43	435	367
Shared Lane Traffic (%)												
Lane Group Flow (vph)	269	154	114	118	288	0	144	480	0	43	435	367
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.04	0.85	1.00	1.09	1.09	1.04	0.96	0.96	1.00	1.00	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	pt+ov

Lanes, Volumes, Timings
1: Pond Street & Eliot Street

2028 Build Condition w/ Retail
Weekday Evening Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4	4 1	3	8		1	6		5	2	2 7
Permitted Phases	4			8			6			2		
Detector Phase	7	4	4 1	3	8		1	6		5	2	2 7
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		8.0	10.0		6.0	10.0	
Minimum Split (s)	14.5	15.0		14.5	15.0		15.5	17.0		13.5	17.0	
Total Split (s)	20.5	32.0		20.5	32.0		20.5	54.0		13.5	47.0	
Total Split (%)	17.1%	26.7%		17.1%	26.7%		17.1%	45.0%		11.3%	39.2%	
Maximum Green (s)	12.0	25.0		12.0	25.0		13.0	47.0		6.0	40.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	5.5	4.0		5.5	4.0		4.5	3.0		4.5	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	8.5	7.0		8.5	7.0		7.5	7.0		7.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)	34.6	23.9	42.2	29.6	21.4		47.1	41.0		35.6	30.0	50.9
Actuated g/C Ratio	0.33	0.23	0.40	0.28	0.20		0.45	0.39		0.34	0.29	0.49
v/c Ratio	0.88	0.37	0.14	0.29	0.83		0.47	0.65		0.16	0.82	0.42
Control Delay	57.9	39.9	4.9	25.8	60.3		22.2	32.1		18.1	48.4	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	57.9	39.9	4.9	25.8	60.3		22.2	32.1		18.1	48.4	5.9
LOS	E	D	A	C	E		C	C		B	D	A
Approach Delay		41.5			50.3			29.8			28.4	
Approach LOS		D			D			C			C	
90th %ile Green (s)	12.0	25.0		12.0	25.0		13.0	47.0		6.0	40.0	
90th %ile Term Code	Max	Hold		Max	Max		Max	Hold		Max	Max	
70th %ile Green (s)	12.0	25.0		12.0	25.0		12.5	43.6		6.0	37.1	
70th %ile Term Code	Max	Hold		Max	Max		Gap	Hold		Max	Gap	
50th %ile Green (s)	12.0	26.1		10.1	24.2		11.0	37.0		6.0	32.0	
50th %ile Term Code	Max	Hold		Gap	Gap		Gap	Hold		Max	Gap	
30th %ile Green (s)	12.0	23.1		8.4	19.5		9.3	42.4		0.0	25.6	
30th %ile Term Code	Max	Hold		Gap	Gap		Gap	Hold		Skip	Gap	
10th %ile Green (s)	12.0	19.6		6.6	14.2		8.0	33.7		0.0	18.2	
10th %ile Term Code	Max	Hold		Gap	Gap		Min	Hold		Skip	Gap	
Queue Length 50th (ft)	134	90	0	53	185		58	291		16	281	32
Queue Length 95th (ft)	#302	170	37	106	#348		98	413		37	413	95
Internal Link Dist (ft)		170			170			520			170	
Turn Bay Length (ft)	150		60	100			200			150		200
Base Capacity (vph)	306	449	814	442	415		339	868		272	724	875
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.88	0.34	0.14	0.27	0.69		0.42	0.55		0.16	0.60	0.42

Intersection Summary

Area Type: Other
Cycle Length: 120

Lanes, Volumes, Timings
 1: Pond Street & Eliot Street

2028 Build Condition w/ Retail
 Weekday Evening Peak Hour

Actuated Cycle Length: 104.9
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 35.4
 Intersection Capacity Utilization 83.3%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 120
 70th %ile Actuated Cycle: 116.6
 50th %ile Actuated Cycle: 109.2
 30th %ile Actuated Cycle: 96.4
 10th %ile Actuated Cycle: 82.4
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 1: Pond Street & Eliot Street



HCM 6th TWSC
 2: Pond Street & Secondary Site Driveway

2028 Build Condition w/ Retail
 Weekday Evening Peak Hour

Intersection

Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	4	5	529	579	32
Future Vol, veh/h	26	4	5	529	579	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	4	5	575	629	35

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1232	647	664	0	-	0
Stage 1	647	-	-	-	-	-
Stage 2	585	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	196	471	925	-	-	-
Stage 1	521	-	-	-	-	-
Stage 2	557	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	194	471	925	-	-	-
Mov Cap-2 Maneuver	194	-	-	-	-	-
Stage 1	517	-	-	-	-	-
Stage 2	557	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	25.2	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	925	-	211	-	-
HCM Lane V/C Ratio	0.006	-	0.155	-	-
HCM Control Delay (s)	8.9	0	25.2	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

HCM 6th TWSC
 3: Concord Street/Pond Street & Converse Way

2028 Build Condition w/ Retail
 Weekday Evening Peak Hour

Intersection

Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	15	15	522	572	11
Future Vol, veh/h	12	15	15	522	572	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	13	16	16	555	609	12

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	1202	615	621	0	0
Stage 1	615	-	-	-	-
Stage 2	587	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-
Pot Cap-1 Maneuver	206	495	969	-	-
Stage 1	543	-	-	-	-
Stage 2	560	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	201	495	969	-	-
Mov Cap-2 Maneuver	201	-	-	-	-
Stage 1	530	-	-	-	-
Stage 2	560	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.3	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	969	-	300	-	-
HCM Lane V/C Ratio	0.016	-	0.096	-	-
HCM Control Delay (s)	8.8	0	18.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

MOVEMENT SUMMARY

Site: Pond Street at Spyglass Hill Drive Build PM

Pond Street at Spyglass Hill Drive
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Pond Street											
3	L2	59	2.0	0.627	13.0	LOS B	4.4	111.6	0.52	0.36	30.9
8	T1	534	2.0	0.627	13.0	LOS B	4.4	111.6	0.52	0.36	30.9
18	R2	10	17.0	0.627	13.0	LOS B	4.4	111.6	0.52	0.36	29.9
Approach		602	2.2	0.627	13.0	LOS B	4.4	111.6	0.52	0.36	30.9
East: Spyglass Hill Drive											
1	L2	17	0.0	0.149	8.0	LOS A	0.5	12.9	0.56	0.56	32.9
6	T1	18	0.0	0.149	8.0	LOS A	0.5	12.9	0.56	0.56	32.9
16	R2	51	0.0	0.149	8.0	LOS A	0.5	12.9	0.56	0.56	32.0
Approach		87	0.0	0.149	8.0	LOS A	0.5	12.9	0.56	0.56	32.3
North: Pond Street											
7	L2	66	2.0	0.686	14.5	LOS B	5.6	144.6	0.49	0.30	30.3
4	T1	551	3.0	0.686	14.5	LOS B	5.6	144.6	0.49	0.30	30.3
14	R2	66	4.0	0.686	14.5	LOS B	5.6	144.6	0.49	0.30	29.5
Approach		684	3.0	0.686	14.5	LOS B	5.6	144.6	0.49	0.30	30.2
West: Shaw's Plaza											
5	L2	58	0.0	0.258	9.6	LOS A	0.9	23.6	0.59	0.59	31.7
2	T1	15	0.0	0.258	9.6	LOS A	0.9	23.6	0.59	0.59	31.7
12	R2	77	2.0	0.258	9.6	LOS A	0.9	23.6	0.59	0.59	30.8
Approach		150	1.0	0.258	9.6	LOS A	0.9	23.6	0.59	0.59	31.2
All Vehicles		1523	2.3	0.686	13.1	LOS B	5.6	144.6	0.52	0.37	30.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

□ Crash Data

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Light Conditions	Manner of Collision	Road Surface Condition	Total Fatalities	Total Non-Fatal Injuries	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Most Harmful Event (All Vehicles)	X	Y	Roadway	
01/07/2015	Property damage only (none injured)	3:58 PM	2	Daylight	Angle Sideswipe, opposite direction	Dry	0	0	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: W	Clear	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205666.4529	887933.4377	ELIOT ST / POND ST
01/20/2015	Property damage only (none injured)	2:39 PM	2	Daylight	Angle Sideswipe, opposite direction	Dry	0	0	V1: Backing / V2: Backing	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: S	Clear/Unknown	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205652.3914	887889.805	POND ST
02/19/2015	Property damage only (none injured)	5:11 PM	2	Daylight	Angle	Dry	0	0	V1: Turning right / V2: Turning right	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: N / V2: W	Cloudy	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205666.4529	887933.4377	POND STREET / ELIOT STREET
06/12/2015	Property damage only (none injured)	2:04 PM	3	Daylight	Rear-to-rear	Dry	0	0	V1: Backing / V2: Parked / V3: Parked	V1:(Passenger car) / V2:(Passenger car) / V3:(Passenger car)	V1: E / V2: W / V3: E	Clear	V1:(Collision with parked motor vehicle) / V2:(Collision with parked motor vehicle) / V3:(Collision with parked motor vehicle)		205652.3914	887889.805	POND ST
08/14/2015	Non-fatal injury	8:59 AM	2	Daylight	Angle	Dry	0	1	V1: Travelling straight ahead / V2: Entering traffic lane	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: S	Clear/Cloudy	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205652.3914	887889.805	POND ST
10/12/2015	Property damage only (none injured)	7:53 AM	2	Daylight	Angle	Dry	0	0	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: S / V2: E	Clear	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205666.4529	887933.4377	POND ST / ELIOT ST
11/01/2015	Property damage only (none injured)	7:40 PM	2	Dark - lighted roadway	Sideswipe, same direction	Dry	0	0	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: E	Clear	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205666.4529	887933.4377	POND ST / ELIOT ST
11/07/2015	Non-fatal injury	11:43 AM	2	Daylight	Angle Sideswipe, opposite direction	Dry	0	2	V1: Entering traffic lane / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: E	Clear	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205666.4529	887933.4377	POND ST / ELIOT ST
11/25/2015	Property damage only (none injured)	3:25 PM	2	Daylight	Angle Sideswipe, opposite direction	Dry	0	0	V1: Travelling straight ahead / V2: Entering traffic lane	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: W	Clear/Unknown	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		205652.3914	887889.805	POND ST