



TRAFFIC IMPACT STUDY

Murphy Brothers – Mamaroneck Self Storage
416 Waverly Avenue
Village of Mamaroneck, Westchester County, New York

Prepared for
**EAST COAST NORTH PROPERTIES, LLC
AND MURPHY BROTHERS CONTRACTING**
Village of Mamaroneck, New York

Prepared by
DTS Provident Design Engineering, LLP
One North Broadway
White Plains, New York

**Revised February 4, 2022
(Table 5 Revised November 2022)
Revised November 10, 2020
DTSP Project No. 17-060**

TABLE OF CONTENTS

<u>SECTION</u>	<u>DESCRIPTION</u>
1.0	INTRODUCTION
2.0	TRAFFIC AND PARKING GENERATION
3.0	TRAFFIC CIRCULATION
4.0	PARKING
5.0	CONCLUSIONS

APPENDIX A – Figures

APPENDIX B - Level of Service Analysis

APPENDIX C - Self Storage Facility Usage Data

**APPENDIX D - Institute of Transportation Engineers Trip Generation and Parking
Generation Data**

APPENDIX E – Traffic Count Sheets

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

1.0 INTRODUCTION

DTS Provident Design Engineering, LLP (DTS Provident), formerly Provident Design Engineering, PLLC (PDE), 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 (160 units) would replace some existing structures on the site which currently house various contractors/workers. 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 but would generally be only 1 or 2. In addition to the new Self Storage facility, there will also be approximately 5,879-square feet of woodworking shop, 2,157 square feet of Murphy Brothers Contracting offices, and 2,008 square feet of community office workspace.

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 26 parking spaces on-site along with three (3) loading spaces as well as the on-street parking spaces.

DTS Provident, PDE at the time, prepared the Traffic and Parking Study for the original Self Storage facility at the Site. To perform this latest Study, DTS Provident 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. DTS Provident conducted traffic analysis for the intersection of Waverly Avenue and Fenimore Road as well as at the intersection of Fenimore Road and Railroad Way and at the Site Driveways.

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

2.0 TRAFFIC AND PARKING GENERATION

DTS Provident 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 160 additional storage units would generate approximately 1 entering vehicle and 1 exiting vehicle in the Peak AM Hour and approximately 1 entering vehicle and 2 exiting vehicles during the Peak PM Roadway Hour. During the Weekend Peak Hour, the 160 additional storage units would generate similar amounts, 1 entering vehicle and 2 exiting vehicles. 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 that portion of the site.

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

TABLE NO. 1 TRIP GENERATION FOR ADDITIONAL 160 STORAGE UNITS				
	Weekday Peak AM Roadway Hour			Weekday Peak PM Roadway Hour
ENTER	1			1
EXIT	1			2

The 5,879-square feet of woodworking shop (Land Use 180), 2,157 square feet of Murphy Brothers Contracting offices (Land Use 710), and 2,008 square feet of community office workspace (Land Use 710) will also generate minimal traffic. The ITE 10th Edition estimates that these land uses would conservatively generate a total of approximately 9 entering vehicles and 4 exiting vehicles in the Weekday Peak AM Hour and approximately and a total of 7 entering vehicles and 9 exiting vehicles during the Peak PM Roadway Hour. Similar, or reduced, trip amounts would be experienced during the Weekend Peak Hour.

TABLE NO. 2 PROJECTED TRIP GENERATION						
Scenario	Weekday Peak AM Roadway Hour			Weekday Peak PM Roadway Hour		
	Enter	Exit	Total	Enter	Exit	Total
429 Self Storage Units (including 269 Existing and 160 Additional Units)	2	2	4	4	5	9
Woodworking Shop	1	1	2	1	1	2
Incubator Offices	3	1	4	2	3	5
MBC Offices	3	1	4	2	3	5
Total	9	5	14	9	12	21

The following table compares the total anticipated site generated volumes versus the existing site generated volumes (including from the contracting offices).

TABLE NO. 3 TRIP GENERATION COMPARISON						
Scenario	Weekday Peak AM Roadway Hour			Weekday Peak PM Roadway Hour		
	Enter	Exit	Total	Enter	Exit	Total
Existing	12	14	26	9	10	19
Proposed	9	5	14	9	12	21
Difference	-3	-10	-12	0	2	2

As illustrated in the table above, the proposed land uses will generate 12 less vehicles in the Peak AM Hour and only 2 more vehicles in the Peak PM Hour than the existing land uses.

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

Parking Generation

A Self Storage facility of a total of 429 units, based upon the Institute of Transportation Engineers' (ITE) publication "Parking Generation", 5th Edition, would generate a Peak Parking Demand of 6 spaces. The supporting information from the ITE 5th Edition is contained in Appendix D.

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/worker 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. Vehicles sometimes back out of this driveway onto Fenimore Road.

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, which improves safety. 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.

The two remaining driveways will continue to operate 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 vehicular and pedestrian traffic flow and safety throughout the site and off-site as well as improve Waverly Avenue and Fenimore Road by reducing the number of curbcuts. Sidewalks are provided on both Waverly Avenue and Fenimore Road adjacent to the Site. The signalized intersection of Waverly Place and Fenimore Road has crosswalks and pedestrian signals.

Adjacent Roadway Network

The intersection of Waverly Avenue and Fenimore Road is controlled by a multi-phase traffic signal. DTS Provident conducted traffic counts at this intersection as well as at the Site Driveways. The Peak Hours for the intersection are 7:30 AM to 8:30 AM and 4:45 PM to 5:45 PM.

Railroad Way

The intersection of Fenimore Road and Railroad Way is an unsignalized “T” intersection. For the general traveling public, Railroad Way does not appear to be a roadway and has railroad tracks traveling through it. Railroad Way is narrow with no curbing but having two buildings forming its borders. Railroad Way also does not have an official Village street sign. For vehicles traveling eastbound on Fenimore Road, there is a non-typical sign on the side of a warehouse building indicating Railroad Way, while no signs are present in the westbound direction. There are no One-Way Signs at the intersection and no striping along the roadway. However, at the southern end of the alleyway, there is a Do Not Enter Sign so the alleyway is assumed to be one-way southbound. There is also no physical indication to the public when a train may be traveling on Railroad Way. There are no pedestrian facilities or sidewalks along Railroad Way. Thus, limited traffic utilizes Railroad Way at the intersection. There are alternative ways to connect to other portions of Railroad Way such as Ogden Avenue.

Fenimore Road at Railroad Way consists on one lane per direction. There are two sets of double yellow lines across from Railroad Way and there is no break in the double yellow lines for left turns.

Existing Traffic Volumes

DTS Provident utilized the original 2016 Existing Traffic Volumes from traffic counts conducted on behalf of the Village and grew them for one year by using a growth rate of 0.5%. This resulted in the 2017 Existing Traffic Volumes that were supplemented with Site Driveway observations and Traffic Counts conducted in November of 2017. The Traffic Count sheets are contained in Appendix E. These volumes are consistent with volumes from other Studies. Because of the change in traffic patterns due to the current world conditions (Covid impacts), traffic was conservatively applied to Railroad Way. For the Fenimore Road and Railroad Way intersection, 10 vehicles turning in from both the eastbound and westbound Fenimore Road directions were conservatively utilized as current conditions do not permit for traffic counts being performed. The Existing Traffic Volumes are illustrated on Figure 1 in Appendix A.

No-Build Traffic Volumes

The Future Conditions without the Proposed Action (“No Build”) were developed based upon discussions with the Village Planner and Village Engineer as well as various documents provided by the Village’s Planner and Engineer including the Village Comprehensive Plan, the various Village Transit Oriented Development Studies, the Waverly Avenue Study, the Village’s Vision Zero Documents, the Village’s Moratorium Traffic Study and NYSDOT Traffic Data. A growth factor of 0.5% per year was provided by the Village and is consistent with the other Village documents. While there were no known major adjacent developments that would impact traffic in the area that would not be accounted for in the growth rate, the Village provided staff provided some information on some additional background traffic as illustrated on Figure 2. Thus, existing traffic was grown to the Build Year by utilizing the growth factored compounded over the years.

Thus, the Existing Traffic Volumes were then grown for five years by a compounded growth factor of 0.5% per year to result in the 2023 No-Build Traffic Volumes. The 2023 No-Build Traffic Volumes are illustrated on Figure 3.

Build Traffic Volumes

Arrival and Departure distributions are illustrated on Figures 4 and 5 and are based on

Existing Traffic patterns and Site Driveway observations. Using the Arrival and Departure distributions, the Site Generated Traffic Volumes (Figure 6) were distributed onto the Roadway Network, and, after removing the existing Site traffic, resulted in the 2023 Build Traffic Volumes. The 2023 Build Traffic Volumes are illustrated on Figure 7.

The 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 7. DTS Provident also conducted Level of Service capacity analyses for the intersection of Waverly Avenue and Fenimore Road, the intersection of Railroad Way and Fenimore Road, and the Site Driveways. Copies of these analyses are contained in Appendix B.

Table No. 4 summarizes the Levels of Services for the intersections and the Site Driveways:

**TABLE NO. 4
LEVEL OF SERVICE**

Intersection	AM Peak			PM Peak		
	Existing	No-Build	Build	Existing	No-Build	Build
Fenimore Road & Waverly Avenue	C 22.6	C 23.3	C 23.1	C 21.4	C 21.8	C 21.9
Fenimore Road and Existing Exit Driveway	c 15.0	c 15.4	c 15.2	a 0.0	a 0.0	b 14.9
Waverly Avenue & Existing Driveway 1 (Contractor Offices)	b 14.7	b 15.0	- -	b 14.9	c 15.2	- -
Waverly Avenue & Existing Driveway 2 (Self-Storage)	b 11.0	b 11.1	b 13.6	b 11.9	b 12.8	b 12.9
Fenimore Road and Railroad Way	a 0.4	a 0.4	a 0.4	a 0.4	a 0.4	a 0.4

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.

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 B or better. Thus, good Levels of Service are maintained at each of the intersections/driveways.

The Proposed Project will result in a minimal change in traffic operations at the intersection of Fenimore Road and Railroad Way, with only a very conservative estimated 1 eastbound trip and 2 westbound trips during the Peak AM Hour and 3

eastbound trips and 2 westbound trips during the Peak PM Hour. In reality, there would be a reduction in overall Peak Hour trips with the Proposed Project as a result of the traffic from the contractors/workers that will no longer be at the Site. Existing, No Build and Build Traffic Volumes were performed for the intersection which indicated that the intersection currently and will continue to operate at appropriate Levels of Service and the Project will have no impact on the operation of the intersection. 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.

DTS Provident 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 were not available on the property.

In addition, DTS Provident reviewed data for the entrance and exit into the existing Self Storage facility from July 1, 2017 to August 24, 2017. These indicated 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. Recent observations indicated similar amounts.

In addition to the parking for Murphy Brothers, approximately 19 other contractors/workers 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. 5 PARKING FOR OTHER SELF STORAGE FACILITIES				
Facility	Location	No. of Units	Parking Spaces Initially Required by Zoning	Variance Granted or 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
Black Mountain	New Rochelle	1,182	N/A	12
Tarrytown Self Storage	Tarrytown	577	52	3 *
Cube Smart (proposed)	Port Chester	1,000	N/A	10
<i>Project</i>	<i>Mamaroneck</i>	<i>429</i>	<i>124</i>	<i>26</i>

* Based upon maximum recorded

Table No. 5 compares the Parking Spaces per Unit as well as the number of Units per Parking Space for other Self Storage in the area.

TABLE NO. 6 PARKING RATIOS FOR OTHER SELF STORAGE FACILITIES				
Facility	Location	No. of Units	Parking Spaces per Unit	Units per Parking Space
Westy's Self Storage	Port Chester	900	0.0244	41
Safeguard Storage	Elmsford	550	0.0218	46
Safeguard Storage	New Rochelle	653	0.0214	47
Westy's Self Storage	Tuckahoe	1,500	0.0160	63
Black Mountain	New Rochelle	1,182	0.0101	99
Tarrytown Self Storage	Tarrytown	577	0.0052	192
354 North Main St.	Port Chester	1,000	0.0100	100
<i>Project</i>	<i>Mamaroneck</i>	<i>429</i>	<i>0.0606</i>	<i>17</i>

As illustrated in the above Tables, all of these other facilities have significantly more storage units yet provide similar or less 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 429 units, based upon the Institute of Transportation Engineers' (ITE) publication "Parking Generation", 5th Edition, would generate a Peak parking demand of 6 spaces. The supporting information from the ITE 5th Edition is contained in Appendix D. The table below summarizes parking demand by land use.

TABLE NO. 7 PROJECTED PARKING GENERATION	
Scenario	Weekday
	Parking Demand
429 Self Storage Units (including 269 Existing and 160 Additional Units)	6
Woodworking Shop	3
Incubator Offices	6
MBC Offices	4
Total	19

The 5,879-sf Woodworking Shop is estimated to require approximately three (3) parking spaces based upon the use of Site. The 2,008-sf Incubator Offices is estimated to require a peak of approximately six (6) parking spaces based upon the use of the Site. The Murphy Brothers Contracting portion of the Site will have four full time employees on-site and are projected to utilize four (4) parking spaces. Murphy Brothers Contracting will generally not generate any visits from the general public or contractors. The other nineteen contractors/workers 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. In conclusion, the total parking spaces required by all the proposed land uses would be 19 parking spaces if all uses were to reach their peak at the same time, which is not likely.

With the proposed additional Self Storage facility and the modifications to the layout of the site, there will be 26 parking spaces provided on-site along with three (3) loading spaces, in addition to the on-street parking spaces. The three 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 more than sufficient to support the Self Storage facility and the other various uses on the site.

5.0 CONCLUSIONS

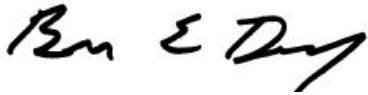
The proposed modifications to the internal circulation of the site will improve traffic flow and operations. The elimination of a driveway along Waverly Avenue and the elimination of a curb cut on Fenimore Road will also improve safety within the site and along Waverly Avenue and Fenimore Road such as vehicles will no longer back out of the barn driveway onto 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 require up to 6 parking spaces, the Murphy Brothers Contracting will require 4 parking spaces, the Incubator Offices will require 6 parking spaces and the Woodworking Shop will require 3 parking spaces for a peak total of 19 spaces. In addition, the peak of each of the above uses would not occur at the same time, with the Murphy Brothers Contracting and Incubator Offices peaking in the early morning, the Self Storage facility peaking mid-late morning and the Woodworking Shop generating insignificant parking. The Village's Code permits the utilization of "Shared Parking", referred to as "Joint Parking", in Section 342-56 B. Shared Parking is the principle where different land uses would have their peak parking demands at different times during the day/week and thus can utilize or "share" the same parking space during different periods. As described above, there will be ample parking even without the principles of Shared Parking being applied.

Thus, the 26 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 3 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:

DTS PROVIDENT DESIGN ENGINEERING, LLP



Brian E. Dempsey, P.E., PTOE, RSP1
Partner



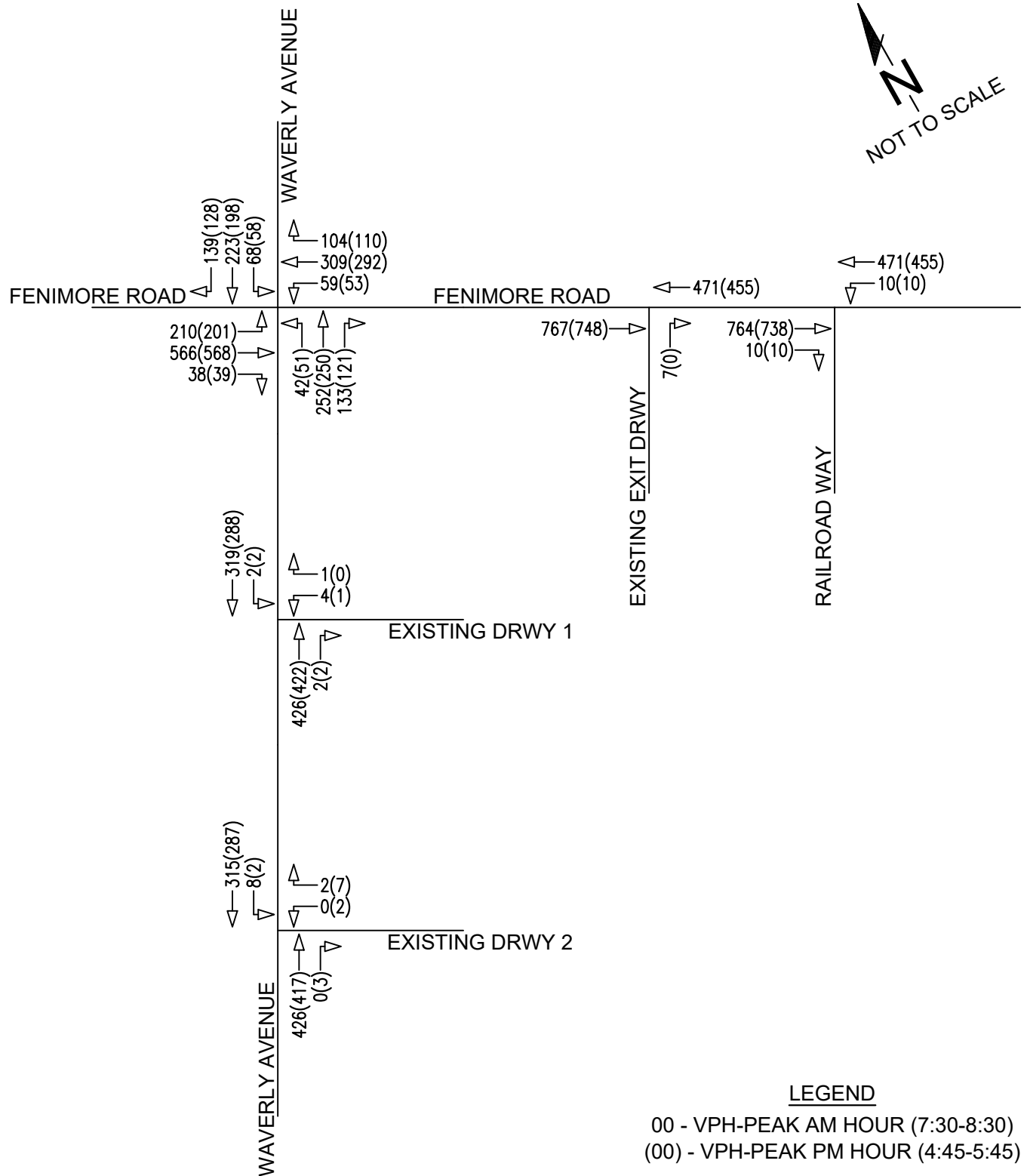
Danny Cuya, EIT
Engineer

Q:\PROJECTS-17\17-060 Murphy Brothers\Reports\Traffic\Traffic and Parking Study (Updated February 2022).doc

APPENDIX A

Figures

Q:\PROJECTS-17\17-060 Murphy Brothers\AutoCAD\Traffic\17-060 TrafficFigures (Rev Feb 2022).dwg



7 SKYLINE DRIVE, HAWTHORNE, NEW YORK 10532
TEL: (914) 592-4040 WWW.PDERESULTS.COM

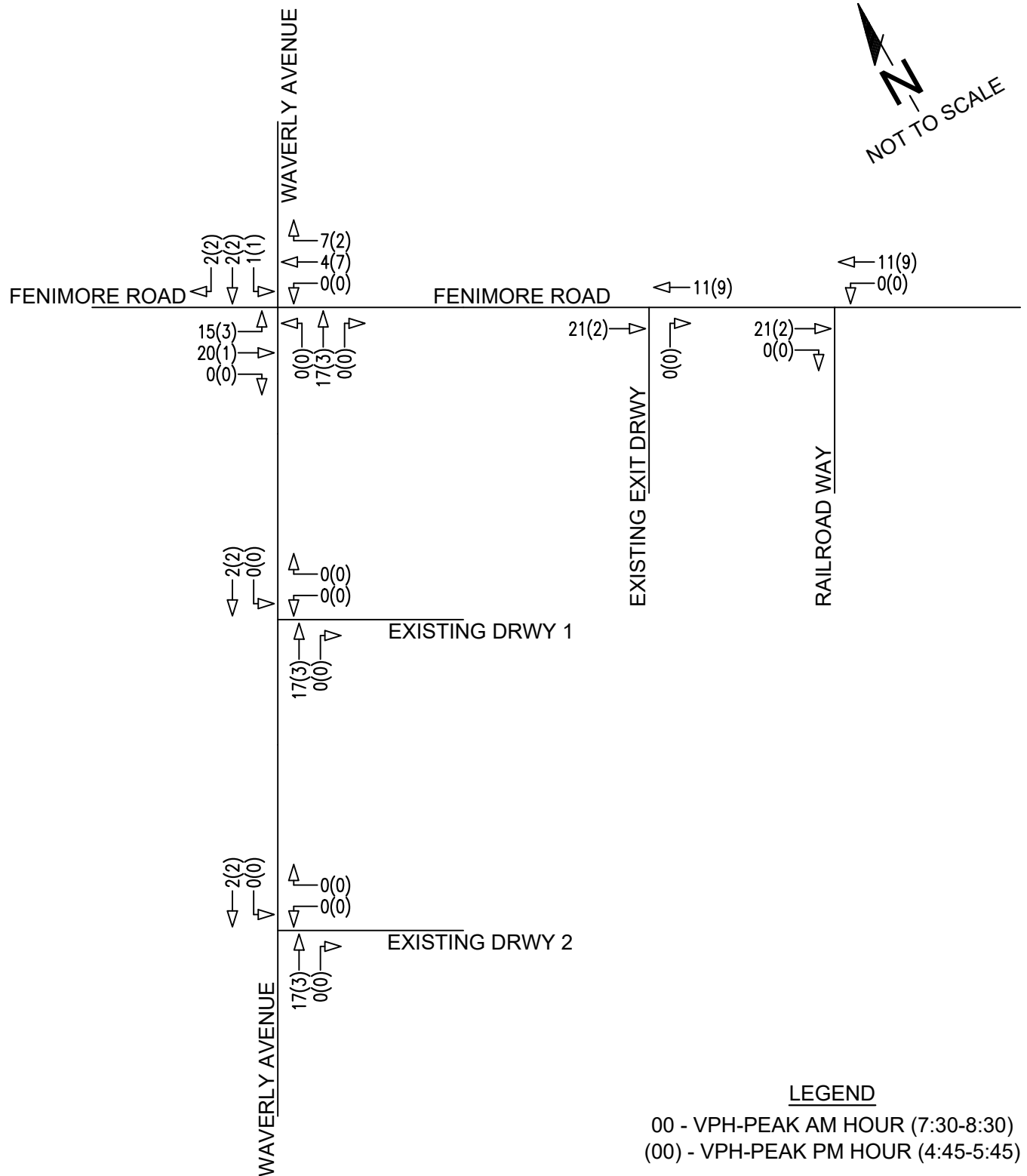
© PROVIDENT DESIGN ENGINEERING, PLLC

Existing Traffic Volumes
Mamaroneck, Westchester, NY

Project No. 17-060
February 2022

Figure No. 01

Q:\PROJECTS-17\17-060 Murphy Brothers\AutoCAD\Traffic\17-060 TrafficFigures (Rev Feb 2022).dwg



7 SKYLINE DRIVE, HAWTHORNE, NEW YORK 10532
TEL: (914) 592-4040 WWW.PDERESULTS.COM

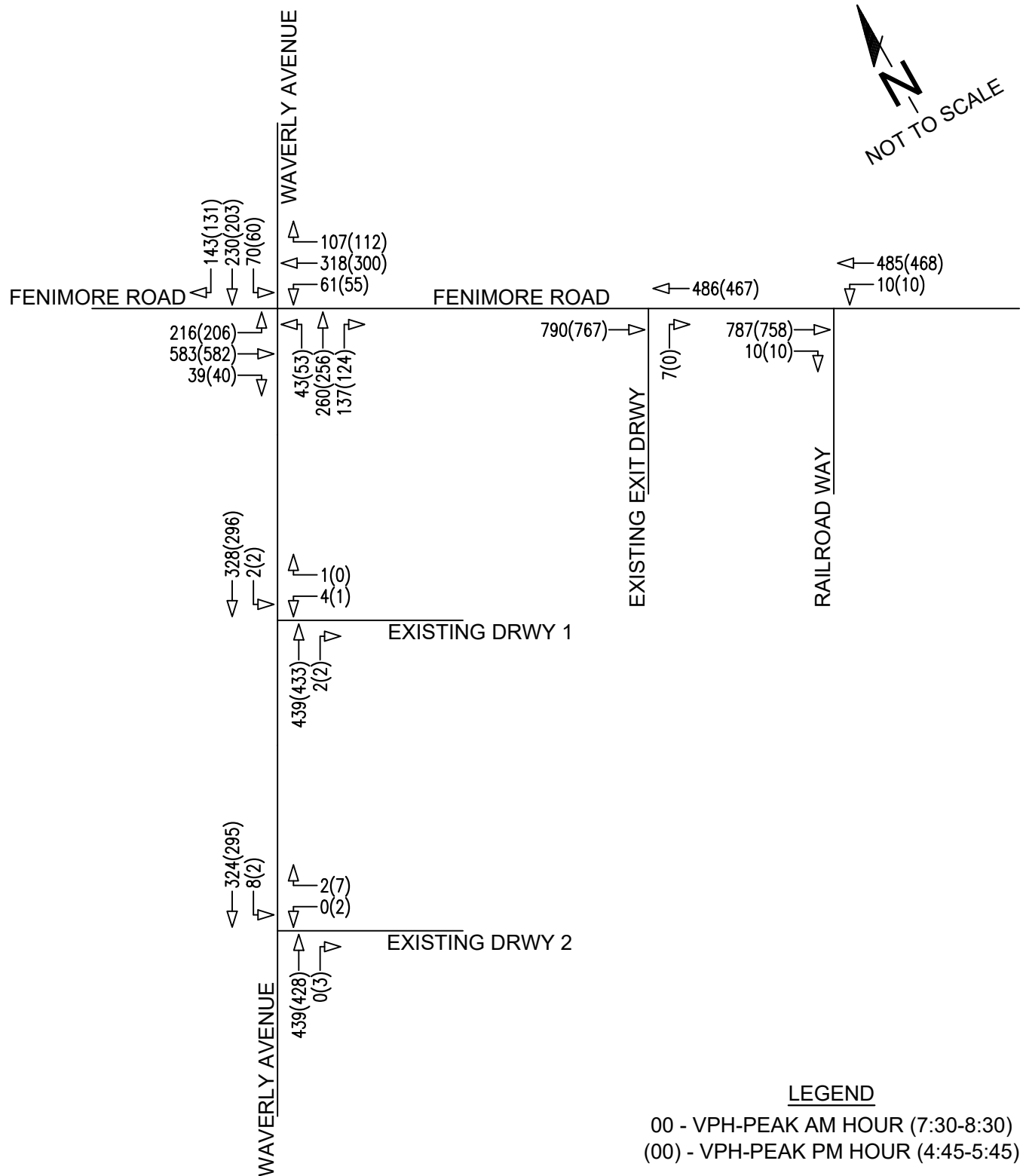
© PROVIDENT DESIGN ENGINEERING, PLLC

Adjacent Development Traffic Volumes Mamaroneck, Westchester, NY

Project No. 17-060
February 2022

Figure No. 02

Q:\PROJECTS-17\17-060 Murphy Brothers\AutoCAD\Traffic\17-060 TrafficFigures (Rev Feb 2022).dwg



7 SKYLINE DRIVE, HAWTHORNE, NEW YORK 10532
 TEL: (914) 592-4040 WWW.PDERESULTS.COM

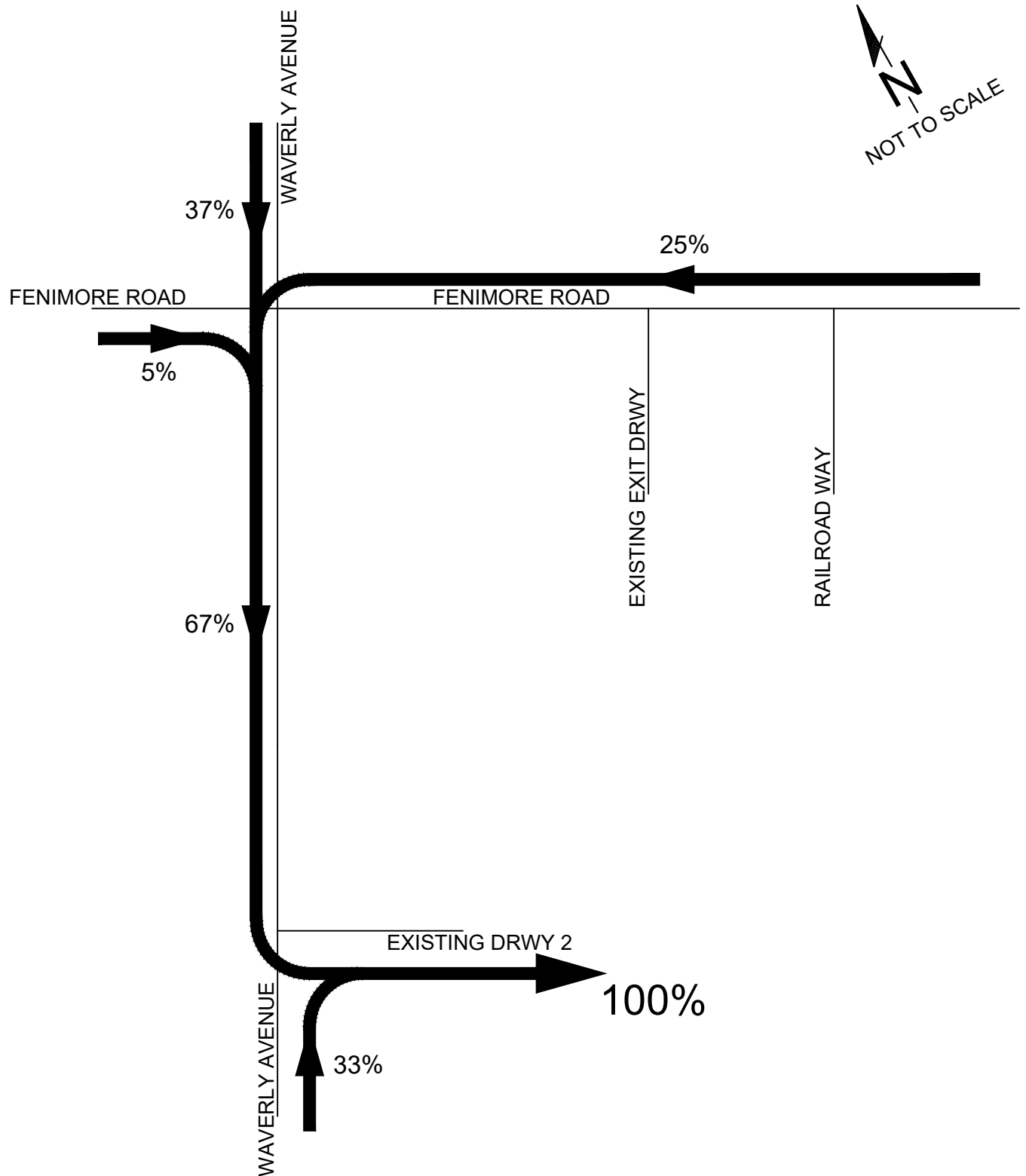
© PROVIDENT DESIGN ENGINEERING, PLLC

No-Build Traffic Volumes
 Mamaroneck, Westchester, NY

Project No. 17-060
 February 2022

Figure No. 03

Q:\PROJECTS-17\17-060 Murphy Brothers\AutoCAD\Traffic\17-060 TrafficFigures (Rev Feb 2022).dwg



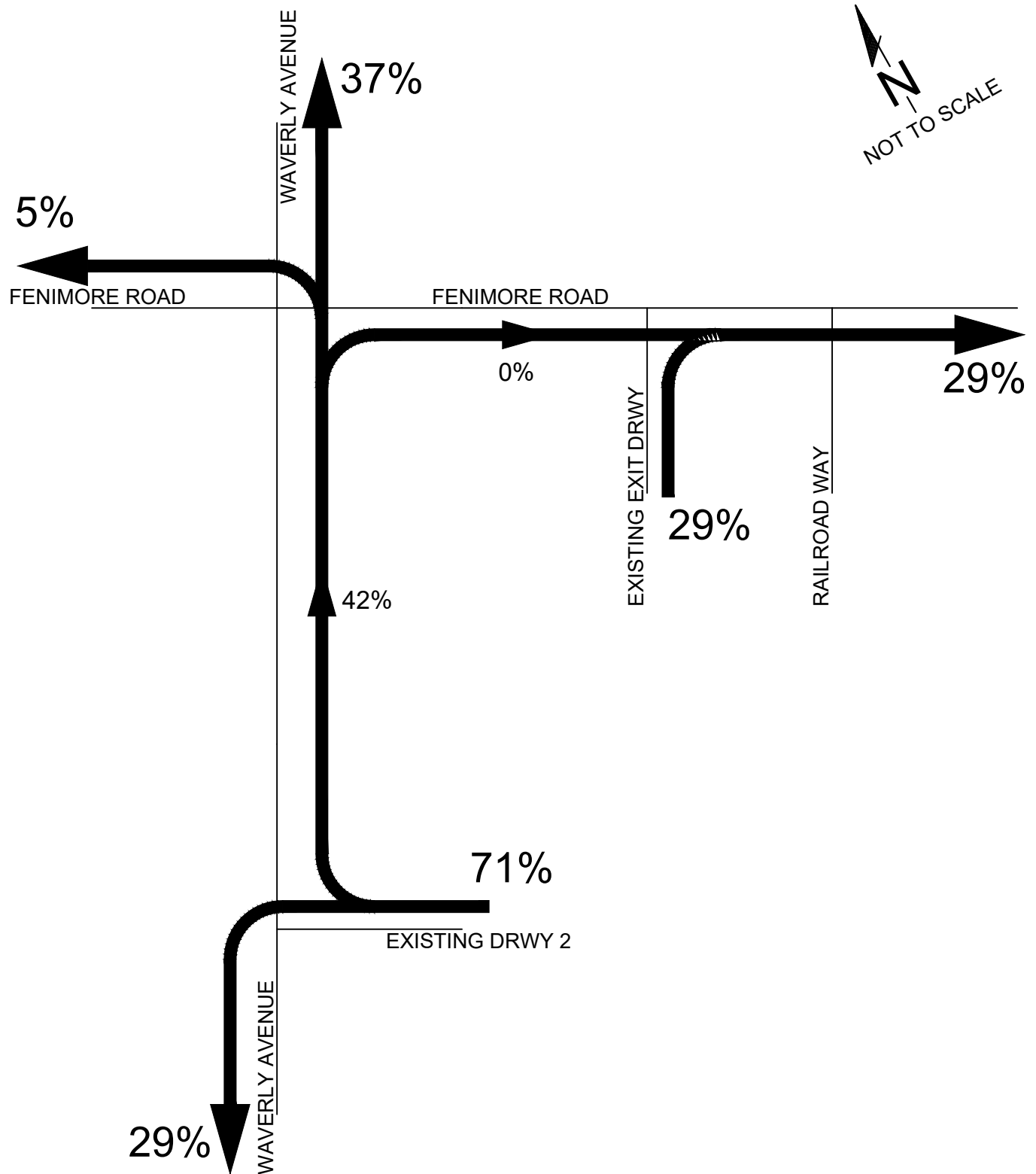
7 SKYLINE DRIVE, HAWTHORNE, NEW YORK 10532
TEL: (914) 592-4040 WWW.PDERESULTS.COM

© PROVIDENT DESIGN ENGINEERING, PLLC

Project No. 17-060
February 2022

Arrival Distribution
Mamaroneck, Westchester, NY

Figure No. 04



Q:\PROJECTS-17\17-060 Murphy Brothers\AutoCAD\Traffic\17-060 TrafficFigures (Rev Feb 2022).dwg



7 SKYLINE DRIVE, HAWTHORNE, NEW YORK 10532
TEL: (914) 592-4040 WWW.PDERESULTS.COM

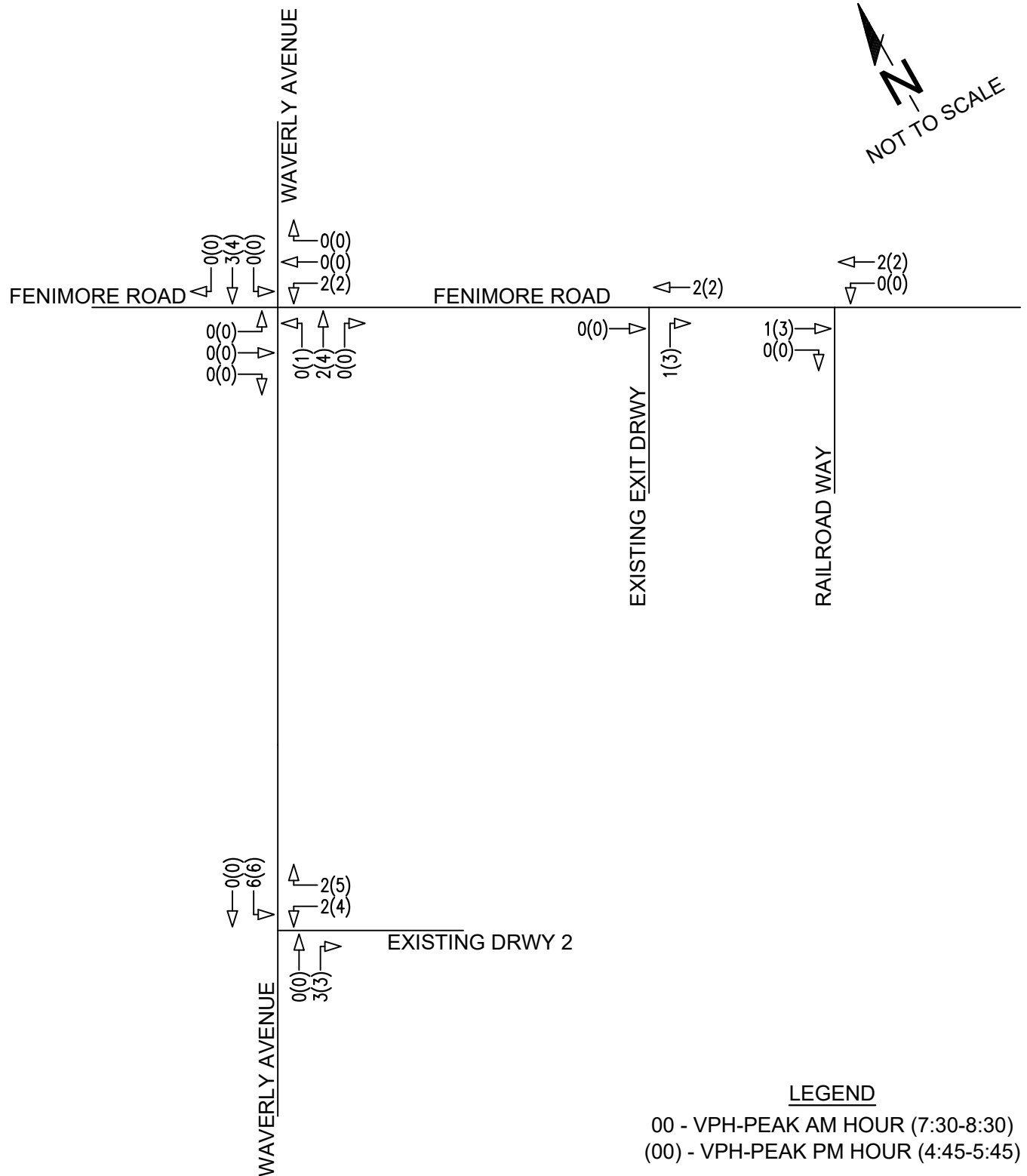
© PROVIDENT DESIGN ENGINEERING, PLLC

Project No. 17-060
February 2022

Departure Distribution
Mamaroneck, Westchester, NY

Figure No. 05

Q:\PROJECTS-17\17-060 Murphy Brothers\AutoCAD\Traffic\17-060 TrafficFigures (Rev Feb 2022).dwg



7 SKYLINE DRIVE, HAWTHORNE, NEW YORK 10532
TEL: (914) 592-4040 WWW.PDERESULTS.COM

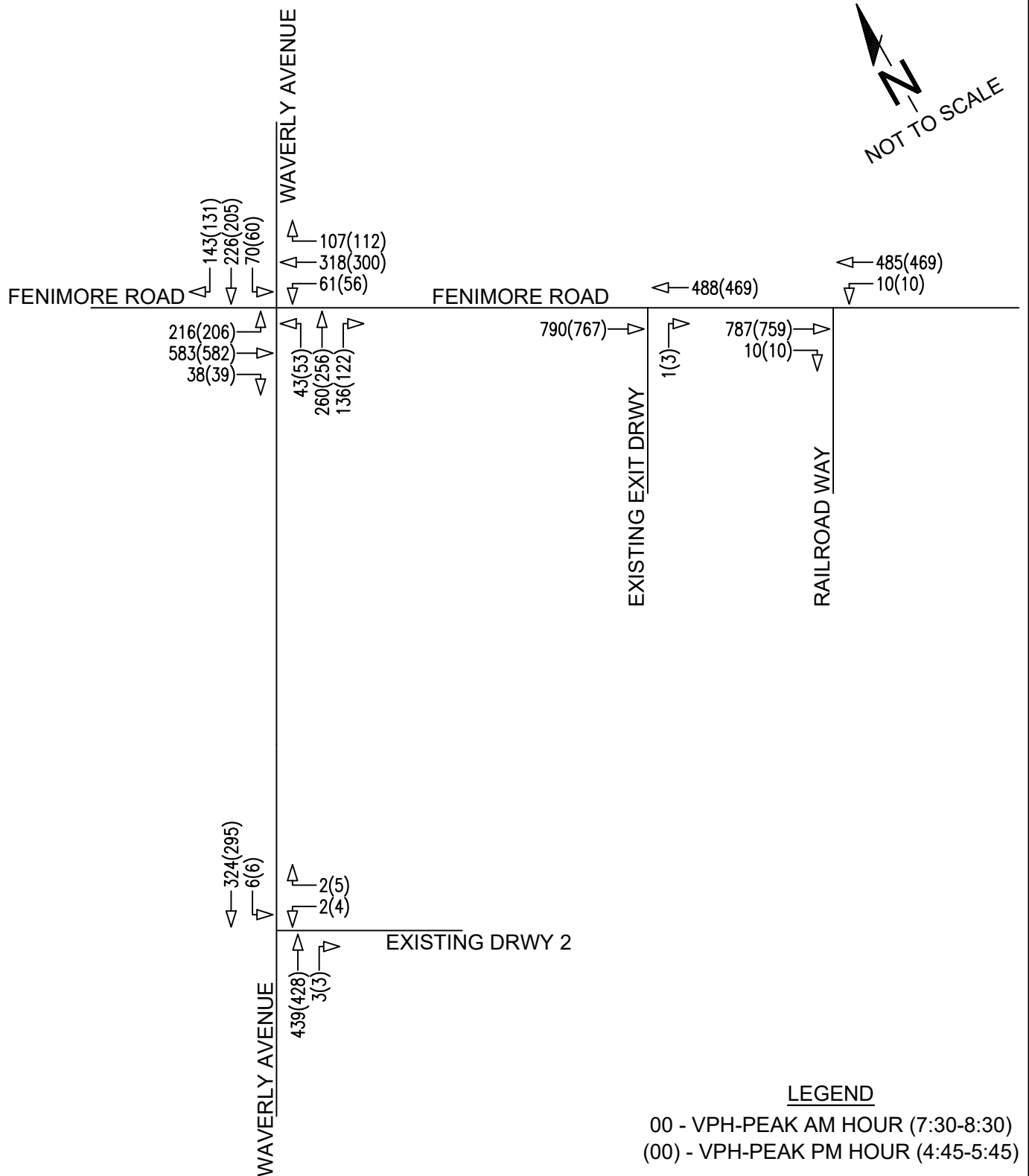
© PROVIDENT DESIGN ENGINEERING, PLLC

Project Generated Traffic Volumes
Mamaroneck, Westchester, NY

Project No. 17-060
February 2022

Figure No. 06

Q:\PROJECTS-17\17-060 Murphy Brothers\AutoCAD\Traffic\17-060 TrafficFigures (Rev Feb 2022).dwg



7 SKYLINE DRIVE, HAWTHORNE, NEW YORK 10532
TEL: (914) 592-4040 WWW.PDERESULTS.COM

© PROVIDENT DESIGN ENGINEERING, PLLC

Build Traffic Figures
Mamaroneck, Westchester, NY

Project No. 17-060
February 2022

Figure No. 07

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)	210	566	38	59	309	104	42	252	133	68	223	139
Future Volume (veh/h)	210	566	38	59	309	104	42	252	133	68	223	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	228	615	41	64	336	113	46	274	145	74	242	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	368	795	667	202	361	191	185	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	13.2	13.4	7.8	19.2	18.1	15.1	36.2	0.0	34.6	42.3	0.0	32.6
Ln Grp LOS	B	B	A	B	B	B	D		C	D		C
Approach Vol, veh/h		884			513			465			467	
Approach Delay, s/veh		13.1			17.6			34.8			34.1	
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		5.2		5.3	3.8	5.1				
Max Q Clear (g_c+I1), s		22.0		19.3		25.9	7.5	12.3				
Green Ext Time (g_e), s		1.1		4.7		0.0	0.0	2.9				
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			986				963	1774	771			
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1139		1863		1065		1863				
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			603		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 Existing
AM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	46	0	0	0	74	228	64
Grp Sat Flow (s), veh/h/ln	0	986	0	0	0	963	1774	771
Q Serve Time (g_s), s	0.0	3.5	0.0	0.0	0.0	6.1	5.5	4.7
Cycle Q Clear Time (g_c), s	0.0	20.0	0.0	0.0	0.0	23.9	5.5	10.0
Perm LT Sat Flow (s_l), veh/h/ln	0	986	0	0	0	963	936	771
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	8.3	24.7	29.7
Perm LT Q Serve Time (g_ps), s	0.0	3.5	0.0	0.0	0.0	6.1	4.0	4.7
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	185	542	368
V/C Ratio (X)	0.00	0.23	0.00	0.00	0.00	0.40	0.42	0.17
Avail Cap (c_a), veh/h	0	202	0	0	0	185	542	368
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	35.9	10.8	18.2
Incr Delay (d2), s/veh	0.0	2.6	0.0	0.0	0.0	6.4	2.4	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	36.2	0.0	0.0	0.0	42.3	13.2	19.2
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	0.76	0.94	1.55
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	615	0	0	0	336
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	17.3	0.0	0.0	0.0	10.3
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.3	0.0	0.0	0.0	10.3
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	1.6
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	0.0	0.0	13.4	0.0	0.0	0.0	18.1
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	8.7	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	1.07	0.00	0.00	0.00	8.02
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	419	0	41	0	393	0	113
Grp Sat Flow (s), veh/h/ln	0	1742	0	1568	0	1729	0	1563
Q Serve Time (g_s), s	0.0	17.7	0.0	0.9	0.0	16.5	0.0	3.7
Cycle Q Clear Time (g_c), s	0.0	17.7	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	25.2	0.0	7.7	0.0	24.7	0.0	14.5
Incr Delay (d2), s/veh	0.0	9.4	0.0	0.1	0.0	7.8	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	34.6	0.0	7.8	0.0	32.6	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	4.95	0.00	0.14	0.00	0.53	0.00	2.36
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	767	0	0	471	0	7
Future Vol, veh/h	767	0	0	471	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	834	0	0	512	0	8
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	-	-	-	-	834
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	0	0	-	0	367
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	367
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)	367	-	-			
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	319
Future Vol, veh/h	4	1	426	2	2	319
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	347
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	815	464	0	0	465	0
Stage 1	464	-	-	-	-	-
Stage 2	351	-	-	-	-	-
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	713	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	346	598	-	-	1096	-
Mov Cap-2 Maneuver	346	-	-	-	-	-
Stage 1	633	-	-	-	-	-
Stage 2	712	-	-	-	-	-
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	426	0	8	315
Future Vol, veh/h	0	2	426	0	8	315
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	463	0	9	342
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	823	463	0	0	463	0
Stage 1	463	-	-	-	-	-
Stage 2	360	-	-	-	-	-
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	343	599	-	-	1098	-
Stage 1	634	-	-	-	-	-
Stage 2	706	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	340	599	-	-	1098	-
Mov Cap-2 Maneuver	340	-	-	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	699	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11	0	0.2			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	599	1098	-	
HCM Lane V/C Ratio	-	-	0.004	0.008	-	
HCM Control Delay (s)	-	-	11	8.3	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

HCM Unsignalized Intersection Capacity Analysis
5: Railroad Way & Fenimore Rd

2017 Existing
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	764	10	10	471	0	0
Future Volume (Veh/h)	764	10	10	471	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	830	11	11	512	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	182					
pX, platoon unblocked			0.76		0.76	0.76
vC, conflicting volume			841		1370	836
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			635		1329	628
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			722		128	368
Direction, Lane #	EB 1	WB 1				
Volume Total	841	523				
Volume Left	0	11				
Volume Right	11	0				
cSH	1700	722				
Volume to Capacity	0.49	0.02				
Queue Length 95th (ft)	0	1				
Control Delay (s)	0.0	0.4				
Lane LOS		A				
Approach Delay (s)	0.0	0.4				
Approach LOS						
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		44.1%		ICU Level of Service		A
Analysis Period (min)		15				

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

2022 No-Build
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	216	583	39	61	318	107	43	260	137	70	230	143
Future Volume (veh/h)	216	583	39	61	318	107	43	260	137	70	230	143
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	235	634	42	66	346	116	47	283	149	76	250	155
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	535	1068	899	355	795	667	193	362	190	175	339	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	13.6	13.8	7.8	20.0	18.3	15.1	37.2	0.0	36.0	44.4	0.0	33.6
Ln Grp LOS	B	B	A	B	B	B	D		D	D		C
Approach Vol, veh/h		911			528			479			481	
Approach Delay, s/veh		13.4			17.8			36.1			35.3	
Approach LOS		B			B			D			D	
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		5.2		5.3	3.8	5.1				
Max Q Clear (g_c+I1), s		22.8		20.1		26.9	7.6	13.1				
Green Ext Time (g_e), s		0.9		4.9		0.0	0.0	3.0				
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		975				952	1774	757				
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1141		1863		1068		1863				
Right-Turn Movement Data												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		601		1568		662		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

2022 No-Build
AM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	47	0	0	0	76	235	66
Grp Sat Flow (s), veh/h/ln	0	975	0	0	0	952	1774	757
Q Serve Time (g_s), s	0.0	3.7	0.0	0.0	0.0	6.5	5.6	5.1
Cycle Q Clear Time (g_c), s	0.0	20.8	0.0	0.0	0.0	24.9	5.6	11.1
Perm LT Sat Flow (s_l), veh/h/ln	0	975	0	0	0	952	925	757
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	8.9	0.0	0.0	0.0	7.5	24.3	28.9
Perm LT Q Serve Time (g_ps), s	0.0	3.7	0.0	0.0	0.0	6.5	4.3	5.1
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	193	0	0	0	175	535	355
V/C Ratio (X)	0.00	0.24	0.00	0.00	0.00	0.43	0.44	0.19
Avail Cap (c_a), veh/h	0	193	0	0	0	175	535	355
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	34.3	0.0	0.0	0.0	36.7	10.9	18.8
Incr Delay (d2), s/veh	0.0	3.0	0.0	0.0	0.0	7.6	2.6	1.2
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	37.2	0.0	0.0	0.0	44.4	13.6	20.0
1st-Term Q (Q1), veh/ln	0.0	1.0	0.0	0.0	0.0	1.7	2.7	1.1
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.4	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	1.2	0.0	0.0	0.0	2.1	3.1	1.2
%ile Storage Ratio (RQ%)	0.00	0.57	0.00	0.00	0.00	0.81	0.97	1.66
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	634	0	0	0	346
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	18.1	0.0	0.0	0.0	10.7
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	18.1	0.0	0.0	0.0	10.7
Lane Grp Cap (c), veh/h	0	0	0	1068	0	0	0	795
V/C Ratio (X)	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.44
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	11.3	0.0	0.0	0.0	16.5
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.4	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	13.8	0.0	0.0	0.0	18.3
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	9.2	0.0	0.0	0.0	5.5

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

2022 No-Build
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	9.9	0.0	0.0	0.0	5.9
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.13	0.00	0.00	0.00	8.27
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
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	432	0	42	0	405	0	116
Grp Sat Flow (s), veh/h/ln	0	1742	0	1568	0	1730	0	1563
Q Serve Time (g_s), s	0.0	18.5	0.0	1.0	0.0	17.1	0.0	3.8
Cycle Q Clear Time (g_c), s	0.0	18.5	0.0	1.0	0.0	17.1	0.0	3.8
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	0.34	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	0.78	0.00	0.05	0.00	0.74	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	25.4	0.0	7.7	0.0	25.0	0.0	14.5
Incr Delay (d2), s/veh	0.0	10.6	0.0	0.1	0.0	8.6	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	36.0	0.0	7.8	0.0	33.6	0.0	15.1
1st-Term Q (Q1), veh/ln	0.0	8.9	0.0	0.4	0.0	8.1	0.0	1.6
2nd-Term Q (Q2), veh/ln	0.0	1.6	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	10.5	0.0	0.4	0.0	9.4	0.0	1.7
%ile Storage Ratio (RQ%)	0.00	5.23	0.00	0.15	0.00	0.55	0.00	2.42
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	23.3							
HCM 2010 LOS	C							

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑↑		↗
Traffic Vol, veh/h	790	0	0	486	0	7
Future Vol, veh/h	790	0	0	486	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	859	0	0	528	0	8

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	-	-	-	859
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	0	0	-	0 355
Stage 1	-	0	0	-	0 -
Stage 2	-	0	0	-	0 -
Platoon blocked, %	-			-	
Mov Cap-1 Maneuver	-	-	-	-	- 355
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	355	-	-
HCM Lane V/C Ratio	0.021	-	-
HCM Control Delay (s)	15.4	-	-
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	439	2	2	328
Future Vol, veh/h	4	1	439	2	2	328
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	477	2	2	357

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	839	478	0
Stage 1	478	-	-
Stage 2	361	-	-
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	336	587	-
Stage 1	624	-	-
Stage 2	705	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	335	587	-
Mov Cap-2 Maneuver	335	-	-
Stage 1	624	-	-
Stage 2	704	-	-

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)	-	-	366	1083
HCM Lane V/C Ratio	-	-	0.015	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	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	2	439	0	8	324
Future Vol, veh/h	0	2	439	0	8	324
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	477	0	9	352
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	847	477	0	0	477	0
Stage 1	477	-	-	-	-	-
Stage 2	370	-	-	-	-	-
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	332	588	-	-	1085	-
Stage 1	624	-	-	-	-	-
Stage 2	699	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	329	588	-	-	1085	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	692	-	-	-	-	-
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)	-	-	588	1085	-	
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	-	

HCM Unsignalized Intersection Capacity Analysis
5: Railroad Way & Fenimore Rd

2022 No-Build
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	787	10	10	485	0	0
Future Volume (Veh/h)	787	10	10	485	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	855	11	11	527	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	182					
pX, platoon unblocked			0.75		0.75	0.75
vC, conflicting volume			866		1410	860
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			655		1379	647
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			699		118	353
Direction, Lane #	EB 1	WB 1				
Volume Total	866	538				
Volume Left	0	11				
Volume Right	11	0				
cSH	1700	699				
Volume to Capacity	0.51	0.02				
Queue Length 95th (ft)	0	1				
Control Delay (s)	0.0	0.4				
Lane LOS		A				
Approach Delay (s)	0.0	0.4				
Approach LOS						
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			45.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM 6th Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2022 Build
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	216	583	38	61	318	107	43	260	136	70	226	143
Future Volume (veh/h)	216	583	38	61	318	107	43	260	136	70	226	143
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
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	235	634	41	66	346	116	47	283	148	76	246	155
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	537	1072	900	357	798	668	197	364	190	177	337	212
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
Unsig. Movement Delay												
Ln Grp Delay, s/veh	13.5	13.7	7.8	19.9	18.2	15.1	36.8	0.0	35.7	44.0	0.0	33.2
Ln Grp LOS	B	B	A	B	B	B	D	A	D	D	A	C
Approach Vol, veh/h	910			528			478			477		
Approach Delay, s/veh	13.4			17.8			35.8			34.9		
Approach LOS	B			B			D			C		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			7		
Case No	6.0			3.0			6.0			1.2		
Phs Duration (G+Y+Rc), s	30.0			52.0			30.0			12.0		
Change Period (Y+Rc), s	4.0			5.0			4.0			4.0		
Max Green (Gmax), s	26.0			47.0			26.0			8.0		
Max Allow Headway (MAH), s	5.3			5.2			5.3			3.8		
Max Q Clear (g_c+I1), s	22.5			19.9			26.7			7.6		
Green Ext Time (g_e), s	1.0			4.9			0.0			0.0		
Prob of Phs Call (p_c)	1.00			1.00			1.00			1.00		
Prob of Max Out (p_x)	0.00			0.00			0.00			0.00		
Left-Turn Movement Data												
Assigned Mvmt	5						1			7		
Mvmt Sat Flow, veh/h	983						957			1781		
Through Movement Data												
Assigned Mvmt	2			4			6			8		
Mvmt Sat Flow, veh/h	1147			1870			1063			1870		
Right-Turn Movement Data												
Assigned Mvmt	12			14			16			18		
Mvmt Sat Flow, veh/h	600			1570			670			1565		
Left Lane Group Data												
Assigned Mvmt	0			5			0			1		
Lane Assignment	L						LL (Pr/Pm)			L		

HCM 6th Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2022 Build
AM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	47	0	0	0	76	235	66
Grp Sat Flow (s), veh/h/ln	0	983	0	0	0	957	1781	761
Q Serve Time (g_s), s	0.0	3.7	0.0	0.0	0.0	6.4	5.6	5.0
Cycle Q Clear Time (g_c), s	0.0	20.5	0.0	0.0	0.0	24.7	5.6	11.0
Perm LT Sat Flow (s_l), veh/h/ln	0	983	0	0	0	957	928	761
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	9.1	0.0	0.0	0.0	7.7	24.3	29.1
Perm LT Q Serve Time (g_ps), s	0.0	3.7	0.0	0.0	0.0	6.4	4.3	5.0
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	177	537	357
V/C Ratio (X)	0.00	0.24	0.00	0.00	0.00	0.43	0.44	0.18
Avail Cap (c_a), veh/h	0	197	0	0	0	177	537	357
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	34.0	0.0	0.0	0.0	36.6	10.9	18.7
Incr Delay (d2), s/veh	0.0	2.8	0.0	0.0	0.0	7.4	2.6	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	36.8	0.0	0.0	0.0	44.0	13.5	19.9
1st-Term Q (Q1), veh/ln	0.0	0.9	0.0	0.0	0.0	1.5	2.0	0.9
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.4	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	1.0	0.0	0.0	0.0	1.8	2.4	1.0
%ile Storage Ratio (RQ%)	0.00	0.48	0.00	0.00	0.00	0.72	0.75	1.36
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	634	0	0	0	346
Grp Sat Flow (s), veh/h/ln	0	0	0	1870	0	0	0	1870
Q Serve Time (g_s), s	0.0	0.0	0.0	17.9	0.0	0.0	0.0	10.7
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.9	0.0	0.0	0.0	10.7
Lane Grp Cap (c), veh/h	0	0	0	1072	0	0	0	798
V/C Ratio (X)	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.43
Avail Cap (c_a), veh/h	0	0	0	1072	0	0	0	798
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	11.3	0.0	0.0	0.0	16.5
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.4	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	13.7	0.0	0.0	0.0	18.2
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	6.6	0.0	0.0	0.0	4.3
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.4

HCM 6th Signalized Intersection Capacity Analysis

2022 Build

3: Waverly Ave & Fenimore Rd

AM Peak

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	7.3	0.0	0.0	0.0	4.7
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.83	0.00	0.00	0.00	6.63
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	431	0	41	0	401	0	116
Grp Sat Flow (s), veh/h/ln	0	1748	0	1570	0	1733	0	1565
Q Serve Time (g_s), s	0.0	18.3	0.0	0.9	0.0	16.9	0.0	3.8
Cycle Q Clear Time (g_c), s	0.0	18.3	0.0	0.9	0.0	16.9	0.0	3.8
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	0.34	0.00	1.00	0.00	0.39	0.00	1.00
Lane Grp Cap (c), veh/h	0	554	0	900	0	550	0	668
V/C Ratio (X)	0.00	0.78	0.00	0.05	0.00	0.73	0.00	0.17
Avail Cap (c_a), veh/h	0	554	0	900	0	550	0	668
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	25.4	0.0	7.7	0.0	24.9	0.0	14.5
Incr Delay (d2), s/veh	0.0	10.3	0.0	0.1	0.0	8.3	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	35.7	0.0	7.8	0.0	33.2	0.0	15.1
1st-Term Q (Q1), veh/ln	0.0	7.2	0.0	0.3	0.0	6.6	0.0	1.3
2nd-Term Q (Q2), veh/ln	0.0	1.6	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	8.8	0.0	0.3	0.0	7.9	0.0	1.4
%ile Storage Ratio (RQ%)	0.00	4.15	0.00	0.11	0.00	0.46	0.00	1.94
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 6th Ctrl Delay	23.1
HCM 6th LOS	C

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑↑		↗
Traffic Vol, veh/h	790	0	0	488	0	1
Future Vol, veh/h	790	0	0	488	0	1
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	859	0	0	530	0	1

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	-	-	-	859
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	0	0	-	0 355
Stage 1	-	0	0	-	0 -
Stage 2	-	0	0	-	0 -
Platoon blocked, %	-			-	
Mov Cap-1 Maneuver	-	-	-	-	- 355
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)	355	-	-
HCM Lane V/C Ratio	0.003	-	-
HCM Control Delay (s)	15.2	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	0	-	-

Intersection

Int Delay, s/veh 0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	2	439	3	6	324
Future Vol, veh/h	2	2	439	3	6	324
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	2	477	3	7	352

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	845	479	0
Stage 1	479	-	-
Stage 2	366	-	-
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	333	587	-
Stage 1	623	-	-
Stage 2	702	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	330	587	-
Mov Cap-2 Maneuver	330	-	-
Stage 1	623	-	-
Stage 2	696	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.6	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	422	1082
HCM Lane V/C Ratio	-	-	0.01	0.006
HCM Control Delay (s)	-	-	13.6	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM Unsignalized Intersection Capacity Analysis
5: Railroad Way & Fenimore Rd

2022 Build
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	787	10	10	485	0	0
Future Volume (Veh/h)	787	10	10	485	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	855	11	11	527	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	182					
pX, platoon unblocked			0.75		0.75	0.75
vC, conflicting volume			866		1410	860
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			655		1379	647
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			699		118	353
Direction, Lane #	EB 1	WB 1				
Volume Total	866	538				
Volume Left	0	11				
Volume Right	11	0				
cSH	1700	699				
Volume to Capacity	0.51	0.02				
Queue Length 95th (ft)	0	1				
Control Delay (s)	0.0	0.4				
Lane LOS		A				
Approach Delay (s)	0.0	0.4				
Approach LOS						
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		45.4%		ICU Level of Service		A
Analysis Period (min)		15				

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

2017 Existing
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	201	568	39	53	292	110	51	250	121	58	198	128
Future Volume (veh/h)	201	568	39	53	292	110	51	250	121	58	198	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	218	617	42	58	317	120	55	272	132	63	215	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	553	1068	899	366	795	667	231	373	181	197	332	215
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	12.7	13.4	7.8	19.0	17.7	15.2	34.4	0.0	33.1	38.8	0.0	29.9
Ln Grp LOS	B	B	A	B	B	B	C		C	D		C
Approach Vol, veh/h		877			495			459			417	
Approach Delay, s/veh		13.0			17.3			33.2			31.2	
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		5.2		5.3	3.8	5.0				
Max Q Clear (g_c+I1), s		20.5		19.3		23.9	7.2	11.6				
Green Ext Time (g_e), s		1.4		4.7		0.5	0.1	2.8				
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		1020				976	1774	769				
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1177		1863		1049		1863				
Right-Turn Movement Data												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		571		1568		678		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
PM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	55	0	0	0	63	218	58
Grp Sat Flow (s), veh/h/ln	0	1020	0	0	0	976	1774	769
Q Serve Time (g_s), s	0.0	4.0	0.0	0.0	0.0	5.0	5.2	4.3
Cycle Q Clear Time (g_c), s	0.0	18.5	0.0	0.0	0.0	21.9	5.2	9.6
Perm LT Sat Flow (s_l), veh/h/ln	0	1020	0	0	0	976	946	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	11.6	0.0	0.0	0.0	9.2	25.4	29.7
Perm LT Q Serve Time (g_ps), s	0.0	4.0	0.0	0.0	0.0	5.0	3.5	4.3
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	197	553	366
V/C Ratio (X)	0.00	0.24	0.00	0.00	0.00	0.32	0.39	0.16
Avail Cap (c_a), veh/h	0	231	0	0	0	197	553	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	32.0	0.0	0.0	0.0	34.6	10.6	18.1
Incr Delay (d2), s/veh	0.0	2.4	0.0	0.0	0.0	4.2	2.1	0.9
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	0.0	0.0	38.8	12.7	19.0
1st-Term Q (Q1), veh/ln	0.0	1.1	0.0	0.0	0.0	1.3	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	0.64	0.00	0.00	0.00	0.62	0.89	1.41
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	617	0	0	0	317
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	17.3	0.0	0.0	0.0	9.6
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.3	0.0	0.0	0.0	9.6
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	16.2
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	13.4	0.0	0.0	0.0	17.7
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	8.7	0.0	0.0	0.0	4.9

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

2017 Existing
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	9.4	0.0	0.0	0.0	5.3
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.08	0.00	0.00	0.00	7.42
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
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	404	0	42	0	354	0	120
Grp Sat Flow (s), veh/h/ln	0	1748	0	1568	0	1726	0	1563
Q Serve Time (g_s), s	0.0	16.8	0.0	1.0	0.0	14.4	0.0	3.9
Cycle Q Clear Time (g_c), s	0.0	16.8	0.0	1.0	0.0	14.4	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	547	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	547	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	9.3	0.0	0.4	0.0	7.8	0.0	1.8
%ile Storage Ratio (RQ%)	0.00	4.65	0.00	0.15	0.00	0.46	0.00	2.51
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	21.4							
HCM 2010 LOS	C							

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑↑		↗
Traffic Vol, veh/h	748	0	0	455	0	0
Future Vol, veh/h	748	0	0	455	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	813	0	0	495	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	-	- 813
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	- 6.23
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	- 3.319
Pot Cap-1 Maneuver	-	0	0 - 377
Stage 1	-	0	0 -
Stage 2	-	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	422	2	2	288
Future Vol, veh/h	1	0	422	2	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	1	0	459	2	2	313
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	777	460	0	0	461	0
Stage 1	460	-	-	-	-	-
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	365	601	-	-	1100	-
Stage 1	636	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	364	601	-	-	1100	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	636	-	-	-	-	-
Stage 2	737	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	14.9	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	364	1100	-	
HCM Lane V/C Ratio	-	-	0.003	0.002	-	
HCM Control Delay (s)	-	-	14.9	8.3	0	
HCM Lane LOS	-	-	B	A	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	417	3	2	287
Future Vol, veh/h	2	7	417	3	2	287
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	453	3	2	312
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	771	455	0	0	456	0
Stage 1	455	-	-	-	-	-
Stage 2	316	-	-	-	-	-
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	368	605	-	-	1105	-
Stage 1	639	-	-	-	-	-
Stage 2	739	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	367	605	-	-	1105	-
Mov Cap-2 Maneuver	367	-	-	-	-	-
Stage 1	639	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11.9	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	529	1105	-	
HCM Lane V/C Ratio	-	-	0.018	0.002	-	
HCM Control Delay (s)	-	-	11.9	8.3	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

HCM Unsignalized Intersection Capacity Analysis
5: Railroad Way & Fenimore Rd

2017 Existing
 PM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	738	10	10	455	0	0
Future Volume (Veh/h)	738	10	10	455	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	802	11	11	495	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	182					
pX, platoon unblocked			0.77		0.77	0.77
vC, conflicting volume			813		1324	808
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			604		1271	597
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	100
cM capacity (veh/h)			747		140	386
Direction, Lane #	EB 1	WB 1				
Volume Total	813	506				
Volume Left	0	11				
Volume Right	11	0				
cSH	1700	747				
Volume to Capacity	0.48	0.01				
Queue Length 95th (ft)	0	1				
Control Delay (s)	0.0	0.4				
Lane LOS		A				
Approach Delay (s)	0.0	0.4				
Approach LOS						
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		42.8%		ICU Level of Service		A
Analysis Period (min)		15				

HCM 6th Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2022 No-Build
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	582	40	55	300	112	53	256	124	60	203	131
Future Volume (veh/h)	206	582	40	55	300	112	53	256	124	60	203	131
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
Work Zone On Approach	No				No				No			
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	224	633	43	60	326	122	58	278	135	65	221	142
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	549	1072	900	358	798	668	226	374	182	191	334	215
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
Unsig. Movement Delay												
Ln Grp Delay, s/veh	12.9	13.7	7.8	19.5	17.9	15.2	35.2	0.0	33.7	39.8	0.0	30.3
Ln Grp LOS	B	B	A	B	B	B	D	A	C	D	A	C
Approach Vol, veh/h	900				508				471		428	
Approach Delay, s/veh	13.2				17.4				33.9		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	5.3	
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			5.2			5.3	3.8	5.1	
Max Q Clear (g_c+I1), s			21.1			19.9			24.5	7.3	12.4	
Green Ext Time (g_e), s			1.3			4.9			0.4	0.0	2.8	
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			1016						972	1781	760	
Through Movement Data												
Assigned Mvmt			2			4			6	8		
Mvmt Sat Flow, veh/h			1180			1870			1054	1870		
Right-Turn Movement Data												
Assigned Mvmt			12			14			16	18		
Mvmt Sat Flow, veh/h			573			1570			677	1565		
Left Lane Group Data												
Assigned Mvmt	0		5	0	0	0	1	7	3			
Lane Assignment			L				LL (Pr/Pm)		L			

HCM 6th Signalized Intersection Capacity Analysis
3: Waverly Ave & Fenimore Rd

2022 No-Build
PM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	58	0	0	0	65	224	60
Grp Sat Flow (s), veh/h/ln	0	1016	0	0	0	972	1781	760
Q Serve Time (g_s), s	0.0	4.3	0.0	0.0	0.0	5.2	5.3	4.5
Cycle Q Clear Time (g_c), s	0.0	19.1	0.0	0.0	0.0	22.5	5.3	10.4
Perm LT Sat Flow (s_l), veh/h/ln	0	1016	0	0	0	972	940	760
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	11.1	0.0	0.0	0.0	8.7	25.1	29.1
Perm LT Q Serve Time (g_ps), s	0.0	4.3	0.0	0.0	0.0	5.2	3.7	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	191	549	358
V/C Ratio (X)	0.00	0.26	0.00	0.00	0.00	0.34	0.41	0.17
Avail Cap (c_a), veh/h	0	226	0	0	0	191	549	358
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	32.5	0.0	0.0	0.0	35.1	10.7	18.5
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	39.8	12.9	19.5
1st-Term Q (Q1), veh/ln	0.0	1.0	0.0	0.0	0.0	1.2	1.9	0.8
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	1.2	0.0	0.0	0.0	1.5	2.2	0.9
%ile Storage Ratio (RQ%)	0.00	0.60	0.00	0.00	0.00	0.57	0.70	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

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	633	0	0	0	326
Grp Sat Flow (s), veh/h/ln	0	0	0	1870	0	0	0	1870
Q Serve Time (g_s), s	0.0	0.0	0.0	17.9	0.0	0.0	0.0	9.9
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	17.9	0.0	0.0	0.0	9.9
Lane Grp Cap (c), veh/h	0	0	0	1072	0	0	0	798
V/C Ratio (X)	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.41
Avail Cap (c_a), veh/h	0	0	0	1072	0	0	0	798
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	11.3	0.0	0.0	0.0	16.3
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.4	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	13.7	0.0	0.0	0.0	17.9
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	6.5	0.0	0.0	0.0	4.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.3

HCM 6th Signalized Intersection Capacity Analysis

2022 No-Build

3: Waverly Ave & Fenimore Rd

PM Peak

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	7.2	0.0	0.0	0.0	4.4
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.83	0.00	0.00	0.00	6.14
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	413	0	43	0	363	0	122
Grp Sat Flow (s), veh/h/ln	0	1753	0	1570	0	1732	0	1565
Q Serve Time (g_s), s	0.0	17.3	0.0	1.0	0.0	14.9	0.0	4.0
Cycle Q Clear Time (g_c), s	0.0	17.3	0.0	1.0	0.0	14.9	0.0	4.0
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	556	0	900	0	549	0	668
V/C Ratio (X)	0.00	0.74	0.00	0.05	0.00	0.66	0.00	0.18
Avail Cap (c_a), veh/h	0	556	0	900	0	549	0	668
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	25.0	0.0	7.7	0.0	24.2	0.0	14.6
Incr Delay (d2), s/veh	0.0	8.7	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	33.7	0.0	7.8	0.0	30.3	0.0	15.2
1st-Term Q (Q1), veh/ln	0.0	6.8	0.0	0.3	0.0	5.8	0.0	1.3
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	8.2	0.0	0.3	0.0	6.7	0.0	1.5
%ile Storage Ratio (RQ%)	0.00	4.07	0.00	0.11	0.00	0.40	0.00	2.05
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 6th Ctrl Delay	21.8
HCM 6th LOS	C

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑↑		↗
Traffic Vol, veh/h	767	0	0	467	0	0
Future Vol, veh/h	767	0	0	467	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	834	0	0	508	0	0

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	-	-	-	834
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	0	0	-	0 367
Stage 1	-	0	0	-	0 -
Stage 2	-	0	0	-	0 -
Platoon blocked, %	-			-	
Mov Cap-1 Maneuver	-	-	-	-	- 367
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	433	2	2	296
Future Vol, veh/h	1	0	433	2	2	296
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	471	2	2	322

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	798	472	0
Stage 1	472	-	-
Stage 2	326	-	-
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	355	592	-
Stage 1	628	-	-
Stage 2	731	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	354	592	-
Mov Cap-2 Maneuver	354	-	-
Stage 1	628	-	-
Stage 2	730	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.2	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	354	1089
HCM Lane V/C Ratio	-	-	0.003	0.002
HCM Control Delay (s)	-	-	15.2	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	428	3	2	295
Future Vol, veh/h	2	7	428	3	2	295
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	465	3	2	321

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	792	467	0
Stage 1	467	-	-
Stage 2	325	-	-
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	358	596	-
Stage 1	631	-	-
Stage 2	732	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	357	596	-
Mov Cap-2 Maneuver	357	-	-
Stage 1	631	-	-
Stage 2	731	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.1	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	519	1094
HCM Lane V/C Ratio	-	-	0.019	0.002
HCM Control Delay (s)	-	-	12.1	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM Unsignalized Intersection Capacity Analysis
5: Railroad Way & Fenimore Rd

2022 No-Build
PM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	758	10	10	468	0	0
Future Volume (Veh/h)	758	10	10	468	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	824	11	11	509	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	182					
pX, platoon unblocked			0.76		0.76	0.76
vC, conflicting volume			835		1360	830
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			621		1316	614
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			726		130	372
Direction, Lane #	EB 1	WB 1				
Volume Total	835	520				
Volume Left	0	11				
Volume Right	11	0				
cSH	1700	726				
Volume to Capacity	0.49	0.02				
Queue Length 95th (ft)	0	1				
Control Delay (s)	0.0	0.4				
Lane LOS		A				
Approach Delay (s)	0.0	0.4				
Approach LOS						
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		43.8%		ICU Level of Service		A
Analysis Period (min)		15				

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

2022 Build
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	582	39	56	300	112	53	256	122	60	205	131
Future Volume (veh/h)	206	582	39	56	300	112	53	256	122	60	205	131
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	224	633	42	61	326	122	58	278	133	65	223	142
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	547	1068	899	356	795	667	223	375	179	192	335	213
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	13.0	13.7	7.8	19.7	17.9	15.2	35.4	0.0	33.6	39.8	0.0	30.5
Ln Grp LOS	B	B	A	B	B	B	D		C	D		C
Approach Vol, veh/h		899			509			469			430	
Approach Delay, s/veh		13.3			17.5			33.9			31.9	
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		5.2		5.3	3.8	5.1				
Max Q Clear (g_c+I1), s		21.3		20.0		24.5	7.3	12.7				
Green Ext Time (g_e), s		1.2		4.9		0.4	0.0	2.8				
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		1010				970	1774	758				
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		1183		1863		1055		1863				
Right-Turn Movement Data												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		566		1568		672		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

2022 Build
PM Peak

Lanes in Grp	0	1	0	0	0	1	1	1
Grp Vol (v), veh/h	0	58	0	0	0	65	224	61
Grp Sat Flow (s), veh/h/ln	0	1010	0	0	0	970	1774	758
Q Serve Time (g_s), s	0.0	4.3	0.0	0.0	0.0	5.3	5.3	4.6
Cycle Q Clear Time (g_c), s	0.0	19.3	0.0	0.0	0.0	22.5	5.3	10.7
Perm LT Sat Flow (s_l), veh/h/ln	0	1010	0	0	0	970	936	758
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	11.0	0.0	0.0	0.0	8.8	25.0	29.0
Perm LT Q Serve Time (g_ps), s	0.0	4.3	0.0	0.0	0.0	5.3	3.8	4.6
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	223	0	0	0	192	547	356
V/C Ratio (X)	0.00	0.26	0.00	0.00	0.00	0.34	0.41	0.17
Avail Cap (c_a), veh/h	0	223	0	0	0	192	547	356
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	32.6	0.0	0.0	0.0	35.0	10.7	18.6
Incr Delay (d2), s/veh	0.0	2.8	0.0	0.0	0.0	4.7	2.3	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	35.4	0.0	0.0	0.0	39.8	13.0	19.7
1st-Term Q (Q1), veh/ln	0.0	1.2	0.0	0.0	0.0	1.4	2.6	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	1.7	2.9	1.1
%ile Storage Ratio (RQ%)	0.00	0.65	0.00	0.00	0.00	0.65	0.92	1.51
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	633	0	0	0	326
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	18.0	0.0	0.0	0.0	10.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	18.0	0.0	0.0	0.0	10.0
Lane Grp Cap (c), veh/h	0	0	0	1068	0	0	0	795
V/C Ratio (X)	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.41
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	11.3	0.0	0.0	0.0	16.3
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.4	0.0	0.0	0.0	1.6
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	0.0	0.0	13.7	0.0	0.0	0.0	17.9
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	9.1	0.0	0.0	0.0	5.1

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

2022 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	9.9	0.0	0.0	0.0	5.4
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.13	0.00	0.00	0.00	7.64
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	411	0	42	0	365	0	122
Grp Sat Flow (s), veh/h/ln	0	1749	0	1568	0	1728	0	1563
Q Serve Time (g_s), s	0.0	17.2	0.0	1.0	0.0	15.0	0.0	4.0
Cycle Q Clear Time (g_c), s	0.0	17.2	0.0	1.0	0.0	15.0	0.0	4.0
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	0.32	0.00	1.00	0.00	0.39	0.00	1.00
Lane Grp Cap (c), veh/h	0	555	0	899	0	548	0	667
V/C Ratio (X)	0.00	0.74	0.00	0.05	0.00	0.67	0.00	0.18
Avail Cap (c_a), veh/h	0	555	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	25.0	0.0	7.7	0.0	24.2	0.0	14.6
Incr Delay (d2), s/veh	0.0	8.7	0.0	0.1	0.0	6.3	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	33.6	0.0	7.8	0.0	30.5	0.0	15.2
1st-Term Q (Q1), veh/ln	0.0	8.2	0.0	0.4	0.0	7.1	0.0	1.7
2nd-Term Q (Q2), veh/ln	0.0	1.3	0.0	0.0	0.0	1.0	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	9.6	0.0	0.4	0.0	8.1	0.0	1.8
%ile Storage Ratio (RQ%)	0.00	4.49	0.00	0.15	0.00	0.47	0.00	2.55
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	21.9							
HCM 2010 LOS	C							

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑↑		↗
Traffic Vol, veh/h	767	0	0	469	0	3
Future Vol, veh/h	767	0	0	469	0	3
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	834	0	0	510	0	3

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	-	-	-	834
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	0	0	-	0 367
Stage 1	-	0	0	-	0 -
Stage 2	-	0	0	-	0 -
Platoon blocked, %	-			-	
Mov Cap-1 Maneuver	-	-	-	-	- 367
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	367	-	-
HCM Lane V/C Ratio	0.009	-	-
HCM Control Delay (s)	14.9	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0	-	-

Intersection

Int Delay, s/veh 0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	5	428	3	6	295
Future Vol, veh/h	3	5	428	3	6	295
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	3	5	465	3	7	321

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	802	467	0
Stage 1	467	-	-
Stage 2	335	-	-
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	353	596	-
Stage 1	631	-	-
Stage 2	725	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	350	596	-
Mov Cap-2 Maneuver	350	-	-
Stage 1	631	-	-
Stage 2	719	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	472	1094
HCM Lane V/C Ratio	-	-	0.018	0.006
HCM Control Delay (s)	-	-	12.8	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM Unsignalized Intersection Capacity Analysis
5: Railroad Way & Fenimore Rd

2022 Build
PM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	759	10	10	469	0	0
Future Volume (Veh/h)	759	10	10	469	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	825	11	11	510	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	182					
pX, platoon unblocked			0.76		0.76	0.76
vC, conflicting volume			836		1362	830
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			623		1318	615
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			725		129	372
Direction, Lane #	EB 1	WB 1				
Volume Total	836	521				
Volume Left	0	11				
Volume Right	11	0				
cSH	1700	725				
Volume to Capacity	0.49	0.02				
Queue Length 95th (ft)	0	1				
Control Delay (s)	0.0	0.4				
Lane LOS		A				
Approach Delay (s)	0.0	0.4				
Approach LOS						
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		43.9%		ICU Level of Service		A
Analysis Period (min)		15				

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

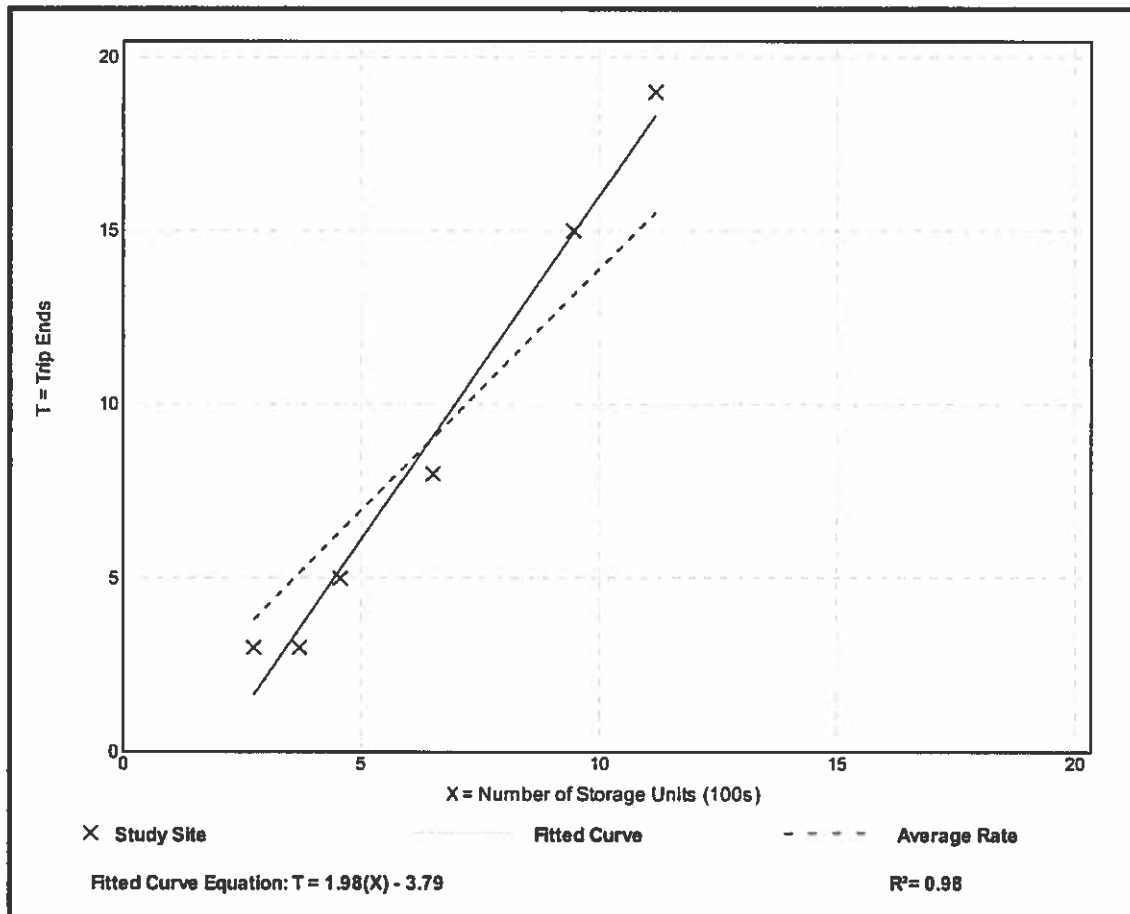
Avg. Num. of Storage Units (100s): 6

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

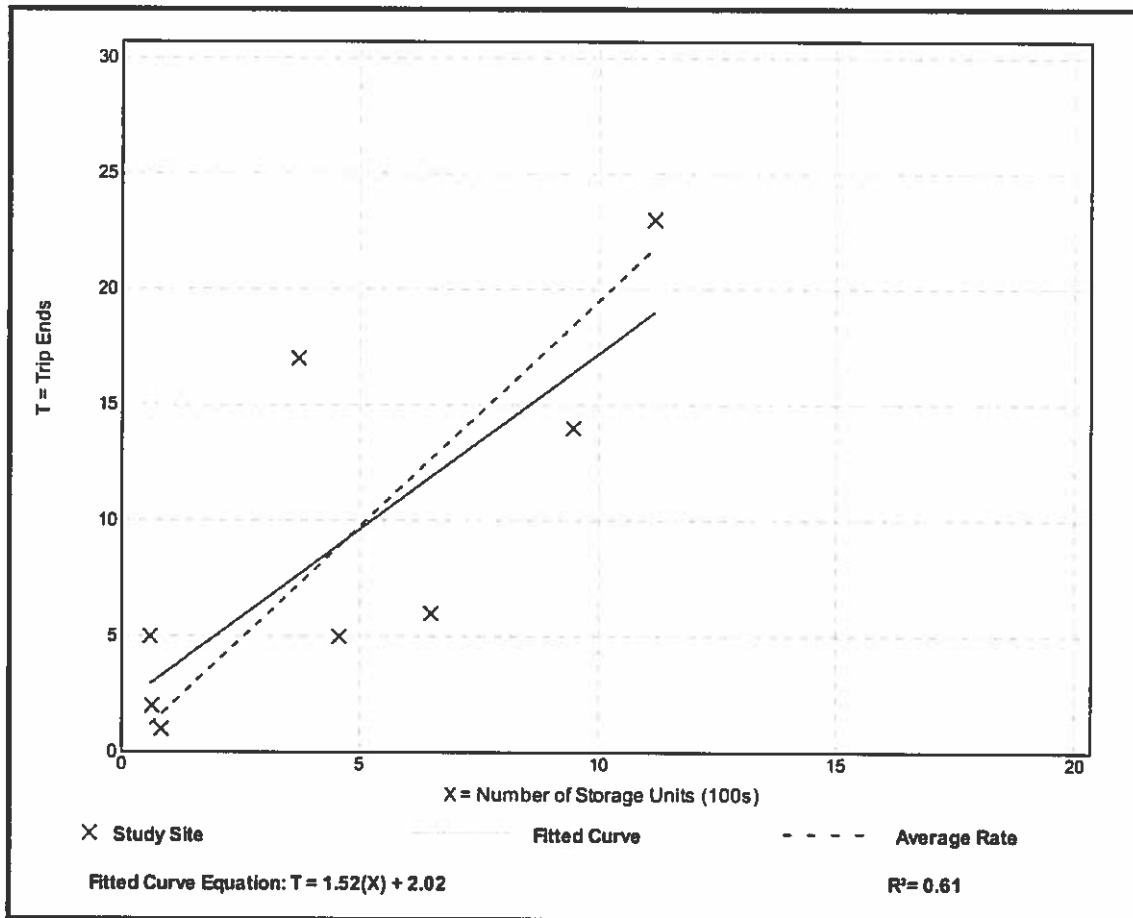
Avg. Num. of Storage Units (100s): 5

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





Parking Generation Manual

5th Edition

JANUARY 2019

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.

Time of Day Distribution for Parking Demand

The following table presents a time-of-day distribution of parking demand on a weekday (nine study sites) and a Saturday (one study site) in a general urban/suburban setting.

Hour Beginning	Percent of Peak Parking Demand	
	Weekday	Saturday
12:00–4:00 a.m.	0	—
5:00 a.m.	0	—
6:00 a.m.	0	—
7:00 a.m.	0	—
8:00 a.m.	14	—
9:00 a.m.	71	—
10:00 a.m.	50	—
11:00 a.m.	79	—
12:00 p.m.	57	—
1:00 p.m.	64	91
2:00 p.m.	64	27
3:00 p.m.	79	55
4:00 p.m.	71	100
5:00 p.m.	100	91
6:00 p.m.	14	27
7:00 p.m.	0	0
8:00 p.m.	0	—
9:00 p.m.	0	—
10:00 p.m.	0	—
11:00 p.m.	0	—

Mini-Warehouse (151)

Peak Period Parking Demand vs: Storage Units (100)

On a: Weekday (Monday - Friday)

Setting/Location: General Urban/Suburban

Peak Period of Parking Demand: 4:00 - 6:00 p.m.

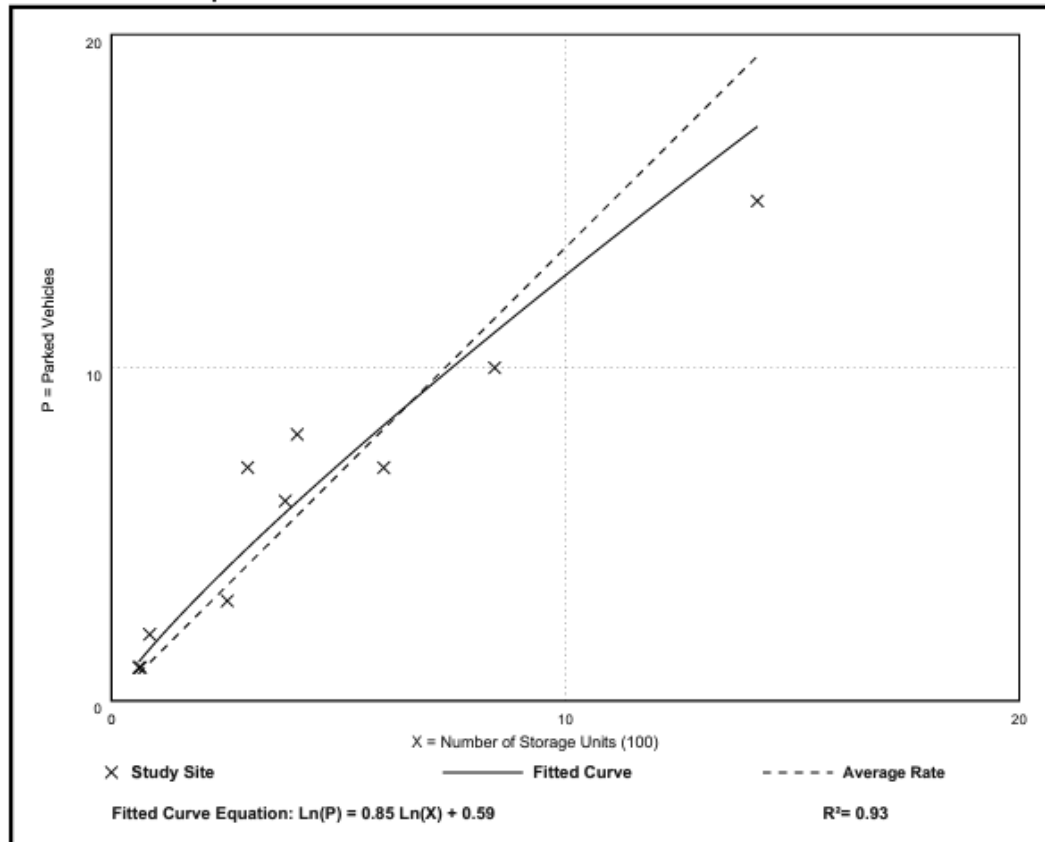
Number of Studies: 10

Avg. Num. of Storage Units (100): 4.4

Peak Period Parking Demand per Storage Unit (100)

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.36	1.05 - 2.38	1.18 / 2.35	***	0.43 (32%)

Data Plot and Equation



APPENDIX E

Traffic Count Sheets

Traffic Count (11/21/17)								
Peak AM - 7:30 - 8:30 AM								
Southern Driveway				Northern Driveway				Fenimore Driveway
Enter		Exit		Enter		Exit		Exit
Right	Left	Right	Left	Right	Left	Right	Left	Right
0	8	2	0	2	2	1	4	7
			Peak PM - 4:45 - 5:45 PM					
Southern Driveway				Northern Driveway				Fenimore Driveway
Enter		Exit		Enter		Exit		Exit
Right	Left	Right	Left	Right	Left	Right	Left	Right
3	2	7	2	2	2	0	1	0

File Name: Fenimore Rd and Waverly Ave - AM Peak

Start Date: 9/20/2016

Start Time: 7:00:00 AM

Site Code: 11111101

Comment 1: Job No.

Comment 2: Project

Comment 3: Location

Comment 4:

Start Time	Southbound				Westbound				Northbound				Eastbound			
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
07:00 AM	8	22	23	5	12	41	2	0	10	14	19	9	29	63	15	11
07:15 AM	21	48	24	6	13	55	16	5	13	45	18	4	34	125	13	3
07:30 AM	22	59	32	5	16	71	18	3	7	59	31	4	62	125	9	6
07:45 AM	24	62	44	4	19	87	30	2	12	56	40	3	52	152	9	4
08:00 AM	13	64	37	0	8	90	27	0	14	59	31	1	49	145	12	2
08:15 AM	9	37	25	0	16	59	28	0	9	74	30	3	46	141	8	1
08:30 AM	12	34	21	1	10	55	24	2	16	60	19	1	53	127	10	2
08:45 AM	10	38	44	4	24	68	16	1	12	65	27	0	32	126	8	1
09:00 AM	14	49	25	1	8	45	19	1	29	109	9	0	7	28	21	1

File Name: Fenimore Rd and Waverly Ave - PM Peak

Start Date: 9/20/2016

Start Time: 4:00:00 PM

Site Code: 11111102

Comment 1: Job No.

Comment 2: Project

Comment 3: Location

Comment 4:

Start Time	Southbound				Westbound				Northbound				Eastbound			
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
04:00 PM	9	34	30	1	14	111	19	0	8	63	20	1	47	76	9	0
04:15 PM	10	49	37	4	15	67	21	3	6	58	17	8	41	105	4	5
04:30 PM	7	51	41	4	21	68	10	1	17	61	36	4	34	115	10	0
04:45 PM	9	42	35	5	17	77	17	4	18	53	30	4	43	95	10	0
05:00 PM	8	42	19	3	24	104	26	2	16	60	44	0	47	110	6	5
05:15 PM	4	37	27	0	20	78	24	0	14	59	17	2	47	105	5	0
05:30 PM	12	38	45	4	18	68	11	0	13	63	23	1	36	98	9	1
05:45 PM	14	48	22	0	14	67	18	1	8	41	18	3	35	104	5	0
06:00 PM	7	45	25	1	22	52	10	1	12	53	14	0	45	91	2	1