



TRAFFIC AND PARKING STUDY

Murphy Brothers - Mamaroneck Self Storage

416 Waverly Avenue

Village of Mamaroneck, New York

Prepared for

East Coast North Properties, LLC

and

Murphy Brothers Contracting

Village of Mamaroneck, NY

Prepared by

Provident Design Engineering, PLLC

formerly TRC Engineers, Inc.

Hawthorne, New York

February 8, 2018

Project No. 17-060

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TRAFFIC AND PARKING STUDY
Murphy Brothers - Mamaroneck Self Storage
416 Waverly Avenue
Village of Mamaroneck, New York

1.0 INTRODUCTION

Provident Design Engineering, PLLC (PDE), formerly TRC Engineers, Inc., has been retained by East Coast North Properties, LLC and Murphy Brothers Contracting to review the traffic circulation and the parking conditions for the proposed Mamaroneck Self Storage facility addition to be located at 416 Waverly Avenue in the Village of Mamaroneck. Similar to the storage facility that was recently constructed at the Site (269 units), the additional storage facility (321 units) would replace some existing structures on the site which currently house various contractors. Self Storage facilities tend to generate minimal traffic or parking. The existing Self Storage facility generally has one employee on site, while at times there could be two employees present. With the additional Self Storage units, there will be a maximum of three employees at any one time. In addition to the new Self Storage facility, there will also be a limited amount of retail space (1,750 sf) along the Waverly Avenue frontage in the existing Self Storage building.

Parking is currently provided on-site, with the provision of additional on-street parking spaces located along Waverly Avenue. Previous to the construction of the original Self

Storage facility, some of the vehicles would have had to back out of their parking spaces directly onto Waverly Avenue.

With the additional Self Storage facility, there will be 24 parking spaces on-site along with four (4) loading spaces as well as the on-street parking spaces.

PDE, TRC at the time, prepared the Traffic and Parking Study for the original Self Storage facility at the Site. To perform this latest Study, PDE followed a similar methodology including performing various observations of the traffic operations at the existing facility, as well as conducted parking counts at various times during the day and week. Utilization data of the Self Storage facility over an extended period of time was also reviewed. PDE conducted traffic analysis for the intersection of Waverly Avenue and Fenimore Road as well as at the Site Driveways.

The following is a summary of PDE's observations and findings in relation to the Self Storage facility in regards to traffic operations and parking.

2.0 TRAFFIC AND PARKING GENERATION

PDE has reviewed the amount of traffic that is generated by the proposed Self Storage facility utilizing the Institute of Transportation Engineers' (ITE) publication, "Trip Generation", 10th Edition, for this type of facility (ITE Land Use 151). The 310 additional storage units would conservatively generate approximately 3 entering vehicles and 3 exiting vehicles in the Peak AM Hour and approximately 2 entering vehicles and 3 exiting vehicles during the Peak PM Roadway Hour. This is minimal traffic and in general, the same vehicle that enters is also the vehicle that exits within the hour, as well as the occasional employee potentially entering or exiting. This minimal traffic will have no impact upon traffic operating conditions in the area. It is less traffic than utilized the previous uses of the site.

The following Table is a summary of the Peak Hour Trip Generation:

TABLE NO. 1 TRIP GENERATION FOR ADDITIONAL 321 STORAGE UNITS				
	Weekday Peak AM Roadway Hour			Weekday Peak PM Roadway Hour
ENTER	3			2
EXIT	3			3

The 1,750 sf of retail space will also generate minimal traffic. The ITE 10th Edition

(Land Use 920) estimates that this space would conservatively generate approximately 4 entering vehicles and 1 exiting vehicles in the Peak AM Hour and approximately 6 entering vehicles and 7 exiting vehicles during the Peak PM Roadway Hour.

The supporting information from the ITE 10th Edition is contained in Appendix D.

Parking Generation

A Self Storage facility of a total of 590 units, based upon the Institute of Transportation Engineers' (ITE) publication "Parking Generation", 4th Edition, would generate a Peak parking demand of 8 spaces. The supporting information from the ITE 4th Edition is contained in Appendix D.

The 1,750 sf retail space is estimated to require approximately five parking spaces.

Parking is described in more detail in Section 4.0 below.

3.0 TRAFFIC CIRCULATION AND OPERATIONS

Existing Circulation

The previous site was served by various curbcuts and driveways along both Waverly Avenue and Fenimore Road. The access was “cleaned up” with the construction of the original Self Storage Building, which also improved the safety along Waverly Avenue as vehicles were backing out onto Waverly Avenue. Along Waverly Avenue currently, the access to the northern portion of the site is an unsignalized entrance/exit (with only right turns out permitted). A second curbcut along Waverly Avenue is located at the southern end of the site and serves the Self Storage Building and other contractor parking but does not provide a vehicular connection to the rest of the property.

Along Fenimore Road, there is an existing curbcut between the barn and the front building that was converted to a right turn exiting movement only as part of the original Self Storage project. An additional curbcut provides limited access to the barn area. Each of these curbcuts have minimal amounts of traffic.

Future Circulation and Operations

The number of curbcuts under the future scenario with the additional Self Storage facility

will be reduced from four to two. The curbcut along Waverly Avenue currently serving the northern portion of the facility will be closed. The curbcut that currently serves the southern portion of the site along Waverly Avenue will remain.

The curbcut along Fenimore Road between the barn and the front building will remain an exit only driveway (right turns only). The curbcut that serves the barn will be removed.

All of the driveways will remain unsignalized under STOP control.

In addition to the modifications to the driveways, the internal circulation at the site will also be improved. Elimination of some of the buildings will improve traffic flow. In addition, as illustrated on the Site Plan, circulation will become more organized and striped islands will be provided to provide clearer direction. The signage also will be upgraded to improve traffic control. The northern portion will now be connected with the southern portion of the site. These improvements will significantly improve traffic flow throughout the site as well as improve Waverly Avenue and Fenimore Road by reducing the number of curbcuts.

Adjacent Roadway Network

The intersection of Waverly Avenue and Fenimore Road is controlled by a multi-phase

traffic signal. PDE conducted traffic counts at this intersection as well as at the Site Driveways. The Existing Traffic Volumes are illustrated on Figure 1 in Appendix A. PDE also conducted Level of Service capacity analyses for the intersection of Waverly Avenue and Fenimore Road and the Site Driveways. “Build” conditions were also analyzed and incorporate a background growth rate in addition to the Site modifications including the additional Self Storage units as illustrated on Figure 2. Copies of these analyses are contained in Appendix B.

Table No. 2 summarizes the Levels of Services for the intersection and the Site Driveways:

TABLE NO. 2 LEVEL OF SERVICE				
Intersection	AM Peak		PM Peak	
	Existing	Build	Existing	Build
Fenimore Road & Waverly Avenue	C 22.6	C 22.7	C 21.5	C 21.8
Fenimore Road and Existing Exit Driveway	c 15.0	c 15.2	a 0.0	a 0.0
Waverly Avenue & Existing Driveway 1 (Contractor Offices)	b 14.7	- -	c 15.0	- -
Waverly Avenue & Existing Driveway 2 (Self-Storage)	b 11.1	b 12.7	b 12.0	b 12.4

Note: Signalized intersection Levels of Service are represented by Upper Case letters while unsignalized intersections are represented by lower case letters. Average Delay is provided below the Levels of Service and is illustrated in seconds per vehicle. To be conservative, no credit was taken for the traffic contractors at the Site that will no longer be present during the Build condition.

As illustrated in the Table above, the analysis shows that the intersection of Fenimore Road and Waverly Avenue currently operates at Level of Service C in the Peak AM and PM Hours and these Levels of Service will remain. The Site Driveways will also continue to operate at Level of Service C or better. Thus, good Levels of Service are maintained at each of the intersections/driveways. To be conservative, no credit was taken for the traffic contractors at the Site that will no longer be present during the Build condition, which would remove approximately 19 vehicles. Thus there will actually be less vehicles than current.

As described in Section 2.0, the Self Storage facility will not generate significant traffic and will not have any significant impact upon the traffic operating conditions of this intersection or on the Site Driveways and adjacent streets.

4.0 PARKING

a. Existing Parking Conditions

The current parking spaces on-site are split between two separate lots, as well as on-street parking spaces along Waverly Avenue.

PDE conducted parking observations on various days (both weekdays and weekends) and at various times throughout the day at the site. There were very few vehicles ever parked for the existing Self Storage facility and there were never times that ample parking spaces was not available on the property.

In addition, PDE reviewed data for the entrance and exit into the existing Self Storage facility from July 1, 2017 to August 24, 2017. These indicate that the maximum number of parking spaces for the Self Storage facility utilized at any one time throughout the entire period was five spaces, which included two parking spaces utilized by employees. A copy of this data is contained in Appendix C.

In addition to the parking for Murphy Brothers, approximately 19 other contractors currently park at the Site. These 19 vehicles will be removed from the

Site after the additional Self Storage units are constructed. Thus there would be less vehicles parking on the Site.

b. Future Parking

To determine the parking that was to be required for the original Self Storage facility at the Site, the parking requirements at other Self Storage facilities in the area was reviewed. The following table, similar to the Table that was contained in the previous Traffic and Parking Study illustrates the parking spaces provided for other Self Storage facilities in Westchester.

TABLE NO. 3 PARKING FOR OTHER SELF STORAGE FACILITIES				
Facility	Location	No. of Units	Parking Spaces Initially Required by Zoning	Variance Granted (Parking Spaces to be installed)
Westy's Self Storage	Port Chester	900	83	22
Safeguard Storage	Elmsford	550	68	12
Safeguard Storage	New Rochelle	653	48	14
Westy's Self Storage	Tuckahoe	1,500	N/A	24

As illustrated in the above Table, some of these other facilities have significantly more storage units yet provide a similar number of parking spaces as proposed for the Mamaroneck Self Storage facility. Observations of the parking in these lots indicate minimal vehicles are parked there.

The Mamaroneck Self Storage facility currently has 1-2 employees on-site at any one time. With additional units, this could increase to a maximum of 3 employees on-site at times. As described earlier, a Self Storage facility of a total of 590 units, based upon the Institute of Transportation Engineers' (ITE) publication "Parking Generation", 4th Edition, would generate a Peak parking demand of 8 spaces. The supporting information from the ITE 4th Edition is contained in Appendix D.

The 1,750 sf retail space is estimated to require approximately five parking spaces based upon the potential use of Site. The Murphy Brothers Contracting portion of the Site will have four full time employees and two contractors on-site and are projected to utilize six parking spaces. The other nineteen contractors that currently park on the Site will no longer be parking there as that usage will be replaced by the additional Self Storage units and thus the overall parking demand will be reduced.

With the proposed additional Self Storage facility and the modifications to the layout of the site, there will be 24 parking spaces provided on-site along with four (4) loading spaces, in addition to the on-street parking spaces. The four loading spaces will be utilized by the patrons of the Self Storage facility, thus freeing up

even more parking spaces. Thus the parking to be provided will be sufficient to support the Self Storage facility and the other various uses on the site.

5.0 CONCLUSIONS

The proposed modifications to the internal circulation of the site will improve traffic flow and operations. The elimination of a driveway along Waverly Avenue and the elimination of a curb cut on Fenimore Road will also improve safety within the site and along Waverly Avenue and Fenimore Road. The additional Self Storage facility will not generate significant traffic and will not impact traffic operating conditions along the adjacent roadways or within the site.

The Self Storage facility with the additional units would conservatively require up to 8 parking spaces while the Murphy Brothers Contracting will require 6 parking spaces and up to 5 parking spaces will be required for the retail space. In addition, the peak of all of the above uses would not occur at the same time. Thus, the 24 parking spaces to be provided will result in more than sufficient parking be provided for the entire site, including for the additional Self Storage facility. There will be also 4 loading spaces that will be provided and these will be utilized by the patrons of the Self Storage facility, thus freeing up even more parking spaces.

Respectively submitted:

PROVIDENT DESIGN ENGINEERING, PLLC

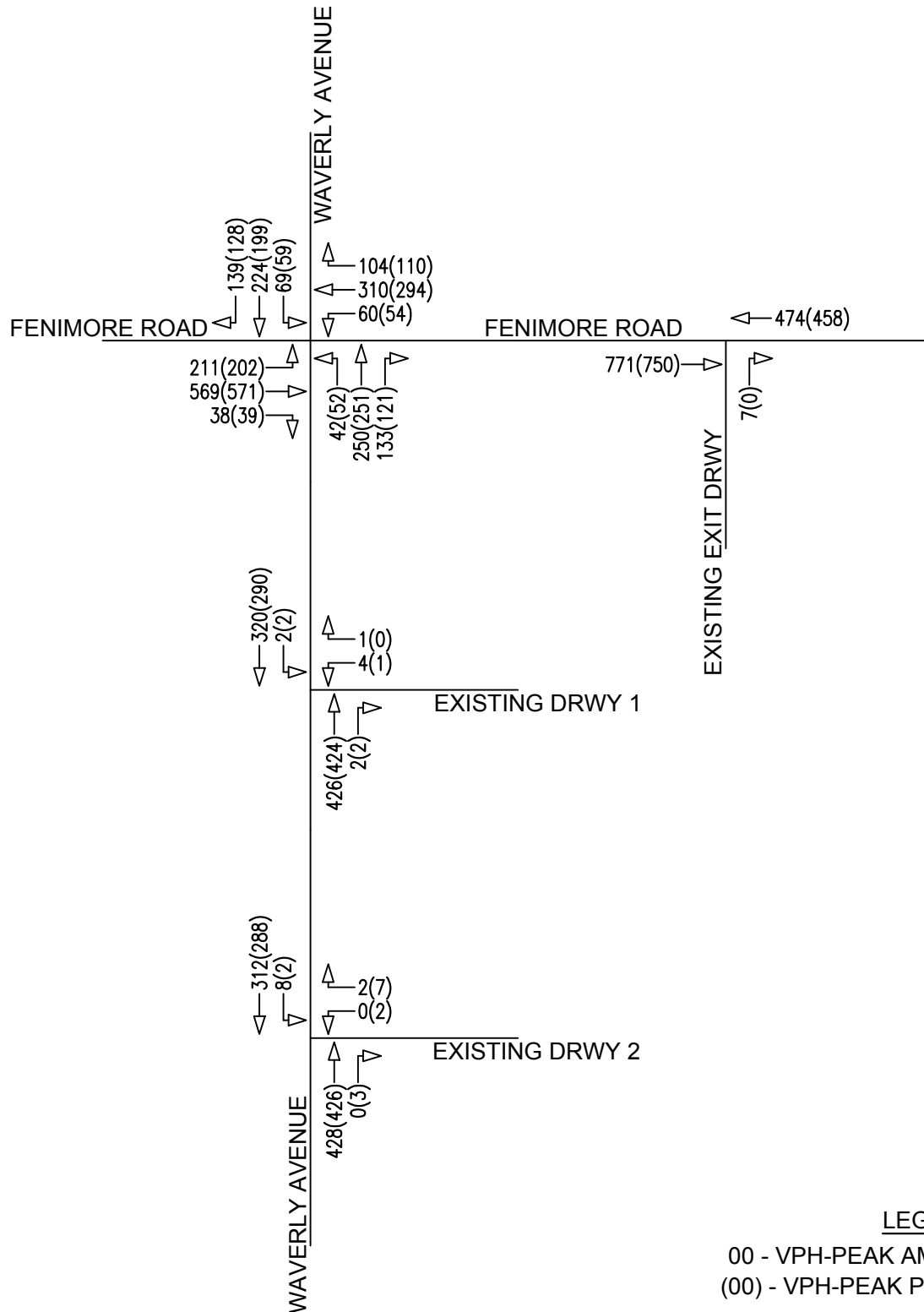
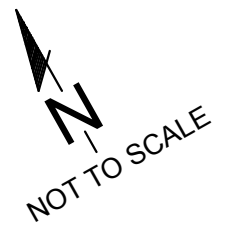
A handwritten signature in black ink, appearing to read "Brian E. Dempsey". The signature is fluid and cursive, with the first name "Brian" being the most prominent.

Brian E. Dempsey, P.E., PTOE
Senior Project Manager

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APPENDIX A

Figures



LEGEND

00 - VPH-PEAK AM HOUR (7:30-8:30)
 (00) - VPH-PEAK PM HOUR (4:45-5:45)

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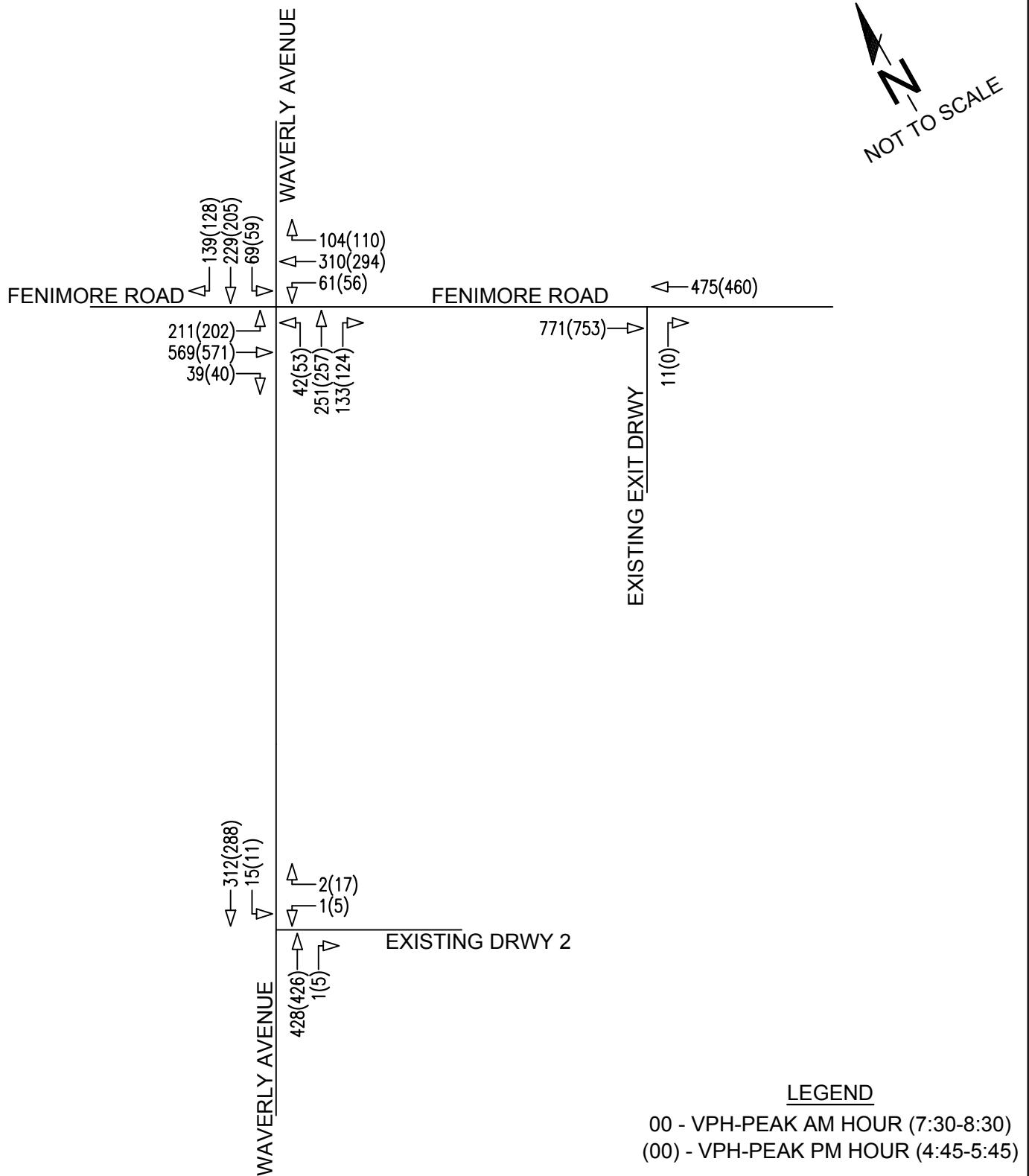
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Project No. 17-060
 February 2018

Existing Traffic Volumes
 Mamaroneck, Westchester, NY

Figure No. 01

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Build Traffic Figures
Mamaroneck, Westchester, NY

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February 2018























Figure No. 02

APPENDIX B

Level of Service Analysis

HCM 2010 Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2017 Existing
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	569	38	60	310	104	42	250	133	69	224	139
Future Volume (veh/h)	211	569	38	60	310	104	42	250	133	69	224	139
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A _{pbT})	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.98
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	229	618	41	65	337	113	46	272	145	75	243	151
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	542	1068	899	366	795	667	202	360	192	186	338	210
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.10	0.57	0.57	0.43	0.43	0.43	0.32	0.32	0.32	0.32	0.32	0.32
Ln Grp Delay, s/veh	13.2	13.5	7.8	19.3	18.1	15.1	36.3	0.0	34.4	42.2	0.0	32.7
Ln Grp LOS	B	B	A	B	B	B	D		C	D		C
Approach Vol, veh/h		888			515			463			469	
Approach Delay, s/veh		13.1			17.6			34.6			34.2	
Approach LOS		B			B			C			C	
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Case No		6.0		3.0		6.0	1.2	5.0				
Phs Duration (G+Y+Rc), s		30.0		52.0		30.0	12.0	40.0				
Change Period (Y+Rc), s		4.0		5.0		4.0	4.0	5.0				
Max Green (Gmax), s		26.0		47.0		26.0	8.0	35.0				
Max Allow Headway (MAH), s		5.3		5.1		5.3	3.8	5.1				
Max Q Clear (g _c +I1), s		22.1		19.4		25.8	7.5	12.4				
Green Ext Time (g _e), s		2.1		8.4		0.1	0.0	7.9				
Prob of Phs Call (p _c)		1.00		1.00		1.00	1.00	1.00				
Prob of Max Out (p _x)		0.00		0.00		0.00	0.00	0.00				
Left-Turn Movement Data												
Assigned Mvmt		5				1	7	3				
Mvmt Sat Flow, veh/h		985				965	1774	769				
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1136		1863		1067		1863				
Right-Turn Movement Data												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		605		1568		663		1563				
Left Lane Group Data												
Assigned Mvmt		0	5	0	0	0	1	7	3			
Lane Assignment							(Pr/Pm)					

HCM 2010 Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2017 Existing
AM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	46	0	0	0	75	229	65
Grp Sat Flow (s), veh/h/ln	0	985	0	0	0	965	1774	769
Q Serve Time (g_s), s	0.0	3.6	0.0	0.0	0.0	6.2	5.5	4.8
Cycle Q Clear Time (g_c), s	0.0	20.1	0.0	0.0	0.0	23.8	5.5	10.2
Perm LT Sat Flow (s_l), veh/h/ln	0	985	0	0	0	965	935	769
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	26.0	0.0	0.0	0.0	26.0	37.0	35.0
Perm LT Serve Time (g_u), s	0.0	9.5	0.0	0.0	0.0	8.4	24.6	29.6
Perm LT Q Serve Time (g_ps), s	0.0	3.6	0.0	0.0	0.0	6.2	4.0	4.8
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Lane Grp Cap (c), veh/h	0	202	0	0	0	186	542	366
V/C Ratio (X)	0.00	0.23	0.00	0.00	0.00	0.40	0.42	0.18
Avail Cap (c_a), veh/h	0	202	0	0	0	186	542	366
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d1), s/veh	0.0	33.6	0.0	0.0	0.0	35.8	10.8	18.3
Incr Delay (d2), s/veh	0.0	2.6	0.0	0.0	0.0	6.4	2.4	1.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	36.3	0.0	0.0	0.0	42.2	13.2	19.3
1st-Term Q (Q1), veh/ln	0.0	1.0	0.0	0.0	0.0	1.6	2.6	1.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.3	0.4	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
%ile Back of Q (50%), veh/ln	0.0	1.1	0.0	0.0	0.0	2.0	3.0	1.1
%ile Storage Ratio (RQ%)	0.00	0.56	0.00	0.00	0.00	0.77	0.94	0.29
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T				T			
Lanes in Grp	0	0	0	1	0	0	0	1
Grp Vol (v), veh/h	0	0	0	618	0	0	0	337
Grp Sat Flow (s), veh/h/ln	0	0	0	1863	0	0	0	1863
Q Serve Time (g_s), s	0.0	0.0	0.0	17.4	0.0	0.0	0.0	10.4
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.4	0.0	0.0	0.0	10.4
Lane Grp Cap (c), veh/h	0	0	0	1068	0	0	0	795
V/C Ratio (X)	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.42
Avail Cap (c_a), veh/h	0	0	0	1068	0	0	0	795
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	11.2	0.0	0.0	0.0	16.4
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.0	0.0	1.7
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	13.5	0.0	0.0	0.0	18.1
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	8.8	0.0	0.0	0.0	5.3

HCM 2010 Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2017 Existing
AM Peak




2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.4
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	9.4	0.0	0.0	0.0	5.7
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.08	0.00	0.00	0.00	1.32
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R		R		T+R		R	
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	417	0	41	0	394	0	113
Grp Sat Flow (s), veh/h/ln	0	1741	0	1568	0	1729	0	1563
Q Serve Time (g_s), s	0.0	17.6	0.0	0.9	0.0	16.5	0.0	3.7
Cycle Q Clear Time (g_c), s	0.0	17.6	0.0	0.9	0.0	16.5	0.0	3.7
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.35	0.00	1.00	0.00	0.38	0.00	1.00
Lane Grp Cap (c), veh/h	0	552	0	899	0	548	0	667
V/C Ratio (X)	0.00	0.76	0.00	0.05	0.00	0.72	0.00	0.17
Avail Cap (c_a), veh/h	0	552	0	899	0	548	0	667
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	25.1	0.0	7.7	0.0	24.8	0.0	14.5
Incr Delay (d2), s/veh	0.0	9.3	0.0	0.1	0.0	7.9	0.0	0.5
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	34.4	0.0	7.8	0.0	32.7	0.0	15.1
1st-Term Q (Q1), veh/ln	0.0	8.5	0.0	0.4	0.0	7.9	0.0	1.6
2nd-Term Q (Q2), veh/ln	0.0	1.4	0.0	0.0	0.0	1.2	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	9.9	0.0	0.4	0.0	9.1	0.0	1.7
%ile Storage Ratio (RQ%)	0.00	4.92	0.00	0.14	0.00	0.53	0.00	0.42
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	22.6							
HCM 2010 LOS	C							




Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↗
Traffic Vol, veh/h	771	0	0	474	0	7
Future Vol, veh/h	771	0	0	474	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
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	838	0	0	515	0	8

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	-	- 838
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	- 6.22
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	- 3.318
Pot Cap-1 Maneuver	-	0	0 - 366
Stage 1	-	0	0 -
Stage 2	-	0	0 -
Platoon blocked, %	-		-
Mov Cap-1 Maneuver	-	-	- 366
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	15
HCM LOS			C























Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	366	-	-
HCM Lane V/C Ratio	0.021	-	-
HCM Control Delay (s)	15	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	0.1	-	-

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	1	426	2	2	320
Future Vol, veh/h	4	1	426	2	2	320
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	4	1	463	2	2	348
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	816	464	0	0	465	0
Stage 1	464	-	-	-	-	-
Stage 2	352	-	-	-	-	-
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	347	598	-	-	1096	-
Stage 1	633	-	-	-	-	-
Stage 2	712	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	346	598	-	-	1096	-
Mov Cap-2 Maneuver	346	-	-	-	-	-
Stage 1	633	-	-	-	-	-
Stage 2	711	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	14.7	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	378	1096	-	
HCM Lane V/C Ratio	-	-	0.014	0.002	-	
HCM Control Delay (s)	-	-	14.7	8.3	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	2	428	0	8	312
Future Vol, veh/h	0	2	428	0	8	312
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	0	2	465	0	9	339
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	822	465	0	0	465	0
Stage 1	465	-	-	-	-	-
Stage 2	357	-	-	-	-	-
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	344	597	-	-	1096	-
Stage 1	632	-	-	-	-	-
Stage 2	708	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	341	597	-	-	1096	-
Mov Cap-2 Maneuver	341	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11.1	0	0.2			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	597	1096	-	
HCM Lane V/C Ratio	-	-	0.004	0.008	-	
HCM Control Delay (s)	-	-	11.1	8.3	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	569	39	61	310	104	42	251	133	69	229	139
Future Volume (veh/h)	211	569	39	61	310	104	42	251	133	69	229	139
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.98
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	229	618	42	66	337	113	46	273	145	75	249	151
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	542	1068	899	365	795	667	197	361	192	186	342	207
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.10	0.57	0.57	0.43	0.43	0.43	0.32	0.32	0.32	0.32	0.32	0.32
Ln Grp Delay, s/veh	13.2	13.5	7.8	19.4	18.1	15.1	36.7	0.0	34.5	42.3	0.0	33.1
Ln Grp LOS	B	B	A	B	B	B	D		C	D		C
Approach Vol, veh/h		889			516			464			475	
Approach Delay, s/veh		13.1			17.6			34.7			34.6	
Approach LOS		B			B			C			C	
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Case No		6.0		3.0		6.0	1.2	5.0				
Phs Duration (G+Y+Rc), s		30.0		52.0		30.0	12.0	40.0				
Change Period (Y+Rc), s		4.0		5.0		4.0	4.0	5.0				
Max Green (Gmax), s		26.0		47.0		26.0	8.0	35.0				
Max Allow Headway (MAH), s		5.3		5.1		5.3	3.8	5.1				
Max Q Clear (g_c+I1), s		22.4		19.4		25.9	7.5	12.4				
Green Ext Time (g_e), s		1.9		8.4		0.1	0.0	7.9				
Prob of Phs Call (p_c)		1.00		1.00		1.00	1.00	1.00				
Prob of Max Out (p_x)		0.00		0.00		0.00	0.00	0.00				
Left-Turn Movement Data												
Assigned Mvmt		5				1	7	3				
Mvmt Sat Flow, veh/h		980				964	1774	768				
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1137		1863		1078		1863				
Right-Turn Movement Data												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		604		1568		654		1563				
Left Lane Group Data												
Assigned Mvmt		0	5	0	0	0	1	7	3			
Lane Assignment							(Pr/Pm)					

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Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	46	0	0	0	75	229	66
Grp Sat Flow (s), veh/h/ln	0	980	0	0	0	964	1774	768
Q Serve Time (g_s), s	0.0	3.6	0.0	0.0	0.0	6.2	5.5	4.9
Cycle Q Clear Time (g_c), s	0.0	20.4	0.0	0.0	0.0	23.9	5.5	10.3
Perm LT Sat Flow (s_l), veh/h/ln	0	980	0	0	0	964	935	768
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	26.0	0.0	0.0	0.0	26.0	37.0	35.0
Perm LT Serve Time (g_u), s	0.0	9.2	0.0	0.0	0.0	8.3	24.6	29.6
Perm LT Q Serve Time (g_ps), s	0.0	3.6	0.0	0.0	0.0	6.2	4.0	4.9
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Lane Grp Cap (c), veh/h	0	197	0	0	0	186	542	365
V/C Ratio (X)	0.00	0.23	0.00	0.00	0.00	0.40	0.42	0.18
Avail Cap (c_a), veh/h	0	197	0	0	0	186	542	365
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d1), s/veh	0.0	33.9	0.0	0.0	0.0	35.9	10.8	18.3
Incr Delay (d2), s/veh	0.0	2.7	0.0	0.0	0.0	6.4	2.4	1.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	36.7	0.0	0.0	0.0	42.3	13.2	19.4
1st-Term Q (Q1), veh/ln	0.0	1.0	0.0	0.0	0.0	1.6	2.6	1.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.3	0.4	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
%ile Back of Q (50%), veh/ln	0.0	1.1	0.0	0.0	0.0	2.0	3.0	1.2
%ile Storage Ratio (RQ%)	0.00	0.32	0.00	0.00	0.00	0.77	0.94	0.29
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T				T			
Lanes in Grp	0	0	0	1	0	0	0	1
Grp Vol (v), veh/h	0	0	0	618	0	0	0	337
Grp Sat Flow (s), veh/h/ln	0	0	0	1863	0	0	0	1863
Q Serve Time (g_s), s	0.0	0.0	0.0	17.4	0.0	0.0	0.0	10.4
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.4	0.0	0.0	0.0	10.4
Lane Grp Cap (c), veh/h	0	0	0	1068	0	0	0	795
V/C Ratio (X)	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.42
Avail Cap (c_a), veh/h	0	0	0	1068	0	0	0	795
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	11.2	0.0	0.0	0.0	16.4
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.0	0.0	1.7
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	13.5	0.0	0.0	0.0	18.1
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	8.8	0.0	0.0	0.0	5.3

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2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.4
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	9.4	0.0	0.0	0.0	5.7
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.08	0.00	0.00	0.00	1.32
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R		R		T+R		R	
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	418	0	42	0	400	0	113
Grp Sat Flow (s), veh/h/ln	0	1741	0	1568	0	1731	0	1563
Q Serve Time (g_s), s	0.0	17.7	0.0	1.0	0.0	16.8	0.0	3.7
Cycle Q Clear Time (g_c), s	0.0	17.7	0.0	1.0	0.0	16.8	0.0	3.7
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.35	0.00	1.00	0.00	0.38	0.00	1.00
Lane Grp Cap (c), veh/h	0	552	0	899	0	549	0	667
V/C Ratio (X)	0.00	0.76	0.00	0.05	0.00	0.73	0.00	0.17
Avail Cap (c_a), veh/h	0	552	0	899	0	549	0	667
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	25.2	0.0	7.7	0.0	24.9	0.0	14.5
Incr Delay (d2), s/veh	0.0	9.4	0.0	0.1	0.0	8.2	0.0	0.5
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	34.5	0.0	7.8	0.0	33.1	0.0	15.1
1st-Term Q (Q1), veh/ln	0.0	8.5	0.0	0.4	0.0	8.0	0.0	1.6
2nd-Term Q (Q2), veh/ln	0.0	1.4	0.0	0.0	0.0	1.3	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	9.9	0.0	0.4	0.0	9.3	0.0	1.7
%ile Storage Ratio (RQ%)	0.00	1.33	0.00	0.15	0.00	0.54	0.00	0.42
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	22.7							
HCM 2010 LOS	C							

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↗
Traffic Vol, veh/h	771	0	0	475	0	11
Future Vol, veh/h	771	0	0	475	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
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	838	0	0	516	0	12
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	-	-	-	-	838
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	0	0	-	0	366
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	366
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		NB		
HCM Control Delay, s	0	0		15.2		
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	WBT			
Capacity (veh/h)	366	-	-			
HCM Lane V/C Ratio	0.033	-	-			
HCM Control Delay (s)	15.2	-	-			
HCM Lane LOS	C	-	-			
HCM 95th %tile Q(veh)	0.1	-	-			

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	2	428	1	15	312
Future Vol, veh/h	1	2	428	1	15	312
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	1	2	465	1	16	339
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	838	466	0	0	466	0
Stage 1	466	-	-	-	-	-
Stage 2	372	-	-	-	-	-
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	336	597	-	-	1095	-
Stage 1	632	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	330	597	-	-	1095	-
Mov Cap-2 Maneuver	330	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	684	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	12.7	0	0.4			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	470	1095	-	
HCM Lane V/C Ratio	-	-	0.007	0.015	-	
HCM Control Delay (s)	-	-	12.7	8.3	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	571	39	54	294	110	52	251	121	59	199	128
Future Volume (veh/h)	202	571	39	54	294	110	52	251	121	59	199	128
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.98
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	220	621	42	59	320	120	57	273	132	64	216	139
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	551	1068	899	363	795	667	231	374	181	196	333	214
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.10	0.57	0.57	0.43	0.43	0.43	0.32	0.32	0.32	0.32	0.32	0.32
Ln Grp Delay, s/veh	12.8	13.5	7.8	19.2	17.8	15.2	34.6	0.0	33.1	39.0	0.0	29.9
Ln Grp LOS	B	B	A	B	B	B	C		C	D		C
Approach Vol, veh/h		883			499			462			419	
Approach Delay, s/veh		13.1			17.3			33.3			31.3	
Approach LOS		B			B			C			C	
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Case No		6.0		3.0		6.0	1.2	5.0				
Phs Duration (G+Y+Rc), s		30.0		52.0		30.0	12.0	40.0				
Change Period (Y+Rc), s		4.0		5.0		4.0	4.0	5.0				
Max Green (Gmax), s		26.0		47.0		26.0	8.0	35.0				
Max Allow Headway (MAH), s		5.3		5.1		5.3	3.8	5.1				
Max Q Clear (g_c+I1), s		20.7		19.5		24.0	7.2	11.9				
Green Ext Time (g_e), s		2.5		8.3		1.1	0.1	7.8				
Prob of Phs Call (p_c)		1.00		1.00		1.00	1.00	1.00				
Prob of Max Out (p_x)		0.00		0.00		0.00	0.00	0.00				
Left-Turn Movement Data												
Assigned Mvmt			5				1	7	3			
Mvmt Sat Flow, veh/h			1019				975	1774	766			
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1178		1863		1051		1863				
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			570		1568		676		1563			
Left Lane Group Data												
Assigned Mvmt		0	5	0	0	0	1	7	3			
Lane Assignment							(Pr/Pm)					

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Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	57	0	0	0	64	220	59
Grp Sat Flow (s), veh/h/ln	0	1019	0	0	0	975	1774	766
Q Serve Time (g_s), s	0.0	4.2	0.0	0.0	0.0	5.1	5.2	4.4
Cycle Q Clear Time (g_c), s	0.0	18.7	0.0	0.0	0.0	22.0	5.2	9.9
Perm LT Sat Flow (s_l), veh/h/ln	0	1019	0	0	0	975	943	766
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	26.0	0.0	0.0	0.0	26.0	37.0	35.0
Perm LT Serve Time (g_u), s	0.0	11.5	0.0	0.0	0.0	9.1	25.3	29.5
Perm LT Q Serve Time (g_ps), s	0.0	4.2	0.0	0.0	0.0	5.1	3.6	4.4
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Lane Grp Cap (c), veh/h	0	231	0	0	0	196	551	363
V/C Ratio (X)	0.00	0.25	0.00	0.00	0.00	0.33	0.40	0.16
Avail Cap (c_a), veh/h	0	231	0	0	0	196	551	363
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d1), s/veh	0.0	32.1	0.0	0.0	0.0	34.7	10.6	18.2
Incr Delay (d2), s/veh	0.0	2.5	0.0	0.0	0.0	4.4	2.2	1.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	34.6	0.0	0.0	0.0	39.0	12.8	19.2
1st-Term Q (Q1), veh/ln	0.0	1.2	0.0	0.0	0.0	1.4	2.5	0.9
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.2	0.3	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
%ile Back of Q (50%), veh/ln	0.0	1.3	0.0	0.0	0.0	1.6	2.8	1.0
%ile Storage Ratio (RQ%)	0.00	0.66	0.00	0.00	0.00	0.63	0.90	0.26
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T				T			
Lanes in Grp	0	0	0	1	0	0	0	1
Grp Vol (v), veh/h	0	0	0	621	0	0	0	320
Grp Sat Flow (s), veh/h/ln	0	0	0	1863	0	0	0	1863
Q Serve Time (g_s), s	0.0	0.0	0.0	17.5	0.0	0.0	0.0	9.7
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.5	0.0	0.0	0.0	9.7
Lane Grp Cap (c), veh/h	0	0	0	1068	0	0	0	795
V/C Ratio (X)	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.40
Avail Cap (c_a), veh/h	0	0	0	1068	0	0	0	795
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	11.2	0.0	0.0	0.0	16.3
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.0	0.0	1.5
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	13.5	0.0	0.0	0.0	17.8
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	9.0	0.0	0.0	0.0	5.0

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2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.3
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	9.7	0.0	0.0	0.0	5.3
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.10	0.00	0.00	0.00	1.23
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R		R		T+R		R	
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	405	0	42	0	355	0	120
Grp Sat Flow (s), veh/h/ln	0	1748	0	1568	0	1727	0	1563
Q Serve Time (g_s), s	0.0	16.9	0.0	1.0	0.0	14.5	0.0	3.9
Cycle Q Clear Time (g_c), s	0.0	16.9	0.0	1.0	0.0	14.5	0.0	3.9
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.33	0.00	1.00	0.00	0.39	0.00	1.00
Lane Grp Cap (c), veh/h	0	554	0	899	0	548	0	667
V/C Ratio (X)	0.00	0.73	0.00	0.05	0.00	0.65	0.00	0.18
Avail Cap (c_a), veh/h	0	554	0	899	0	548	0	667
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	24.9	0.0	7.7	0.0	24.1	0.0	14.6
Incr Delay (d2), s/veh	0.0	8.2	0.0	0.1	0.0	5.8	0.0	0.6
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	33.1	0.0	7.8	0.0	29.9	0.0	15.2
1st-Term Q (Q1), veh/ln	0.0	8.1	0.0	0.4	0.0	6.9	0.0	1.7
2nd-Term Q (Q2), veh/ln	0.0	1.3	0.0	0.0	0.0	0.9	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	9.4	0.0	0.4	0.0	7.8	0.0	1.8
%ile Storage Ratio (RQ%)	0.00	4.67	0.00	0.15	0.00	0.46	0.00	0.45
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	21.5							
HCM 2010 LOS	C							




Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↗
Traffic Vol, veh/h	750	0	0	458	0	0
Future Vol, veh/h	750	0	0	458	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
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	815	0	0	498	0	0
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	-	-	-	-	815
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	0	0	-	0	377
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	377
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		NB		
HCM Control Delay, s	0	0		0		
HCM LOS				A		
Minor Lane/Major Mvmt	NBLn1	EBT	WBT			
Capacity (veh/h)	-	-	-			
HCM Lane V/C Ratio	-	-	-			
HCM Control Delay (s)	0	-	-			
HCM Lane LOS	A	-	-			
HCM 95th %tile Q(veh)	-	-	-			

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	0	424	2	2	290
Future Vol, veh/h	1	0	424	2	2	290
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	1	0	461	2	2	315

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	782	462	0
Stage 1	462	-	-
Stage 2	320	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	363	600	-
Stage 1	634	-	-
Stage 2	736	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	362	600	-
Mov Cap-2 Maneuver	362	-	-
Stage 1	634	-	-
Stage 2	735	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	362	1098
HCM Lane V/C Ratio	-	-	0.003	0.002
HCM Control Delay (s)	-	-	15	8.3
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	7	426	3	2	288
Future Vol, veh/h	2	7	426	3	2	288
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	2	8	463	3	2	313























Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	782	465	0	0	466	0
Stage 1	465	-	-	-	-	-
Stage 2	317	-	-	-	-	-
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	363	597	-	-	1095	-
Stage 1	632	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	362	597	-	-	1095	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	737	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	522	1095
HCM Lane V/C Ratio	-	-	0.019	0.002
HCM Control Delay (s)	-	-	12	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 2010 Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2017 Build
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	571	40	56	294	110	53	257	124	59	205	128
Future Volume (veh/h)	202	571	40	56	294	110	53	257	124	59	205	128
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.98
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	220	621	43	61	320	120	58	279	135	64	223	139
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	551	1068	899	363	795	667	226	374	181	190	338	211
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.10	0.57	0.57	0.43	0.43	0.43	0.32	0.32	0.32	0.32	0.32	0.32
Ln Grp Delay, s/veh	12.8	13.5	7.8	19.3	17.8	15.2	35.2	0.0	33.9	39.9	0.0	30.3
Ln Grp LOS	B	B	A	B	B	B	D		C	D		C
Approach Vol, veh/h		884			501			472			426	
Approach Delay, s/veh		13.1			17.3			34.1			31.8	
Approach LOS		B			B			C			C	
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Case No		6.0		3.0		6.0	1.2	5.0				
Phs Duration (G+Y+Rc), s		30.0		52.0		30.0	12.0	40.0				
Change Period (Y+Rc), s		4.0		5.0		4.0	4.0	5.0				
Max Green (Gmax), s		26.0		47.0		26.0	8.0	35.0				
Max Allow Headway (MAH), s		5.3		5.1		5.3	3.8	5.1				
Max Q Clear (g_c+I1), s		21.1		19.5		24.6	7.2	12.0				
Green Ext Time (g_e), s		2.4		8.3		0.8	0.1	7.8				
Prob of Phs Call (p_c)		1.00		1.00		1.00	1.00	1.00				
Prob of Max Out (p_x)		0.00		0.00		0.00	0.00	0.00				
Left-Turn Movement Data												
Assigned Mvmt		5				1	7	3				
Mvmt Sat Flow, veh/h		1012				968	1774	766				
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1178		1863		1065		1863				
Right-Turn Movement Data												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		570		1568		664		1563				
Left Lane Group Data												
Assigned Mvmt		0	5	0	0	0	1	7	3			
Lane Assignment							(Pr/Pm)					

HCM 2010 Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd




2017 Build
PM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	58	0	0	0	64	220	61
Grp Sat Flow (s), veh/h/ln	0	1012	0	0	0	968	1774	766
Q Serve Time (g_s), s	0.0	4.3	0.0	0.0	0.0	5.2	5.2	4.5
Cycle Q Clear Time (g_c), s	0.0	19.1	0.0	0.0	0.0	22.6	5.2	10.0
Perm LT Sat Flow (s_l), veh/h/ln	0	1012	0	0	0	968	943	766
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	26.0	0.0	0.0	0.0	26.0	37.0	35.0
Perm LT Serve Time (g_u), s	0.0	11.2	0.0	0.0	0.0	8.6	25.3	29.5
Perm LT Q Serve Time (g_ps), s	0.0	4.3	0.0	0.0	0.0	5.2	3.6	4.5
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Lane Grp Cap (c), veh/h	0	226	0	0	0	190	551	363
V/C Ratio (X)	0.00	0.26	0.00	0.00	0.00	0.34	0.40	0.17
Avail Cap (c_a), veh/h	0	226	0	0	0	190	551	363
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d1), s/veh	0.0	32.4	0.0	0.0	0.0	35.2	10.6	18.3
Incr Delay (d2), s/veh	0.0	2.7	0.0	0.0	0.0	4.8	2.2	1.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	35.2	0.0	0.0	0.0	39.9	12.8	19.3
1st-Term Q (Q1), veh/ln	0.0	1.2	0.0	0.0	0.0	1.4	2.5	1.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.3	0.3	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00
%ile Back of Q (50%), veh/ln	0.0	1.4	0.0	0.0	0.0	1.6	2.8	1.1
%ile Storage Ratio (RQ%)	0.00	0.39	0.00	0.00	0.00	0.64	0.90	0.27
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T				T			
Lanes in Grp	0	0	0	1	0	0	0	1
Grp Vol (v), veh/h	0	0	0	621	0	0	0	320
Grp Sat Flow (s), veh/h/ln	0	0	0	1863	0	0	0	1863
Q Serve Time (g_s), s	0.0	0.0	0.0	17.5	0.0	0.0	0.0	9.7
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.5	0.0	0.0	0.0	9.7
Lane Grp Cap (c), veh/h	0	0	0	1068	0	0	0	795
V/C Ratio (X)	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.40
Avail Cap (c_a), veh/h	0	0	0	1068	0	0	0	795
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	11.2	0.0	0.0	0.0	16.3
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.0	0.0	1.5
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	13.5	0.0	0.0	0.0	17.8
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	9.0	0.0	0.0	0.0	5.0

HCM 2010 Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2017 Build
PM Peak

2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.3
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	9.7	0.0	0.0	0.0	5.3
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.11	0.00	0.00	0.00	1.23
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R		R		T+R		R	
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	414	0	43	0	362	0	120
Grp Sat Flow (s), veh/h/ln	0	1748	0	1568	0	1729	0	1563
Q Serve Time (g_s), s	0.0	17.4	0.0	1.0	0.0	14.8	0.0	3.9
Cycle Q Clear Time (g_c), s	0.0	17.4	0.0	1.0	0.0	14.8	0.0	3.9
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.33	0.00	1.00	0.00	0.38	0.00	1.00
Lane Grp Cap (c), veh/h	0	554	0	899	0	548	0	667
V/C Ratio (X)	0.00	0.75	0.00	0.05	0.00	0.66	0.00	0.18
Avail Cap (c_a), veh/h	0	554	0	899	0	548	0	667
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	25.1	0.0	7.7	0.0	24.2	0.0	14.6
Incr Delay (d2), s/veh	0.0	8.9	0.0	0.1	0.0	6.1	0.0	0.6
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	33.9	0.0	7.8	0.0	30.3	0.0	15.2
1st-Term Q (Q1), veh/ln	0.0	8.4	0.0	0.4	0.0	7.0	0.0	1.7
2nd-Term Q (Q2), veh/ln	0.0	1.4	0.0	0.0	0.0	0.9	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	9.8	0.0	0.4	0.0	8.0	0.0	1.8
%ile Storage Ratio (RQ%)	0.00	1.31	0.00	0.15	0.00	0.47	0.00	0.45
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	21.8							
HCM 2010 LOS	C							

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	17	426	5	11	288
Future Vol, veh/h	5	17	426	5	11	288
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	5	18	463	5	12	313
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	803	466	0	0	468	0
Stage 1	466	-	-	-	-	-
Stage 2	337	-	-	-	-	-
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	353	597	-	-	1094	-
Stage 1	632	-	-	-	-	-
Stage 2	723	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	348	597	-	-	1094	-
Mov Cap-2 Maneuver	348	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	714	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	12.4	0	0.3			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	513	1094	-	
HCM Lane V/C Ratio	-	-	0.047	0.011	-	
HCM Control Delay (s)	-	-	12.4	8.3	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

APPENDIX C

Self Storage Facility Usage Data

Employees

Tenants

X 15 minutes

X 15 minutes

of parking Space needed

DATE	# E	# T	2 in 15	3 IN 15	
Saturday, July 1, 2017	1	10	5	1	4
Sunday, July 2, 2017	1	4	2	0	3
Monday, July 3, 2017	1	6	4	0	3
Tuesday, July 4, 2017	0	3	0	0	1
Wednesday, July 5, 2017	2	11	2	0	4
Thursday, July 6, 2017	2	12	5	0	4
Friday, July 7, 2017	2	13	3	3	5
Saturday, July 8, 2017	2	12	3	3	5
Sunday, July 9, 2017	2	11	3	1	5
Monday, July 10, 2017	1	6	1	0	3
Tuesday, July 11, 2017	2	15	3	0	4
Wednesday, July 12, 2017	1	4	0	0	2
Thursday, July 13, 2017	1	14	1	1	4
Friday, July 14, 2017	1	10	2	0	3
Saturday, July 15, 2017	1	11	4	1	4
Sunday, July 16, 2017	1	9	1	0	3
Monday, July 17, 2017	1	21	4	3	4
Tuesday, July 18, 2017	1	16	6	1	4
Wednesday, July 19, 2017	2	10	1	1	5
Thursday, July 20, 2017	1	8	1	1	4
Friday, July 21, 2017	2	9	3	0	4
Saturday, July 22, 2017	1	11	1	0	3
Sunday, July 23, 2017	2	9	3	1	5
Monday, July 24, 2017	1	10	1	0	3
Tuesday, July 25, 2017	1	14	4	0	3
Wednesday, July 26, 2017	2	9	5	0	4
Thursday, July 27, 2017	2	11	3	0	4
Friday, July 28, 2017	2	10	1	1	5
Saturday, July 29, 2017	1	11	1	0	3
Sunday, July 30, 2017	1	7	0	0	2
Monday, July 31, 2017	1	9	3	0	3

Employees

Tenants

X 15 minutes

X 15 minutes

of parking Space needed

[illegible]

APPENDIX D

Institute of Transportation Engineers Trip Generation and Parking Generation Data



Trip Generation Manual

10th Edition • Volume 2: Data

Industrial (Land Uses 100–199)



SEPTEMBER 2017
INSTITUTE OF TRANSPORTATION ENGINEERS

Land Use: 151 Mini-Warehouse

Description

A mini-warehouse is a building in which a number of storage units or vaults are rented for the storage of goods. They are typically referred to as "self-storage" facilities. Each unit is physically separated from other units, and access is usually provided through an overhead door or other common access point.

Additional Data

Time-of-day distribution data for this land use are presented in Appendix A. For the 10 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 10:30 and 11:30 a.m. and 1:15 and 2:15 p.m., respectively.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Colorado, Massachusetts, Minnesota, New Jersey, Texas, and Utah.

Source Numbers

212, 403, 551, 568, 642, 708, 724, 850, 868, 876

Mini-Warehouse (151)

Vehicle Trip Ends vs: Storage Units (100s)

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 6

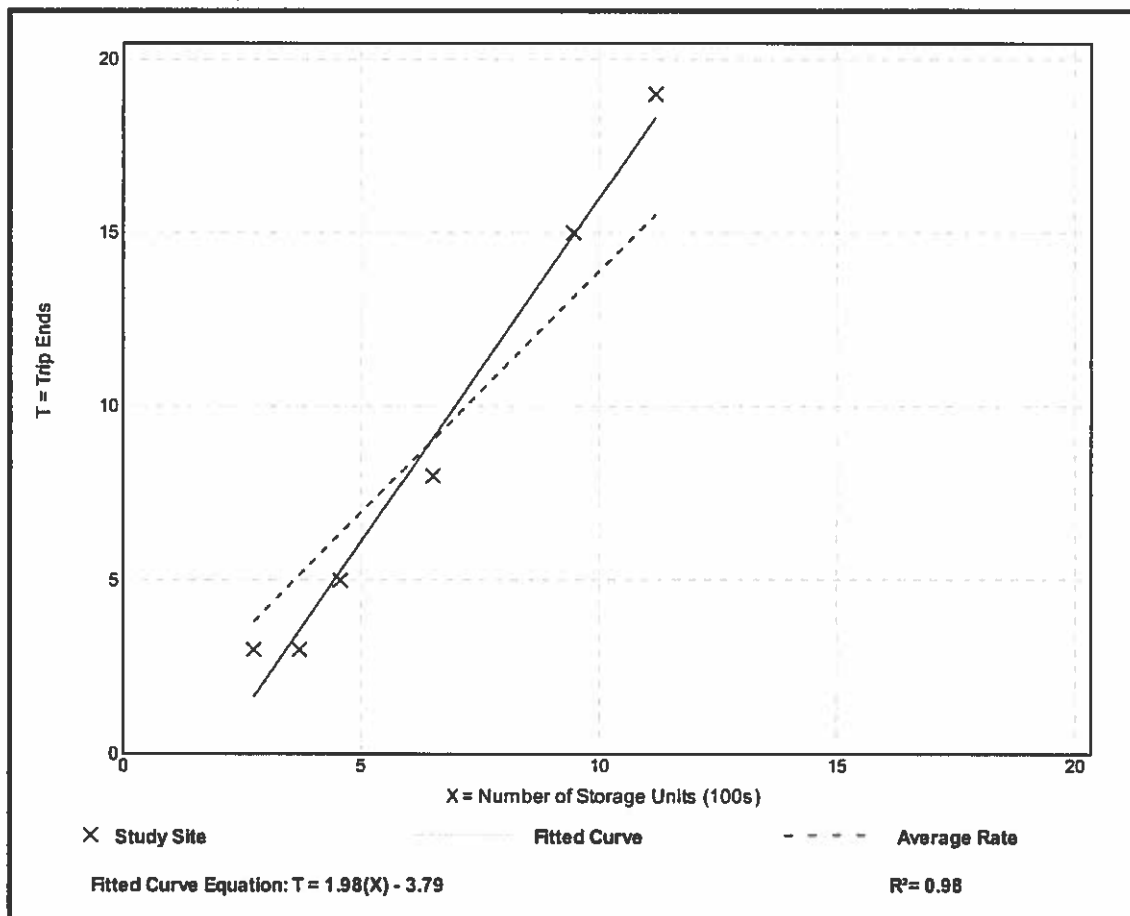
Avg. Num. of Storage Units (100s): 6

Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per Storage Unit (100s)

Average Rate	Range of Rates	Standard Deviation
1.39	0.81 - 1.70	0.33

Data Plot and Equation



Mini-Warehouse (151)

Vehicle Trip Ends vs: Storage Units (100s)

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 8

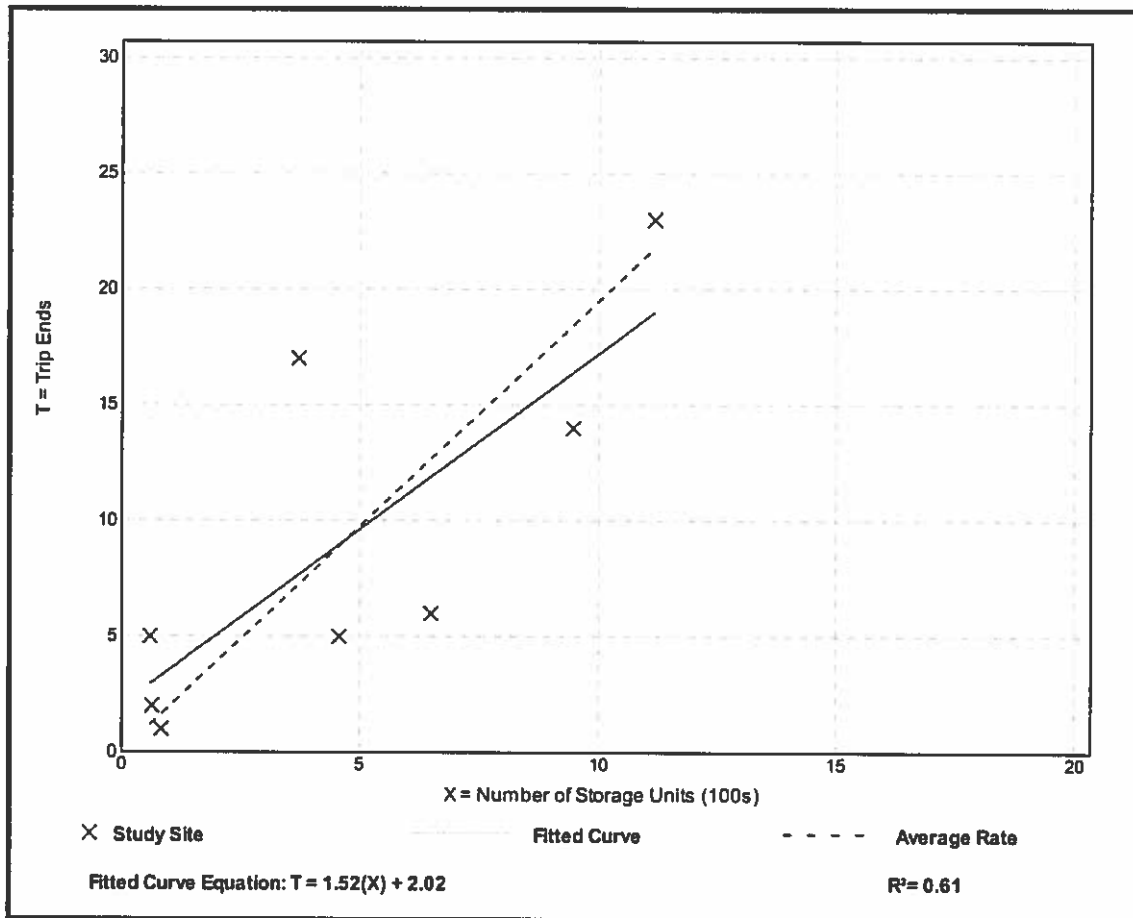
Avg. Num. of Storage Units (100s): 5

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Storage Unit (100s)

Average Rate	Range of Rates	Standard Deviation
1.95	0.92 - 8.33	1.40

Data Plot and Equation





Trip Generation Manual

10th Edition • Volume 2: Data

Services (Land Uses 900–999)



SEPTEMBER 2017
INSTITUTE OF TRANSPORTATION ENGINEERS

Land Use: 920

Copy, Print, and Express Ship Store

Description

A copy, print, and express ship store is a facility that offers a variety of copying, printing, binding, and shipping services. Retail sales of a limited range of office-related items including packing and shipping supplies are also commonly available. Technology services, such as computer rental and wireless Internet may also be provided. Copy, print, and express ship stores typically maintain long store hours 7 days a week. Some stores may be open 24 hours a day.

Additional Data

The weekday AM peak hour occurred between 10:30 and 11:30 a.m. The weekday PM peak hour occurred between 3:30 and 4:30 p.m.

The site was surveyed in the 2000s in Texas.

Source Number

608

Copy, Print, and Express Ship Store (920)

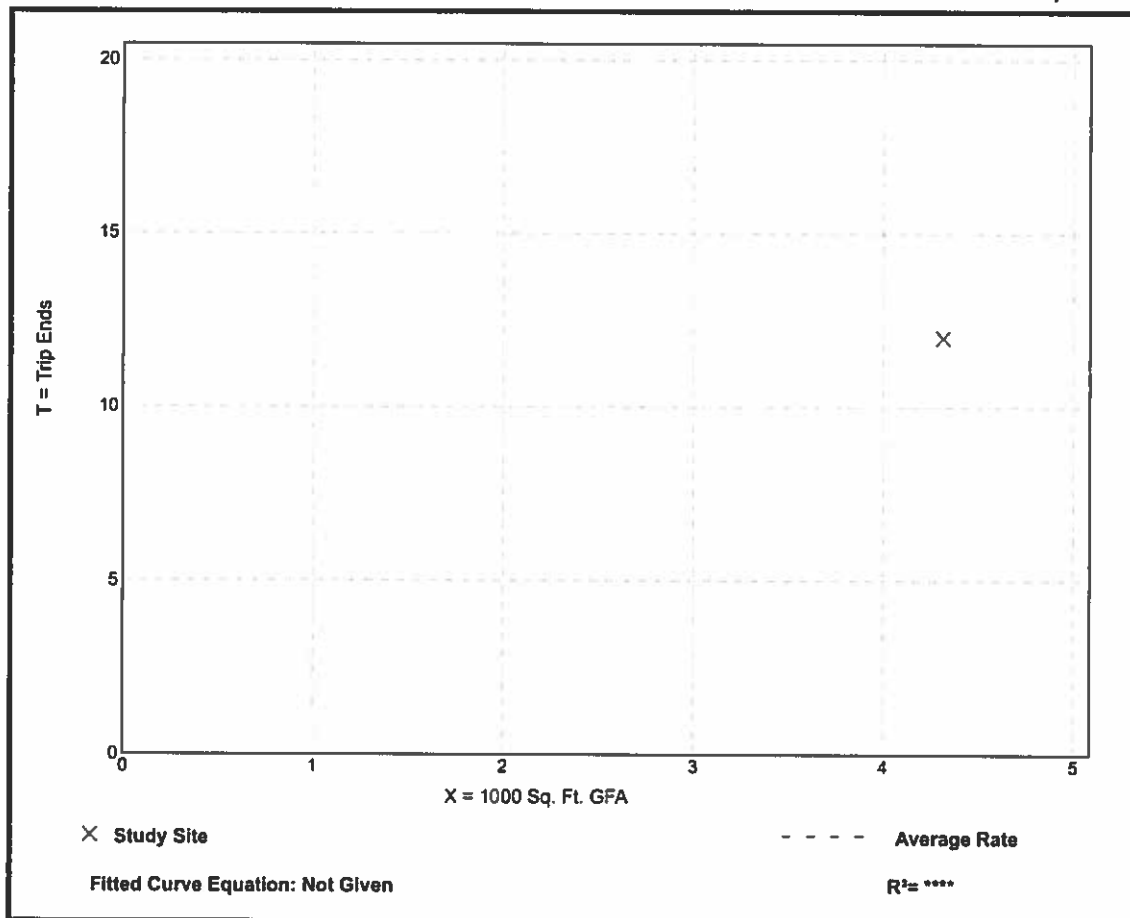
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 7 and 9 a.m.
 Setting/Location: General Urban/Suburban
 Number of Studies: 1
 1000 Sq. Ft. GFA: 4
 Directional Distribution: 75% entering, 25% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.78	2.78 - 2.78	*

Data Plot and Equation

Caution – Small Sample Size



Copy, Print, and Express Ship Store (920)

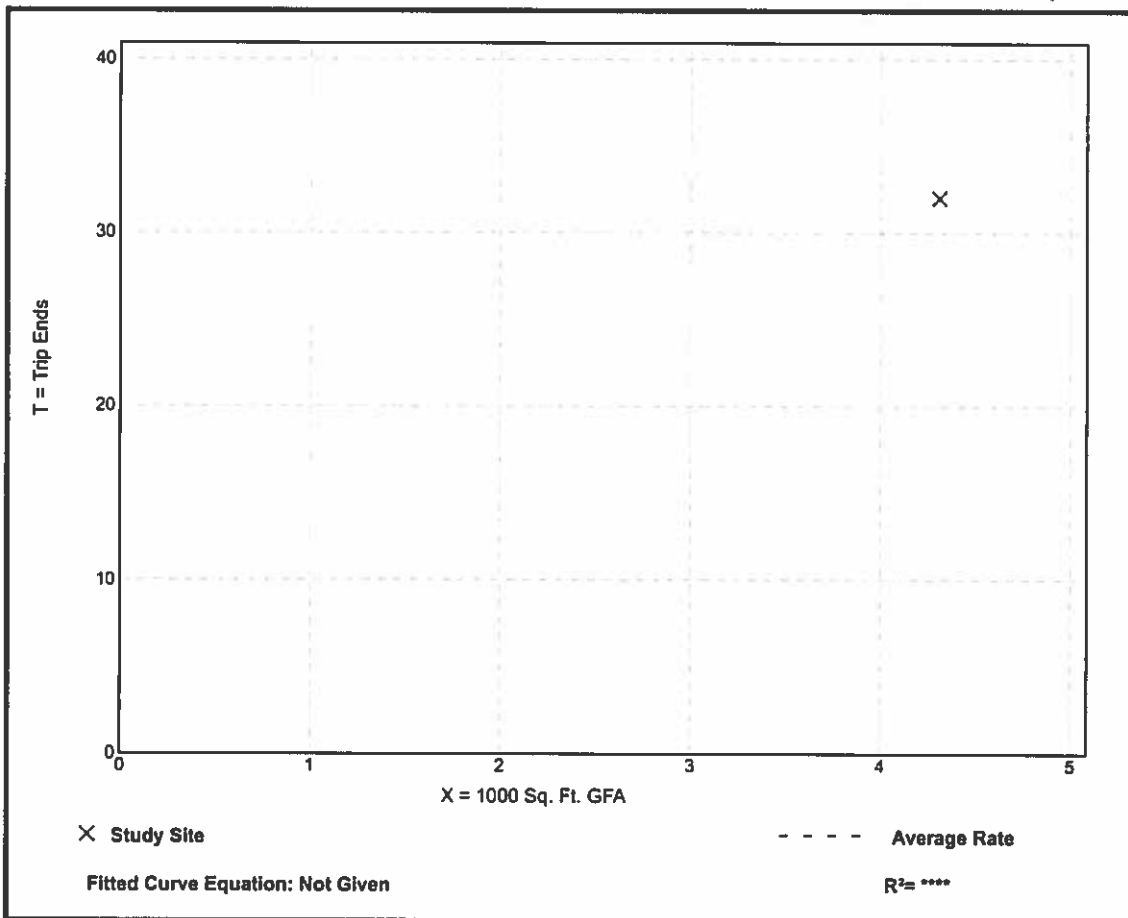
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
 Setting/Location: General Urban/Suburban
 Number of Studies: 1
 1000 Sq. Ft. GFA: 4
 Directional Distribution: 44% entering, 56% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
7.42	7.42 - 7.42	.

Data Plot and Equation

Caution – Small Sample Size



4th Edition

Parking Generation



Institute of Transportation Engineers

Land Use: 151 Mini-Warehouse

Description

Mini-warehouses are buildings in which a number of storage units or vaults are rented for the storage of goods. They are typically referred to as "self-storage" facilities. Each unit is physically separated from other units, and access is usually provided through an overhead door or other common access point.

Database Description

- Average parking supply ratio: 0.2 spaces per 1,000 square feet (sq. ft.) gross floor area (GFA) (two study sites).

The Saturday parking demand ratio for a site with 1,400 storage units was 0.77 vehicles per 100 storage units. Parking demand data at this site were collected for six consecutive hours between 1:00 and 7:00 p.m., and the peak period of demand occurred between 4:00 and 5:00 p.m.

The following table presents a time-of-day distribution of parking demand for three study sites.

<i>Based on Vehicles per 1,000 sq. ft. GFA</i>	<i>Weekday</i>	
Hour Beginning	Percent of Peak Period	Number of Data Points*
12:00–4:00 a.m.	–	0
5:00 a.m.	–	0
6:00 a.m.	–	0
7:00 a.m.	31	3
8:00 a.m.	24	3
9:00 a.m.	59	3
10:00 a.m.	91	3
11:00 a.m.	100	3
12:00 p.m.	55	3
1:00 p.m.	45	3
2:00 p.m.	46	3
3:00 p.m.	40	2
4:00 p.m.	88	1
5:00 p.m.	27	1
6:00 p.m.	35	1
7:00 p.m.	27	1
8:00 p.m.	–	0
9:00 p.m.	–	0
10:00 p.m.	–	0
11:00 p.m.	–	0

* Subset of database

Study Sites/Years

Canada:

Burnaby, BC (1991); Coquitlam, BC (1991); Richmond, BC (1991)

United States:

Santa Barbara, CA (1998); Hadley, MA (2008)

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Average Peak Period Parking Demand vs. 100 Storage Units On a: Weekday

Statistic	Peak Period Demand
Peak Period	11:00 a.m.–12:00 p.m.; 4:00–5:00 p.m.
Number of Study Sites	6
Average Size of Study Sites	648 storage units
Average Peak Period Parking Demand	1.35 vehicles per 100 storage units
Standard Deviation	0.34
Coefficient of Variation	25%
Range	1.05–1.96 vehicles per 100 storage units
85th Percentile	1.66 vehicles per 100 storage units
33rd Percentile	1.17 vehicles per 100 storage units

