

U.S. Department of Veterans Affairs



Portland Veterans Affairs Medical Center Traffic Impact Study

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Executive Summary

The U.S. Department of Veterans Affairs (VA) is considering a construction project at the VA Portland Health Care System Portland Campus (Portland VA Medical Center campus) in Oregon. This report supplements the 2019 traffic impact analysis. This 2020 study includes traffic counts for an additional five intersections not studied in 2019.

This report is subject to change as more information becomes available.

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Acronyms and Abbreviations

ADT	Average Daily Traffic
AM (PM) ¹	AM peak period (PM peak period)
BGSF	building gross square foot (feet)
COVID-19	Coronavirus Disease 2019
ITE	Institute of Transportation Engineers
LOS	level of service
MUTCD	<i>Manual of Uniform Traffic Control Devices</i>
PBOT	Portland Bureau of Transportation
TIA	traffic impact analysis
VA	U.S. Department of Veterans Affairs
VAMC	Veterans Affairs Medical Center

¹ Two traffic periods were studied: the AM peak period and the PM peak period. Where parentheses are used, the number not in parentheses refers to the AM period and the number in parentheses refers to the PM period. This applies for traffic volumes, level of service, and other metrics.

1.0 Introduction

The U.S. Department of Veterans Affairs (VA) is proposing a construction project at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus) in Oregon. A traffic impact analysis (TIA) was conducted at three intersections in May 2019. This report supplements the 2019 TIA by including traffic counts from five additional intersections as well as recounts at the three original intersections. The project team collected these counts and made observations in December 2020 and then re-analyzed the traffic operations under a full build of the proposed project and a no-build alternative. This report concludes with recommendations based on the traffic study results.

The report is organized as follows:

- **Section 1.0, Introduction**, includes a description of the proposed construction project.
- **Section 2.0, Existing Traffic Data**, discusses traffic counts collected at key intersections around the Portland VAMC campus and the adjustments made to those traffic volumes to better reflect pre-Coronavirus Disease 2019 (COVID-19) volumes.
- **Section 3.0, Proposed Actions**, describes the potential future performance of traffic operations by determining the anticipated number of trips generated by the proposed actions at the Portland VAMC campus, distributing those trips throughout the traffic network, accounting for background traffic growth, and then analyzing the performance of the traffic network with and without the full buildout.
- **Section 4.0, Recommended Mitigation (Non-VA)**, discusses recommendations to mitigate the potential future traffic growth.
- **Section 5.0, Parking Baseline Counts and Observations**, discusses parking occupancy counts and other observations made during the study.
- **Section 6.0, Summary**, provides recommendations for adequate traffic operations under the proposed action.

1.1 Project Description

The VA is planning construction at the Portland VAMC campus with the implementation of the following three components:

- Building 108 (existing parking structure): Construct two additional parking levels to add approximately 150 parking spaces.
- Building 110 (Specialty Care Building): Design and construction of an approximately 300,000-building-gross-square-foot (BGSF) facility. Approximately 200 additional staff members with no new patient beds are anticipated.
- Building 111 (parking garage): Design and construction for an approximately 650-space parking structure in the area south of Building 101. Building 110 and 111 would be constructed over Lot 5 (196 parking spaces) and Building T-51.

These components would be constructed over an extended period of approximately 6 to 8 years. The site location map is shown on Figure 1-1 and the proposed improvements site map is shown on Figure 1-2.



Figure 1-1. Site Location Map



Figure 1-2. Proposed Improvements Site Map

1.2 Previous Study

Global Transportation Engineering performed a TIA for the site in May 2019. The 2019 TIA report is included as Appendix A. The underlying infrastructure conditions surrounding the VAMC campus have not changed.

1.3 Traffic Counts during the COVID-19 Pandemic

Since the 2019 TIA was conducted, travel has been greatly reduced across the country due to the COVID-19 pandemic. Travel restrictions and advisories have been deployed at all levels of government to encourage people to stay home and limit unnecessary travel.

Traffic counts were collected on December 3, 2020, for both the recounted and newly counted intersections. Because the Portland VAMC was restricting all visitors, guests, and persons under the age of 18 during this time, the project team developed a method for adjusting volumes to pre-COVID-19 levels. This method is described in Section 2.3. This method is necessarily inexact, which should be considered along with the results of the analysis.

1.4 Existing Infrastructure

The existing street network and infrastructure have not changed since the 2019 TIA was completed. The 2019 TIA report in Appendix A should be referenced for general information such as roadway functional classifications, speed limits, number of lanes, and so forth.

2.0 Existing Traffic Data

2.1 2019 and 2020 Traffic Counts

Figure 2-1 shows the location of turning movement counts collected as part of the 2019 TIA and those counted in 2020. The three intersections counted in 2019 were counted again to provide a baseline for factoring. Five additional intersections, not counted in 2019, were counted in 2020. The traffic counts were collected on December 3, 2020, from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. and included counts of passenger vehicles, heavy trucks, pedestrians, and bicyclists. The counts are provided in Appendix B.

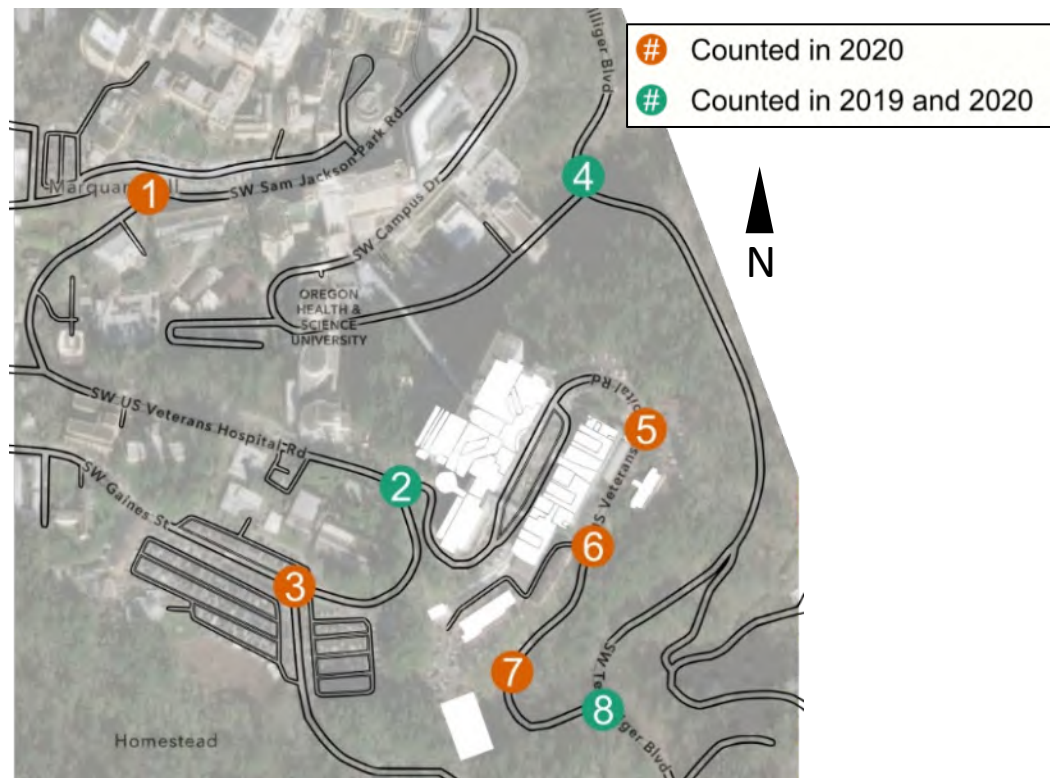


Figure 2-1. Turning Movement Count Locations

The Portland Bureau of Transportation lists daily traffic counts performed on SW Terwilliger Boulevard south of SW Condor Lane (north of Intersection 8) from 2011. These counts list the daily traffic to be 8,965 vehicles.²

2.2 Effects of COVID-19 Pandemic on Traffic Counts

As mentioned previously, traffic counts were collected on December 3, 2020, when the Portland VAMC was restricting all visitors, guests, and persons under the age of 18. In addition, many non-essential medical appointments were moved to tele-visits or restricted. The following guidance from the Portland VAMC website was effective as of November 18, 2020:

*VAPORHCS facilities are operating with limited services; most appts are via phone/video teleconference; face-to-face appts and procedures are still occurring on a case-by-case basis IAW national/local guidance. ED at PVAMC is open for service; visitor restrictions are in place.*³

² <https://www.portland.gov/transportation/engineering/how-we-gather-traffic-counts>. Accessed December 21, 2021.

³ <https://www.portland.va.gov/emergency/index.asp>. Accessed December 29, 2020.

These travel restrictions reduced the number of trips being made to and from the hospital campus by both staff and patients.

The hospital did offer COVID-19 testing to Veterans during this time, which could have generated additional trips:

We offer diagnostic testing for Veterans who are enrolled in VA health care and meet the CDC testing criteria.⁴

Because of these differences in underlying traffic conditions due to the COVID-19 pandemic, the results detailed in this report may differ from the 2019 TIA study. The next section details how the analysis forecasts future growth based on counts made available in 2019 and 2020.

2.3 Factoring Method

Using data from the three intersections counted in both 2019 and 2020, the project team analyzed potential travel patterns that may have been affected differently by the travel restrictions. The patterns showed a reduced number of trips by staff, patients, and visitors and an increased number of trips for COVID-19 testing. Differences in traffic volumes at the three intersections were analyzed to determine the factor that should be applied to 2020 count volumes to make them usable for post-COVID-19 analysis.

The factors that would need to be applied to each intersection and time period are shown in Table 2-1. A factor above 1.00 would correspond to a lower 2020 volume that would need to be increased in order to reach 2019 levels. A factor below 1.00 would correspond to volumes that were higher in 2020.

Table 2-1. Intersection Calibration Factor

Intersection No.	Street 1	Street 2	Period	Intersection Factor
2	SW Gaines Street	SW US Veterans Hospital Road	AM	1.80
			PM	1.34
4	SW Terwilliger Boulevard	SW Campus Drive	AM	1.37
			PM	1.46
8	SW Terwilliger Boulevard	SW US Veterans Hospital Road	AM	1.37
			PM	1.50
Overall Weighted Average				1.44

As shown in Table 2-1, the three intersections for which traffic volumes were counted in both 2019 and 2020 had lower volumes in 2020 than in 2019. The overall weighted average for the three recounted intersections was 1.44, meaning that, on average, 2019 volumes were 1.44 times higher than 2020 volumes. There was more variability in the individual turning movement counts, but many of these movements had relatively low volumes where a swing of a few vehicles would more drastically change the factor.

No clear patterns emerged to indicate that travel at certain intersections or in certain directions was more or less affected by the COVID-19 pandemic-related conditions. As a result, the recommended procedure is to apply the network-wide adjustment factor of 1.44 to all volumes counted in 2020.

⁴ <https://www.va.gov/coronavirus-veteran-frequently-asked-questions/>. Accessed December 29, 2020.

2.4 Traffic Count Results

Figures 2-2 and 2-3 show the actual and adjusted 2020 traffic volumes, respectively, for the eight intersections analyzed as part of this study.

2020 Actual Volumes

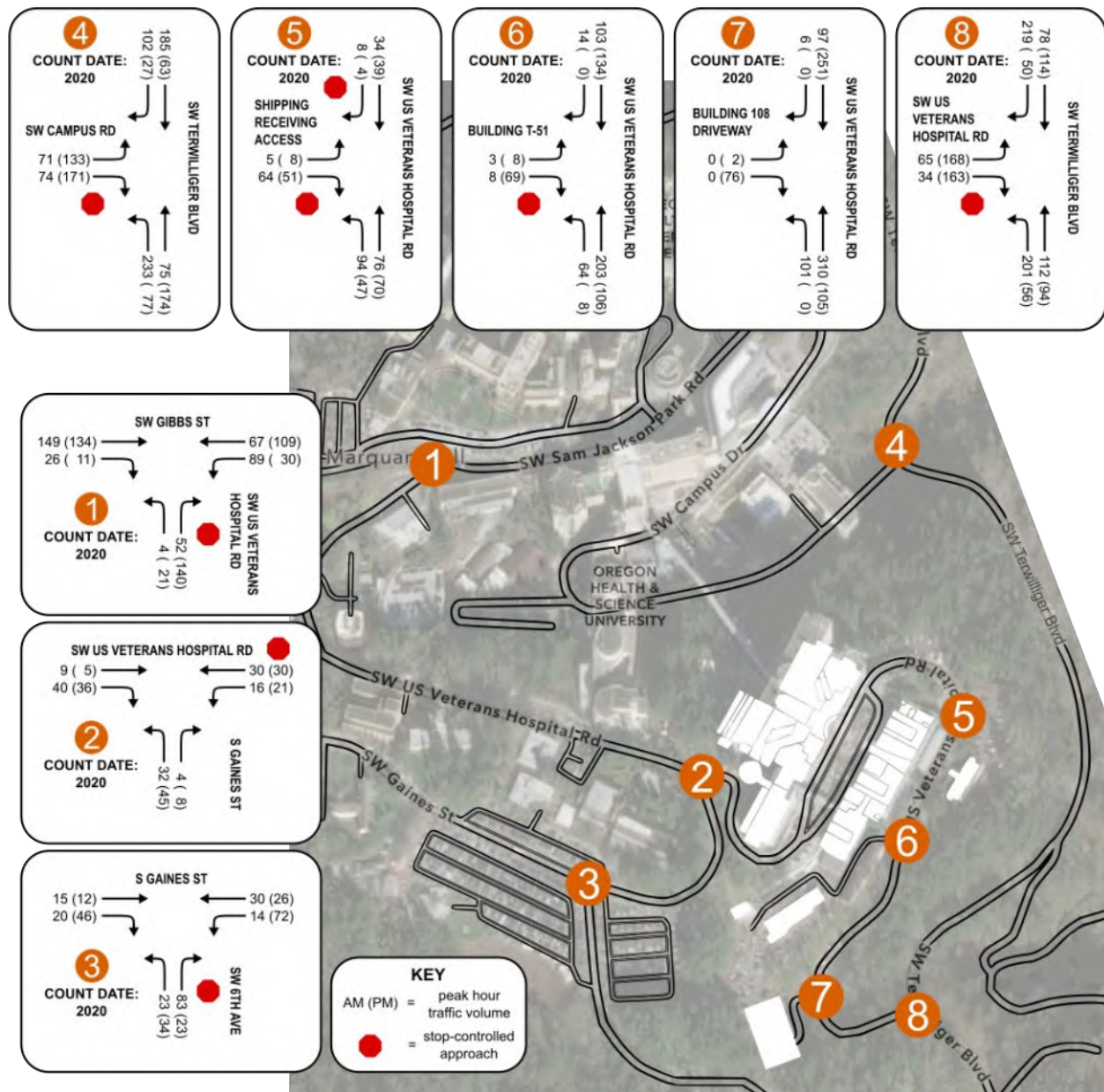


Figure 2-2. 2020 Actual Volumes

2020 Adjusted Volumes

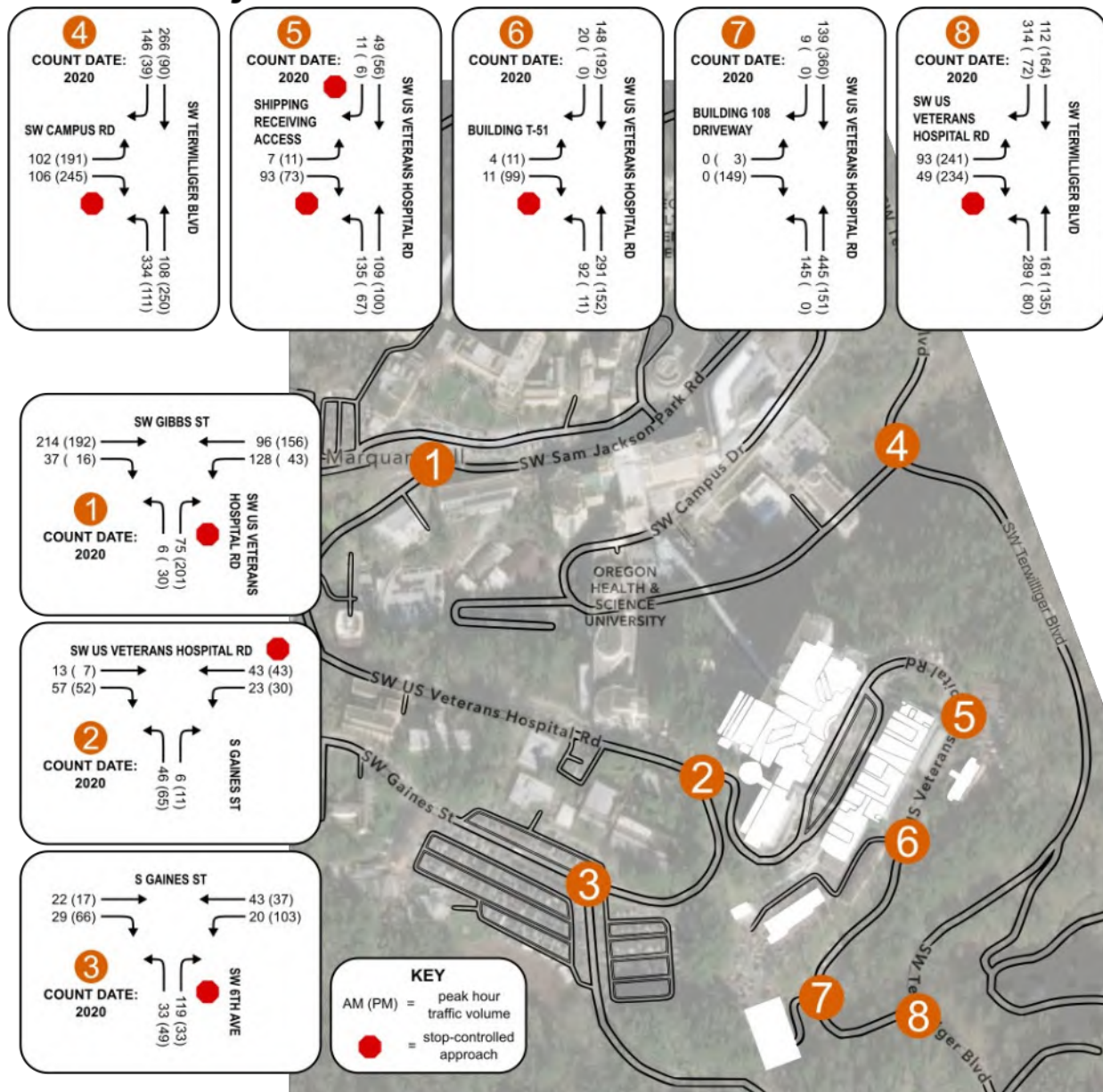


Figure 2-3. 2020 Adjusted Volumes

2.5 Traffic Observations

Traffic observations were collected at the eight study intersections to identify any existing safety or operational issues. Intersection-level observations are included in Appendix C. The main takeaways from the observations are as follows:

- Overall, there were no traffic movements that appeared to exceed their traffic capacity. Traffic volumes were light most of the day. Peak periods had higher volumes than off-peak volumes, but even during heavy periods, traffic operated without notable queuing or delays.
- Limited congestion (no more than seven-vehicle-long queues) occurs at intersections but usually for only short period of time.
- Throughout the campus, compliance with the Americans with Disabilities Act should be addressed along sidewalks/paths and at crossings that lack and/or have insufficient pavement striping and curb ramps/tactile warning devices.

3.0 Proposed Actions

The VA is planning construction at the Portland VAMC campus with the implementation of the following three components:

- Building 108 (existing parking structure): Construct two additional parking levels to add approximately 150 parking spaces.
- Building 110 (Specialty Care Building): Design and construction of an approximately 300,000-building-gross-square-foot (BGSF) facility. Approximately 200 additional staff members with no new patient beds are anticipated.
- Building 111 (parking garage): Design and construction for an approximately 650-space parking structure in the area south of Building 101. Building 110 and 111 would be constructed over Lot 5 (196 parking spaces) and Building T-51.

The implementation of these components would affect traffic patterns.

3.1 Baseline Traffic Growth

To be consistent with the 2019 TIA, this study assumed a 1 percent annual growth rate over a 10-year analysis period (from 2020 to 2030 in this case). Figure 3-1 shows the expected 2030 no-build conditions that represent the 2020 adjusted volumes growing by 1 percent annually until 2030.

2030 No Build Volumes

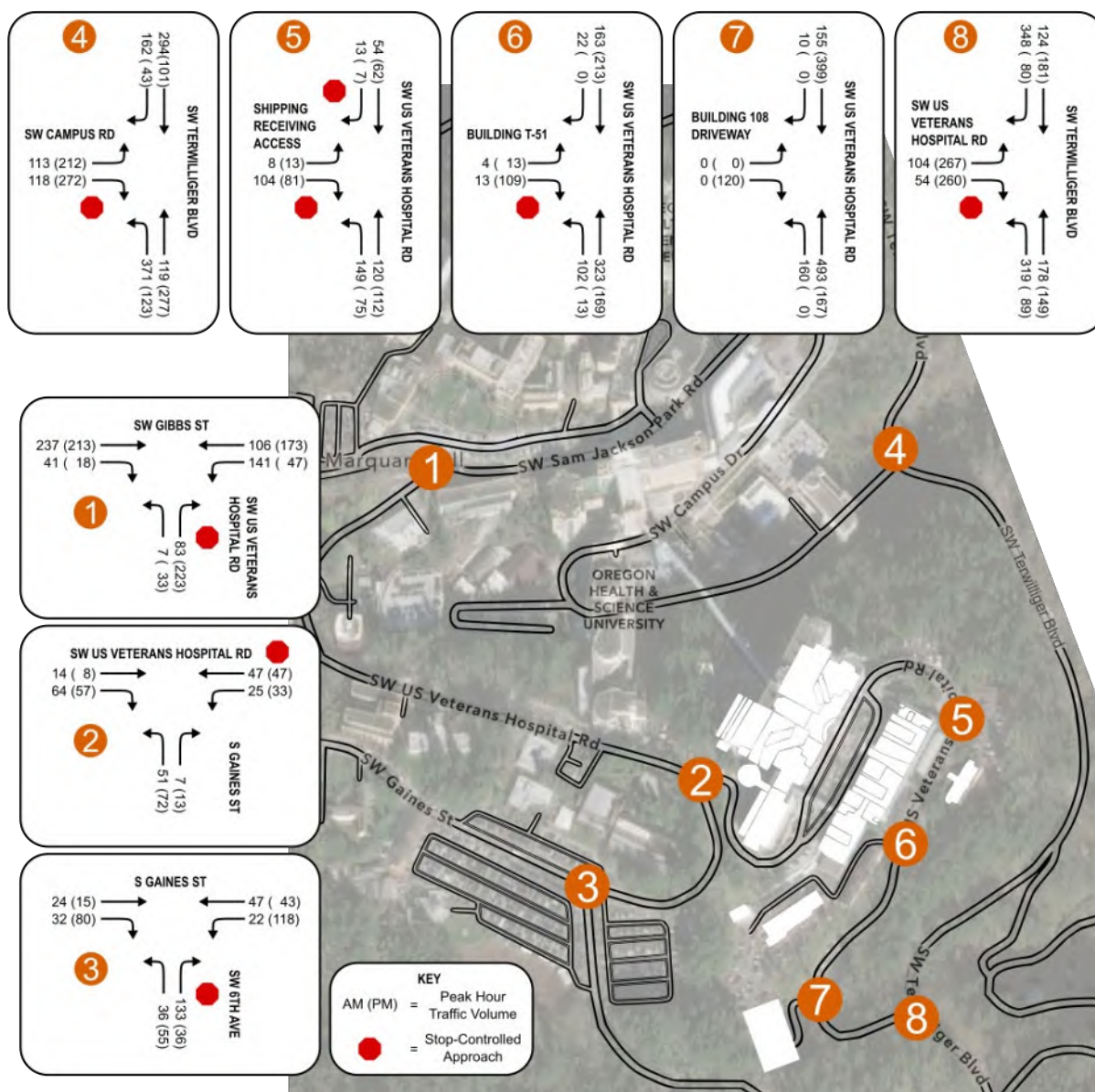


Figure 3-1. 2030 No-build Volumes

3.2 Site Trip Generation and 2030 Combined Volumes

3.2.1 Methodology and Observations

Typical engineering practice would estimate the number of trips generated based on calculations as defined in the Institute of Transportation Engineers' (ITE's) *Trip Generation Manual*, 10th Edition⁵ for the "610: Hospital" land use designation. However, ITE's *Trip Generation Manual* provides average trip generation rates from a large number of studies at hospital facilities throughout the country with a large amount of variability between the projects and results. In this case, site-specific data for the Portland VAMC campus may provide more accurate trip generation forecasts than the average data. Based on data

⁵ Institute of Transportation Engineers (ITE). 2019. *Trip Generation Manual*, 10th Edition.

collected during the 2019 TIA, actual traffic volumes were observed to be more concentrated in the AM and PM peak hours and directionality was more focused on entering trips in the AM and exiting trips in the PM than the data shown in the *Trip Generation Manual*.

3.2.2 Trips Generated by the Proposed Action

The 2019 parking study counted daily trips for three entrances to staff parking lots: Building 108, Lot 5, and Lot 4. In the 2019 study, each parking space in the respective lots generated 1.12 entering trips per day and 1.14 exiting trips per day, implying that most trips are staff arriving for work in the AM, staying in the parking lot all day, and then departing in the PM. Because new Building 110 is a staff-only building with no new beds and the additional parking spaces in Buildings 108 and 111 are staff-only spaces, it is expected that future trips generated by the proposed action would follow a similar pattern to the existing traffic patterns to Building 108, Lot 5, and Lot 4.

Table 3-1 aggregates the observed exiting and entering vehicles at the three driveways measured as part of the 2019 parking study. The data include two days of measurements for the driveways to Building 108 and Lot 5, and one day of measurement for the driveway to Lot 4.

Because the traffic patterns are likely to be similar for the new parking garages, it is recommended to use a method of trip generation that is based on the number of parking spaces instead of the gross floor area. The values in ITE's *Trip Generation Manual* would overestimate the number of trips that result from the proposed action because the values represent more trips made by a wider variety of travelers (patients, staff, visitors, etc.) coming and going throughout the day.

Table 3-1. Measured Entering and Exiting Volumes During Peak Periods as Percentage of Daily Entering and Existing Volumes

Hour Start	2019 Entering Trips		2019 Exiting Trips	
	Count	Percent	Count	Percent
12:00 AM	0	0.0%	0	0.0%
1:00 AM	0	0.0%	1	0.1%
2:00 AM	3	0.2%	1	0.1%
3:00 AM	1	0.1%	0	0.0%
4:00 AM	8	0.6%	1	0.1%
5:00 AM	56	4.2%	5	0.4%
6:00 AM	364	27.6%	9	0.7%
7:00 AM	417	31.6%	21	1.6%
8:00 AM	199	15.1%	25	1.8%
9:00 AM	62	4.7%	48	3.6%
10:00 AM	40	3.0%	30	2.2%
11:00 AM	36	2.7%	45	3.3%
12:00 PM	32	2.4%	43	3.2%
1:00 PM	18	1.4%	41	3.0%
2:00 PM	10	0.8%	54	4.0%
3:00 PM	21	1.6%	196	14.5%
4:00 PM	13	1.0%	355	26.3%
5:00 PM	24	1.8%	233	17.2%
6:00 PM	8	0.6%	113	8.4%
7:00 PM	3	0.2%	98	7.2%
8:00 PM	4	0.3%	24	1.8%
9:00 PM	0	0.0%	2	0.1%
10:00 PM	1	0.1%	3	0.2%
11:00 PM	1	0.1%	4	0.3%
TOTAL	1321	100.0%	1352	100%

The proposed action would result in a net increase of 600 parking spaces (+150 from Building 108, +650 from Building 111, and -200 from the removal of Lot 5). As summarized in Table 3-2, using the same trip generation rates from the existing parking lots, the 600 new parking spaces are expected to generate 672 new entering trips and 684 new exiting trip each day, for a total of 1,356 daily trips.

Table 3-2. Proposed Trips Generated

	Entering	Exiting
Existing Daily Trips Generated per parking space	1.12	1.14
Proposed Parking Spaces	600	
Proposed Daily Trips Generated for Proposed Actions	672	684
Total Proposed Daily Trips Generated	1,356	

Traffic analysis is generally done for the AM and PM peak hours. The AM peak hour usually occurs between 7 AM–9 AM and the PM peak hour usually occurs between 4 PM–6 PM. These peak hours represent the time when traffic is heaviest, especially for work-based trips such as those to and from staff parking lots in this study. The proposed daily trips generated must be distributed among the AM and PM peak hours.

Table 3-1 shows the distribution of daily trips across each hour observed during the 2019 traffic study for the existing garages. Applying these hourly distributions to the projected generated trips results in 212 new entering trips in the AM peak hour, 24 exiting trips in the AM, 12 entering trips in the PM, and 180 exiting trips in the PM. These results are summarized in Table 3-3.

Table 3-3. Distribution of Trips in the AM and PM Peak Hour

Period	Entering	Exiting
All Day	672	684
AM Peak Hour	31.6%	3.6%
	212	24
PM Peak Hour	1.8%	26.3%
	12	180

Comparing these numbers to the *Trip Generation Manual* numbers shows that the AM peak trips are approximately the same but have a different distribution (i.e., more entering trips, fewer exiting trips). The PM peak trips and the total daily trips are lower than the number from the *Trip Generation Manual* because of the lower turnover of parking spaces at the Portland VAMC.

3.2.3 Distribution of Generated Trips and Combined 2030 Volumes

The driveway to Building 108 is projected to be located on the lower section of SW US Veterans Hospital Road, just west of SW Terwilliger Boulevard. The driveway for Building 111 is projected to be on the upper section of SW US Veterans Hospital Road, just east of S Gaines Street. Based on the driveway locations, existing traffic patterns, and projected intersection operation, 55% of all generated trips are projected to enter from SW Terwilliger Boulevard and 45% are projected to enter from S Gaines Street. Further assumed distribution of traffic at the intersection level is shown on Figure 3-2. All turning movements are shown, but if the proposed buildout did not add trips to that movement, it is only shown as “- (-)”.

In 2011, there was an Average Daily Traffic (ADT) on SW Terwilliger Boulevard north of SW US Veterans Hospital Road of 8,965. The projected 2030 no-build scenario assuming 1% annual growth would result in 10,831 ADT on SW Terwilliger Boulevard. The proposed action is projected to result in 746 new trips on SW Terwilliger Boulevard, which is an increase of 6.89% over the no-build scenario.

2030 Distribution of Generated Volumes

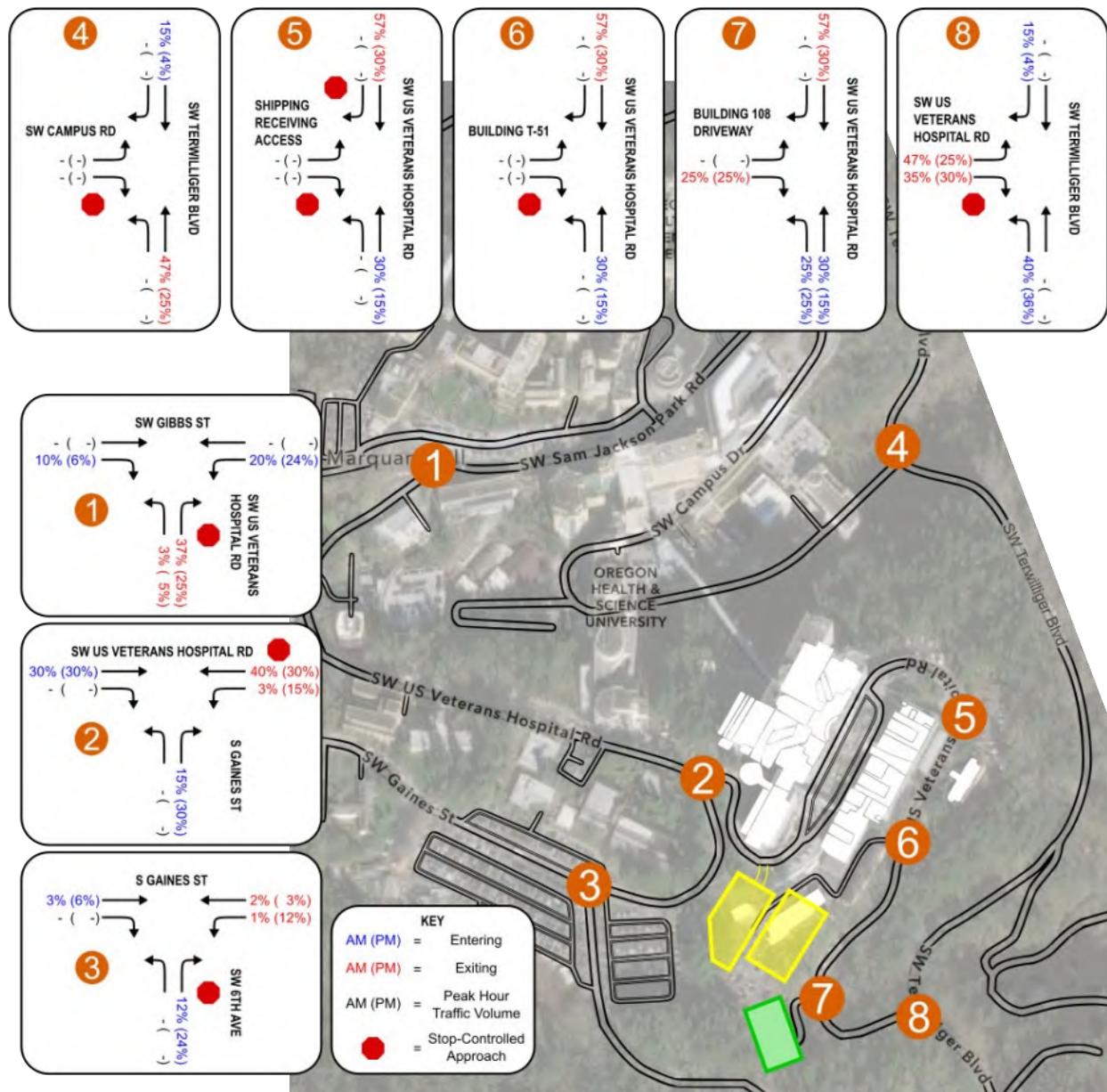


Figure 3-2. Distribution of Generated Volumes

Converting the distribution percentages into additional trips results in additional traffic, as shown on Figure 3-3.

2030 Generated Volumes

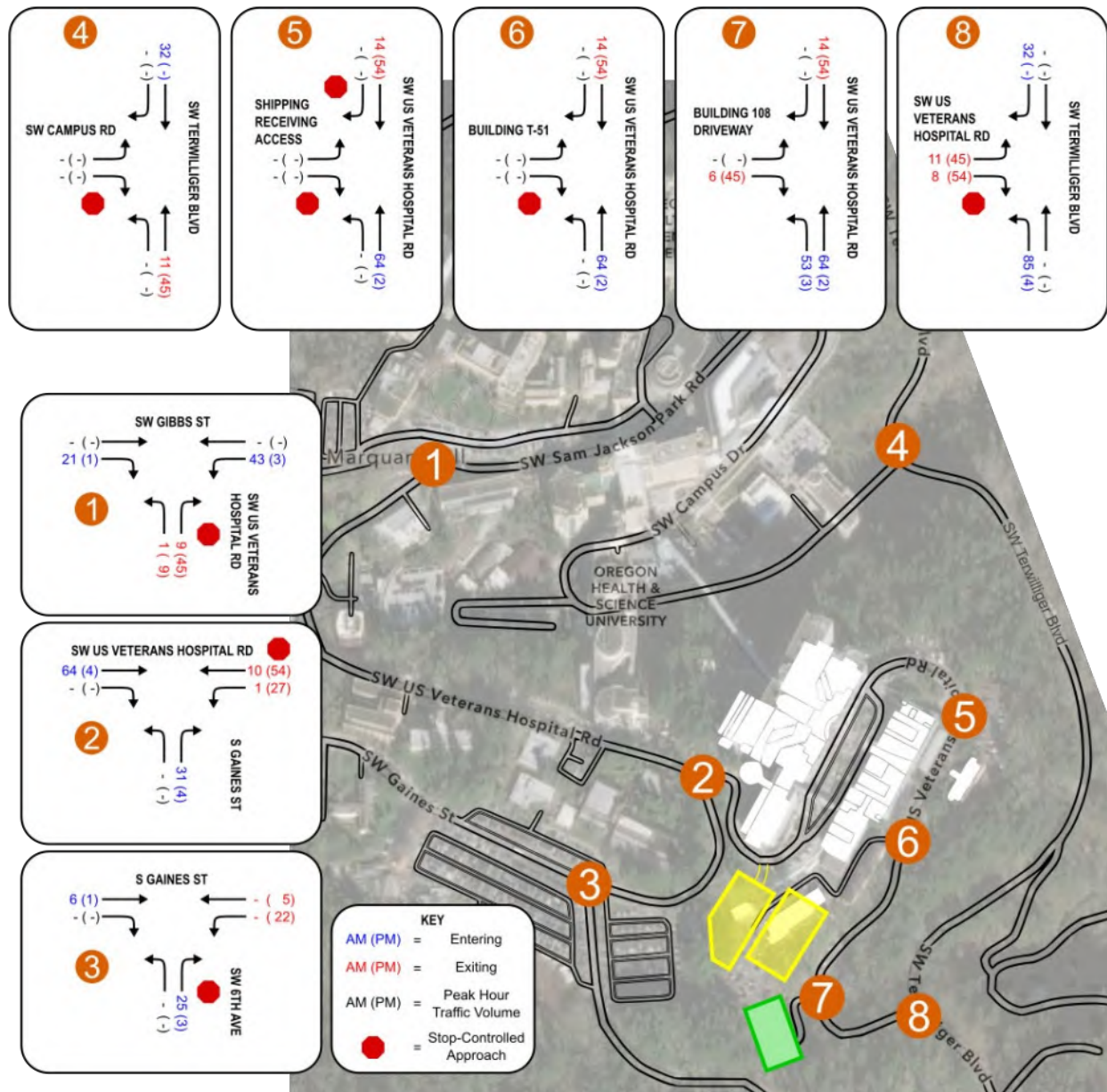


Figure 3-3. Buildout Generated Volumes

Adding these generated volumes to the 2030 no-build base volumes results in the projected 2030 volumes after full buildout, as shown on Figure 3-4.

2030 Combined Volumes

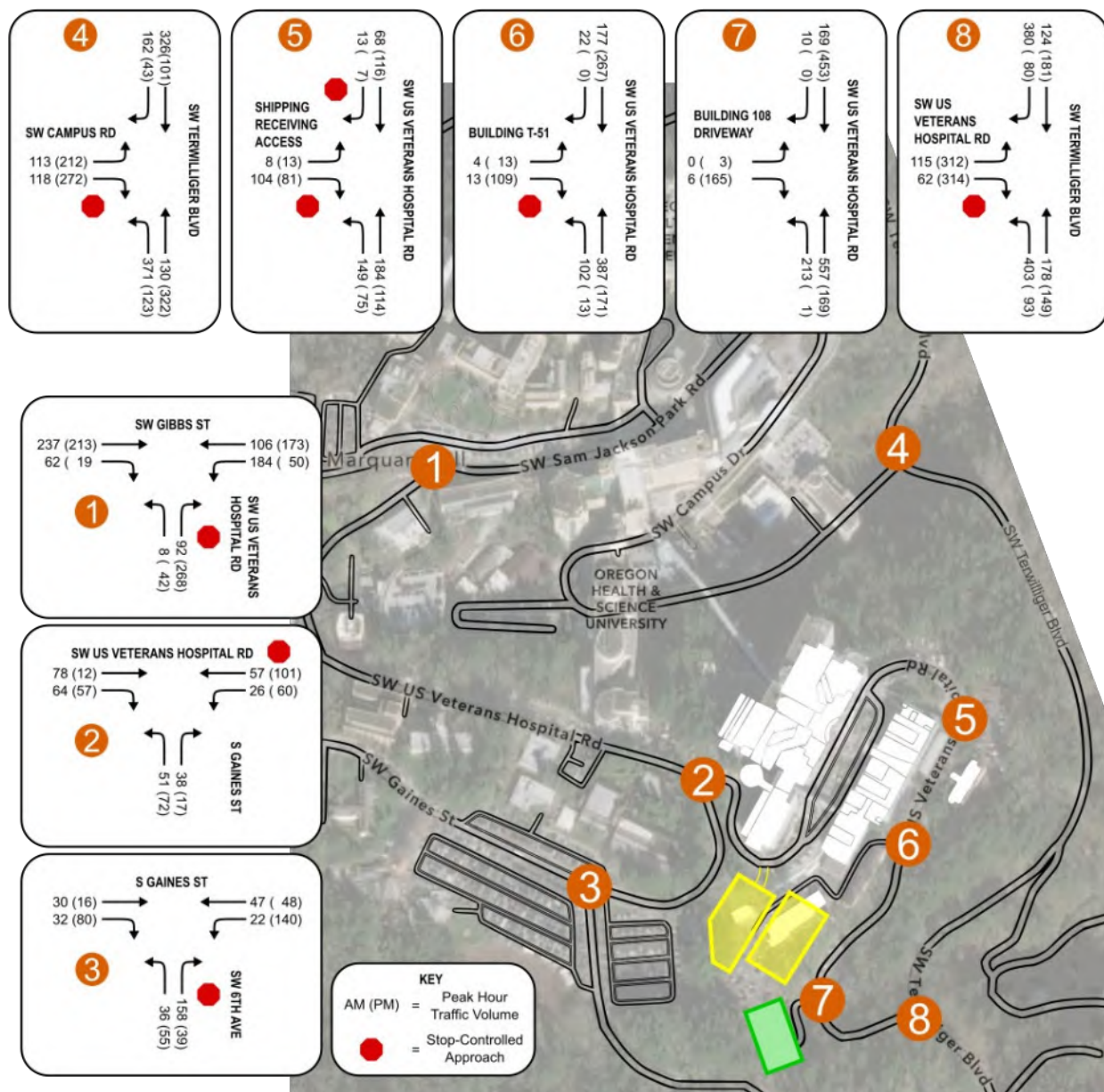


Figure 3-4. 2030 Build Combined Volumes

3.3 Intersection Performance

Traffic operations were analyzed using Synchro 11 software, which uses capacity analysis methodologies defined in the *Highway Capacity Manual*.⁶ Intersections were analyzed for the following three scenarios:

- 2020 Adjusted – Volumes that were adjusted to replicate pre-COVID-19 volumes, as discussed in Section 2.0 (Figure 2-3)
- 2030 No-build – Year 2020 adjusted volumes plus 1 percent annual growth (Figure 3-1)
- 2030 Build – 2030 No-build volumes combined with the distributed, site-generated trips (Figure 3-4)

Intersection operations are shown in Table 3-4, and full Synchro reports are included in Appendices D, E, and F.

Traffic operation performance at intersections is measured using several factors: average vehicle delay, volume over capacity ratio (v/c), and level of service (LOS). LOS is a categorization of the performance, ranging from A to F, that is directly related to the average vehicle delay, where LOS A represents minimal vehicle delay, LOS E represents an intersection operating at full capacity, and LOS F represents failing conditions with excessive delay. The City of Portland requires that unsignalized intersections operate at LOS E or better (in other words, not LOS F) based on individual vehicle movements for two-way, stop-controlled intersections and based on a weighted average of vehicle delay for all-way, stop-controlled intersections. Signalized intersections must operate at LOS D or better based on a weighted average of vehicle delay for the intersection.⁷

As shown in Table 3-4, Intersection 4 (SW Campus Drive and SW Terwilliger Boulevard) and Intersection 8 (SW US Veterans Hospital Road and SW Terwilliger Boulevard) do not meet the City's minimum LOS requirements in all the scenarios, including the 2020 adjusted, 2030 no-build, and the 2030 build scenarios.

Both intersections have high numbers of northbound left turns, especially in the AM peak period and high numbers of eastbound traffic, especially in the PM peak period. Therefore, these intersections are recommended for mitigation.

⁶ Transportation Research Board. 2016. *Highway Capacity Manual, 6th Edition: A Guide for Multimodal Mobility Analysis*.

⁷ City of Portland Title 17 Public Improvements Administrative Rules, Section TRN-10.27

Table 3-4. Intersection Performance Summary

Intersection	2020 Adjusted			2030 No-build			2030 Build		
	LOS ^a	Delay ^b	Max. v/c ^c	LOS ^a	Delay ^b	Max. v/c ^c	LOS ^a	Delay ^b	Max. v/c ^c
1: SW US Veterans Hospital Road and SW Gibbs Street/SW Sam Jackson Park Road ^{TWS}	B (B) NB	11.3 (12.9)	0.137 (0.375)	B (B) NB	11.8 (14.0)	0.160 (0.430)	B (C) NB	12.3 (15.9)	0.187 (0.529)
2: S Gaines Street and SW US Veterans Hospital Road ^{TWS}	A (A) WB	9.8 (9.5)	0.096 (0.100)	B (A) WB	10.4 (9.6)	0.044 (0.068)	B (B) WB	12.5 (10.7)	0.062 (0.103)
3: SW 6th Avenue Drive & S Gaines Street ^{TWS}	A (A) NB	9.5 (10.7)	0.174 (0.132)	A (B) NB	9.6 (11.3)	0.195 (0.156)	A (B) NB	9.8 (11.8)	0.225 (0.171)
4: SW Terwilliger Boulevard and SW Campus Drive^{TWS}	F (D) EB	163 (32)	1.160 (0.805)	F (F) EB	361.1 (57.0)	1.627 (0.959)	F (F) EB	435.2 (69.7)	1.788 (1.006)
5: SW US Veterans Hospital Road and Shipping/Receiving Access ^{TWS}	A (A) EB	9.4 (9.4)	0.120 (0.108)	A (A) EB	9.6 (9.6)	0.138 (0.123)	A (B) EB	9.8 (10.1)	0.143 (0.134)
6: SW US Veterans Hospital Road and Building T-51 ^{TWS}	B (B) EB	10.9 (10.7)	0.028 (0.180)	B (B) EB	11.2 (11.1)	0.033 (0.206)	B (B) EB	11.6 (11.9)	0.035 (0.226)
7: SW US Veterans Hospital Road and Building 108 Driveway ^{TWS}	A (A) NB (EB)	7.9 (12.8)	0.124 (0.235)	A (B) NB (EB)	8.0 (13.8)	0.139 (0.276)	A (C) NB (EB)	9.3 (16.7)	0.188 (0.410)
8: SW Terwilliger Boulevard and SW US Veterans Hospital Road^{TWS}	F (E) EB	68.1 (47.7)	0.791 (0.923)	F (F) EB	161 (95.5)	1.110 (1.099)	F (F) EB	558.9 (175.3)	2.009 (1.310)

^a Vehicle movement level of service (LOS) – worst-performing approach direction indicated below LOS results

^b Movement delay in seconds

^c Maximum v/c (volume/capacity) ratio for the movement

Notes:

AM (PM) = AM Peak Period (PM Peak Period) values

Bold font = intersection with substandard operation

Red font/gray box = substandard LOS

LOS = level of service

^{TWS} = Two-way stop-controlled intersection

EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound

4.0 Recommended Mitigation (Non-VA)

4.1 SW Campus Drive and SW Terwilliger Boulevard (Intersection 4)

The intersection of SW Campus Drive and SW Terwilliger Boulevard performs poorly primarily as a result of steady traffic on SW Terwilliger Boulevard that limits the gaps for eastbound exiting traffic. Background traffic growth in the no-build scenario is projected to cause this intersection to operate at a failing condition. The proposed actions are not anticipated to add any trips to SW Campus Drive, but they would add traffic to SW Terwilliger Boulevard, contributing to the core issue. In addition, the heavy northbound left-turn volumes in the AM peak period may cause issues for the single northbound travel lane, as northbound through traffic is forced to wait behind northbound, left-turning traffic while they wait for a gap in oncoming southbound traffic.

To address the projected operational issues at this intersection, the recommended mitigation is to **install a traffic signal and northbound left-turn lane at SW Campus Drive and SW Terwilliger Boulevard**. A traffic signal would most efficiently control traffic and provide gaps for eastbound traffic on SW Campus Drive. Because of the high number of northbound left-turn movements, especially in the AM peak period, a northbound left-turn lane is also required to achieve an acceptable LOS. The intersection as a whole meets the City of Portland's standards for signalized intersections, operating at an intersection LOS B in the AM and PM periods. The critical movement operations in the full buildout scenario are presented in Table 4-1.

Table 4-1. Critical Movement Operations with Mitigation

Intersection	2030 Build w/Mitigation		
	LOS ^a	Delay ^b	Max. v/c ^c
4: SW Terwilliger Boulevard & SW Campus Drive^s	D (B) EB	35.5 (14.2)	0.86 (0.84)

^a Vehicle movement level of service (LOS) - worst-performing approach direction from Table 3-4 below LOS results

^b Movement delay in seconds

^c Maximum v/c (volume/capacity) ratio for the movement

^s Signalized intersection

Note:

AM (PM) = AM Peak Period (PM Peak Period) values

EB = Eastbound, WB = Westbound, NB = Northbound,

SB = Southbound

4.1.1 Signal Warrant Analysis

Signal warrant requirements for the intersection of SW Campus Drive and SW Terwilliger Boulevard are met based on Warrant 3, Peak Hour Volumes, from the *Manual of Uniform Traffic Control Devices* (MUTCD).⁸ The peak hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. Additional warrants could be met, but traffic volumes outside the peak hours were not analyzed as part of the scope of this study. Additional details are shown in Appendix G.

4.1.2 Additional Considerations

Installing a traffic signal with the existing roadway geometry is the most straightforward improvement to handle the traffic from the proposed action. However, alternative and additional options exist if traffic growth is less than, or greater than, the anticipated growth.

⁸ Federal Highway Administration. 2009. *Manual on Uniform Traffic Control Devices*.

Interim All-way Stop

Installation of a traffic signal on SW Terwilliger Boulevard may be difficult to realize because of the limited right-of-way, limited advance sight distance due to the roadway curvature, and possible public opposition to traffic signals on SW Terwilliger Boulevard. While traffic signals may be the most effective solution to potential traffic issues, an alternative interim option could be installation of all-way stop control.

Installing an all-way stop control would negatively affect operations on SW Terwilliger Boulevard but would improve operations for eastbound traffic on SW Campus Drive. If performance at this intersection is acceptable under current conditions, but declines as traffic grows year over year, an all-way stop could be installed once traffic ceases to function at an acceptable LOS. The MUTCD allows for the installation of an all-way stop as an interim measure before a signal is installed, offering the following guidance:

Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.⁹

Eastbound Left-turn Lane

Due to the large volumes of exiting eastbound traffic turning both left and right onto SW Terwilliger Boulevard, long queues are anticipated for eastbound traffic. The heavy concentration of traffic in the peak hours mean that these queues are unlikely to persist for long periods of time, but if these queues become an issue, an eastbound left-turn lane could also be installed. This left-turn lane is not required for an acceptable LOS (at full buildout, the movement is projected to operate at LOS D with the addition of the traffic signal) but would decrease the length of the eastbound queues.

Northbound Left-turn Lane Options

Installing a turn lane at this location would be difficult because of the steep slopes on either side of the road and the heavily wooded area. Encouraging modal shifts for commuters is recommended to delay or eliminate the need for the left-turn lane in particular.

The existing roadway width is approximately 30 feet from curb to curb, so a left-turn lane could be installed by removing the bike lanes and installing three 10-foot lanes. Removing the bike lanes is not optimal but could be used as an interim solution until other enhancements are implemented.

The northbound left-turn lane is justified based on Portland Bureau of Transportation's (PBOT's) current practice for determining the appropriate left-turn phasing treatment at new and existing signalized intersections. The "Guide for Determining Left Turn Signal Control Form" was completed using required criteria, score-based criteria, and site-specific factors for the northbound left-turn lane. The results of this analysis can be found in Appendix I.

4.2 SW US Veterans Hospital Road and SW Terwilliger Boulevard (Intersection 8)

The intersection of SW US Veterans Hospital Road and SW Terwilliger Boulevard performs similarly to Intersection 4 in that operations are poor for the eastbound, stop-controlled movement turning onto uncontrolled SW Terwilliger Boulevard. In addition, the heavy northbound, left-turn volumes in the AM period may cause issues for the single northbound travel lane, as northbound through traffic is forced to wait behind northbound, left-turning traffic while they wait for a gap in traffic. Background traffic growth in the no-build scenario is projected to cause this intersection to operate at a failing condition. This intersection would be the primary access point for the proposed actions and would add trips to both SW

⁹ *Manual on Uniform Traffic Control Devices*, Section 2B.07 Multi-Way Stop Applications.

Terwilliger Boulevard and US Veterans Hospital Road. As a result, the operations at this intersection are likely to get worse.

To address the projected operational issues at this intersection, the recommended mitigation is to **install a traffic signal and northbound left-turn lane at this intersection**. A traffic signal would most efficiently control traffic and provide gaps for eastbound traffic on SW US Veterans Hospital Road. Due to the high number of northbound left turns, especially in the AM peak period, a northbound left-turn lane is also required to achieve an acceptable LOS. The intersection as a whole meets the City of Portland's standards for signalized intersections, operating at an intersection LOS B in the AM and LOS C in the PM period. The critical movement operations in the full buildout scenario are shown in Table 4-2.

Table 4-2. Critical Movement Operations with Mitigation

Intersection	2030 Build w/Mitigation, Intersection		
	LOS ^a	Delay ^b	Max. v/c ^c
8: SW Terwilliger Boulevard & SW US Veterans Hospital Road^s	C (C) EB	28.2 (22.8)	0.79 (0.91)

^a Vehicle movement level of service (LOS) - worst-performing approach direction from Table 3-4 below LOS results

^b Movement delay in seconds

^c Maximum v/c (volume/capacity) ratio for the movement

^s Signalized intersection

Note:

AM (PM) = AM Peak Period (PM Peak Period) values

EB = Eastbound, WB = Westbound, NB = Northbound,

SB = Southbound

4.2.1 Signal Warrant Analysis

Signal warrant requirements at the intersection of SW US Veterans Hospital Road and SW Terwilliger Boulevard are met based on Warrant 3, Peak Hour Volumes, from the MUTCD. The peak-hour signal warrant is intended for use at a location where traffic conditions are such that, for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. Additional warrants could be met, but traffic volumes outside peak hours were not analyzed as part of the scope of this study. Additional details are shown in Appendix G.

4.2.2 Additional Considerations

Installing a traffic signal with the existing roadway geometry is the most straightforward improvement to handle the traffic from the proposed action. However, alternative and additional options exist if traffic growth is less than, or greater than, the anticipated growth.

Interim All-way Stop

Installation of a traffic signal on SW Terwilliger Boulevard may be difficult because of the limited right-of-way, limited advance sight distance due to the roadway curvature, and possible public opposition to traffic signals on SW Terwilliger Boulevard. While traffic signals may be the most effective solution to potential traffic issues, an alternative interim option could be to install an all-way stop.

Installing an all-way stop control would negatively affect operations on SW Terwilliger Boulevard but would improve operations for eastbound traffic on SW US Veterans Hospital Road. Performance at this intersection may be acceptable under current conditions, but if traffic increases to the point that it ceases to function at an acceptable LOS, an all-way stop could be installed. The MUTCD allows for the installation of all-way stop control as an interim measure before a signal is installed, offering the following guidance:

Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.¹⁰

Eastbound Left-turn Lane

Given the large volume of exiting eastbound traffic turning both left and right onto SW Terwilliger Boulevard, long queues are anticipated for eastbound traffic. The heavy concentration of traffic in the peak hours means that these queues are unlikely to persist for long periods of time. If these queues become an issue, an eastbound left-turn lane could also be installed. This left-turn lane is not required for an acceptable LOS (at full buildout, the movement is projected to operate at LOS D with the addition of the traffic signal) but would decrease the length of the eastbound queues.

Northbound Left-turn Lane Options

Like the intersection of SW Campus Drive and SW Terwilliger Boulevard, installing a turn lane at this location would be difficult because of the steep slopes on either side of the road and the heavily wooded area. Encouraging modal shifts for commuters is recommended to delay or eliminate the need for the left-turn lane in particular.

The existing roadway width is approximately 30 feet from curb to curb, so a left-turn lane could be installed by removing the bike lanes and installing three 10-foot lanes. Removing the bike lanes is not optimal but could be used as an interim solution until other enhancements are implemented.

The northbound left-turn lane is justified based on PBOT's current practice for determining the appropriate left-turn phasing treatment at new and existing signalized intersections. The "Guide for Determining Left Turn Signal Control Form" was completed using required criteria, score-based criteria, and site-specific factors for the northbound left-turn lane. The results of this analysis can be found in Appendix I.

4.3 TriMet Southwest Expansion

TriMet and Metro were working on an expansion of the existing Portland light rail system known as the Southwest Corridor Light Rail Project. This expansion included a new station at SW Barbur Boulevard at SW Gibbs Street, which would have a stairway from the station to the intersection of SW Terwilliger Boulevard and SW Campus Drive. If this expansion were built, it is likely that some vehicle trips would shift to transit trips.

In addition, the new station would cause an influx of pedestrians at the intersection of SW Terwilliger Boulevard and SW Campus Drive. Additional pedestrians crossing SW Terwilliger Boulevard could benefit from traffic control stopping of vehicle traffic on SW Terwilliger Boulevard, whether that is a stop sign or traffic signal. However, the Southwest Corridor expansion does not currently have funding identified, so the construction timeline is uncertain. The following is a statement from TriMet regarding the Southwest Corridor expansion.

In November 2020, voters rejected Measure 26-218 (also known as Get Moving 2020), a proposal to fund the Southwest Corridor Light Rail Project and many other transportation programs across the region. At this time, the project is on hold until funding is identified.¹¹

¹⁰ *Manual on Uniform Traffic Control Devices*, Section 2B.07 Multi-Way Stop Applications.

¹¹ <https://trimet.org/swcorridor/>. Accessed December 31, 2020.

5.0 Parking Baseline Counts and Observations

A parking study and queueing analysis were completed as part of the 2019 TIA. The parking study can be found at the end of Appendix A of this report. The study contains descriptions of the existing parking lots and garages as well as their uses.

Figure 5-1 shows the location of the parking lots counted as part of this study. It also shows the location of the proposed parking lot additions.

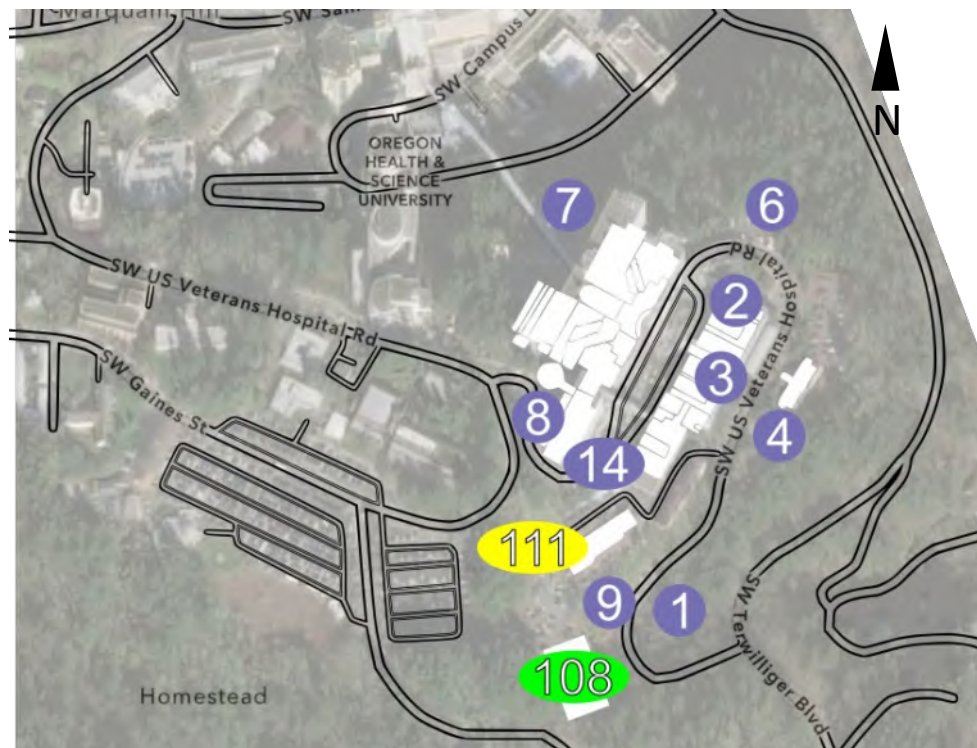


Figure 5-1. Parking Lot Locations

As part of this study, counts of the available and utilized parking spaces in each lot near the Portland VAMC were collected on December 2, 2020. Figure 5-2 shows the results of this study as well as proposed parking changes. The proposed action would add an additional 150 spaces to Building 108, remove 200 spaces from Lot 5, and install a new 650-space garage in Building 111. There are approximately 1,370 parking spaces according to the field data collected in December 2020, resulting in 600 net additional parking spaces, which represents an increase of about 45 percent.

In total, approximately 1,010 spaces were occupied out of an estimated 1,370. These numbers are inexact because of the different types of parking allowed and the fact that people arrived and left during the counting process. The following was also observed:

- Parking Levels 1 and 2 of Lot 3 were closed off as a result of drive-through COVID-19 testing; however, these levels also had many spaces reserved for Portland VAMC security and other operational needs so even if they were open, they would not provide large numbers of additional parking spaces.
- Bike parking exists in some locations, but in several locations, bikes were locked to staircase railings or other non-bike rack locations.

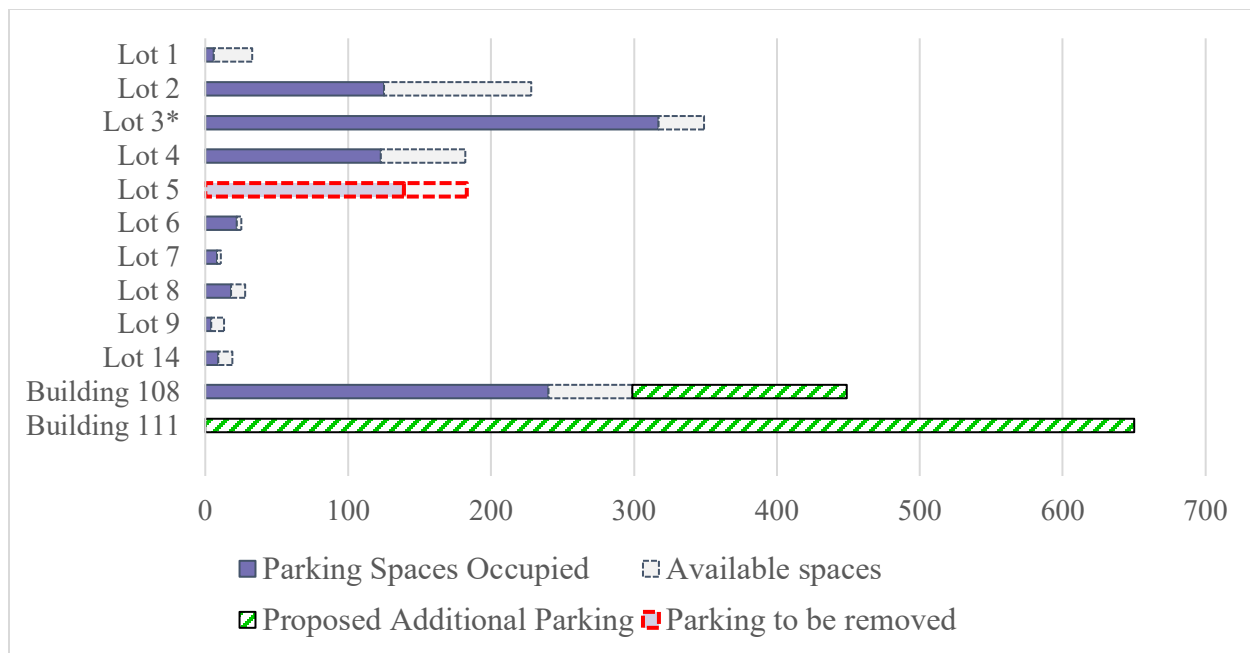


Figure 5-2. Parking Counts

**Levels 1 and 2 of Lot 3 were closed to provide space for COVID-19 testing, so additional parking would be available under normal conditions; however, a large number of spaces were reserved for campus security and other operational usage.*

6.0 Summary

The VA is proposing construction at the Portland VAMC campus that includes adding 150 parking spaces to the Building 108 parking garage, constructing a 300,000-BGSF facility (Building 110), and constructing a new parking garage (Building 111). The project would provide a net increase of approximately 450 parking spaces, for a total of 600 new parking spaces, and is anticipated to generate an additional 1,356 daily car trips, with 236 trips in the AM peak hour and 192 trips in the PM peak hour.

In 2011, there was an ADT on SW Terwilliger Boulevard north of SW US Veterans Hospital Road of 8,965. The projected 2030 no-build scenario assuming 1% annual growth would result in 10,831 ADT on SW Terwilliger Boulevard. The proposed action is projected to result in 746 new trips on SW Terwilliger Boulevard, which is an increase of 6.89%.

6.1 Recommendations

To ensure adequate traffic operations the following non-VA mitigations are recommended:

- Add a traffic signal and northbound left-turn lane at the intersection of SW Campus Drive and SW Terwilliger Boulevard (Intersection 4)
- Add a traffic signal and northbound left-turn lane at the intersection of SW US Veterans Hospital Road and SW Terwilliger Boulevard (Intersection 8)

These mitigations are recommended in both the no-build and the build scenarios. Traffic operations are projected to be sub-standard as a result of the background traffic growth, whether the proposed actions occur or not. As a result, the proposed action would lead to minor impacts on traffic ADT along on SW Terwilliger Boulevard and associated intersections in 2030. Regardless of whether the proposed action is to be implemented, VA recognizes and supports the planning, discussion, and potential implementation of future non-VA traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation, to address the existing operational issues at these intersections and improve traffic conditions.

6.2 Recommended Interim Options

Additional interim options at these two intersections are feasible for the near term before full buildout traffic is realized, such as an all-way stop or a traffic signal without turn lanes.

No additional parking improvements are recommended aside from the proposed parking garage and garage addition.

The findings of this study confirm the results of the 2019 TIA, which also recommended intersections improvements at Intersections 4 and 8.

Appendix A
2019 Portland VAMC Expansion TIA

MEMORANDUM

DATE: May 8, 2019

TO: Emery Layton, PE, MLT

FROM: Dana Beckwith, PE PTOE
Richard Martin, EIT

SUBJECT: Portland VA Hospital Expansion TIA

P18-113-000

This memorandum summarizes the traffic impact analysis prepared for the proposed medical facility expansion at the Portland Veterans Association Medical Center campus in Portland, Oregon. The traffic impact analysis was prepared in accordance with the Portland Bureau of Transportation (PBOT) standards. A ten-year analysis period has been considered for the site. This memorandum includes the following:

- Project Description
- Existing Conditions
 - Study Roadway Transportation Facilities
 - Crash Analysis
- Traffic Data Analysis
 - Year 2019 Traffic
 - 2029 Background Traffic (no-build)
 - 2029 Total Traffic (with site buildout)
- Intersection Performance
 - Operating Standards
 - Capacity Analysis
 - Queueing Analysis
- Warrant Review
 - Traffic Signal Warrants
- Proposed Use Conformance with the PBOT Transportation Element of the Comprehensive Plan
 - Site Access
 - On-Street Parking Impacts
 - Transit Service and Connectivity
 - Impacts to Pedestrian and Bicycle Facilities
 - Neighborhood Impacts
 - Safety for All Modes
- Results and Recommendations

PROJECT DESCRIPTION

The Portland VA has proposed the construction of a new medical facility called the Specialty Care Building, with a reported size of 335,000 building gross square feet (BGSF) and 248,000 departmental gross square feet (DGSF). The new facility will primarily be served by the new parking facilities detailed in a previously submitted parking and queueing analysis. These new lots will increase the staff parking available on campus by approximately 600 spaces. The purpose of this analysis is to identify potential off-site improvements required to adequately serve the additional traffic generated by the campus expansion. The site vicinity map is shown in Figure 1 and the proposed site plan is presented in Figure 2.

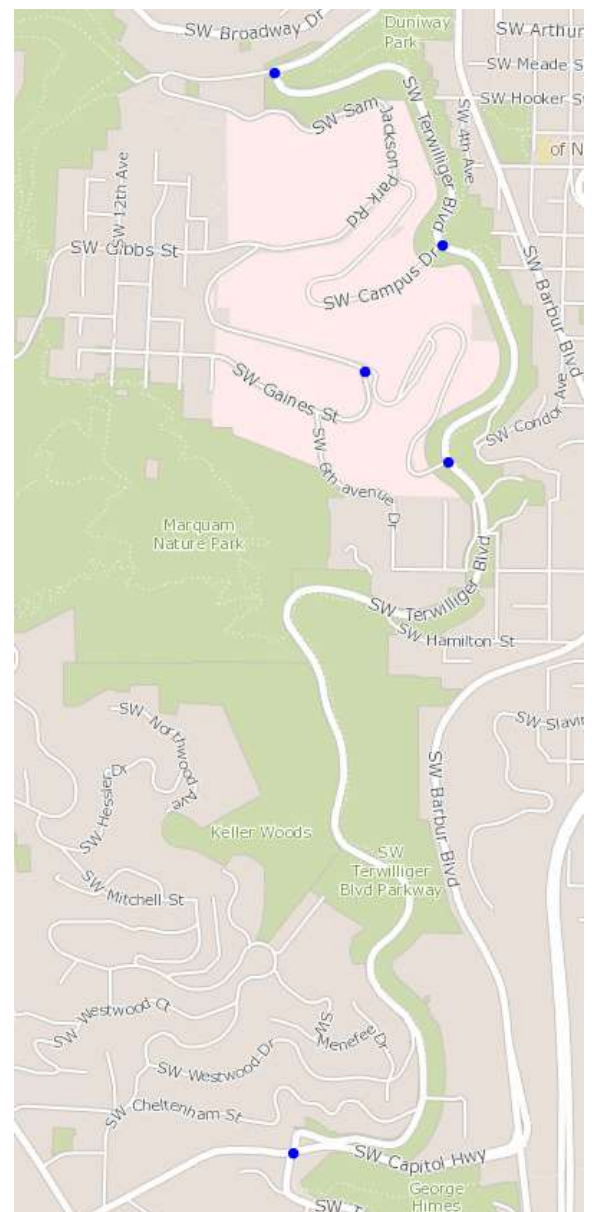


Figure 1: Vicinity Map

EXISTING CONDITIONS

Study Roadway Transportation Facilities

Existing transportation facilities were reviewed along SW US Veterans Hospital Road, SW Terwilliger Boulevard, SW Gaines Street, SW Campus Drive, SW Sam Jackson Park Road, and SW Capitol Highway. All modes of travel including pedestrian bicycles, transit, and motor vehicles were evaluated. The inventory and data collected include the following:

- Street functional classifications (Table 1)
- Inventory of existing conditions (Table 2)
 - Posted speed limits
 - Pedestrian and bicycle facility characteristics
 - Lane geometry
 - On-street parking
 - Transit route information

A vicinity map provided as Figure 1 shows the study area intersections marked in blue. Figure 2 provides a site plan for the proposed development.

Table 1: City of Portland Street Functional Classification

Roadway	Street Functional Classifications*						
	Transit	Traffic	Emergency Response	Street Design	Bicycle	Pedestrian	Freight
SW Terwilliger Blvd	Major Transit Priority	Neighborhood Collector	Major Emergency Response	Community Corridor	Major City Bikeway	City Walkway	Local Service Truck Street
SW US Veterans Hospital Rd	Major Transit Priority	Neighborhood Collector	Minor Emergency Response	Community Corridor	City Bikeway	Local Service Walkway	Local Service Truck Street
SW Capitol Hwy	Major Transit Priority	Major City Traffic Street	Major Emergency Response	Community Corridor	Major City Bikeway	City Walkway	Truck Access Street
SW Sam Jackson Park Rd	Major Transit Priority	Neighborhood Collector	Major Emergency Response	Community Corridor	City Bikeway	City Walkway	Local Service Truck Street
SW Campus Dr	Major Transit Priority	Local Street	Minor Emergency Response	Local Street	City Bikeway	Local Service Walkway	Local Service Truck Street
SW Gaines St	Major Transit Priority	Neighborhood Collector	Minor Emergency Response	Community Corridor	Local Service Bikeway	City Walkway	Local Service Truck Street

*Street functional classification based on the City of Portland website, www.portlandmaps.com

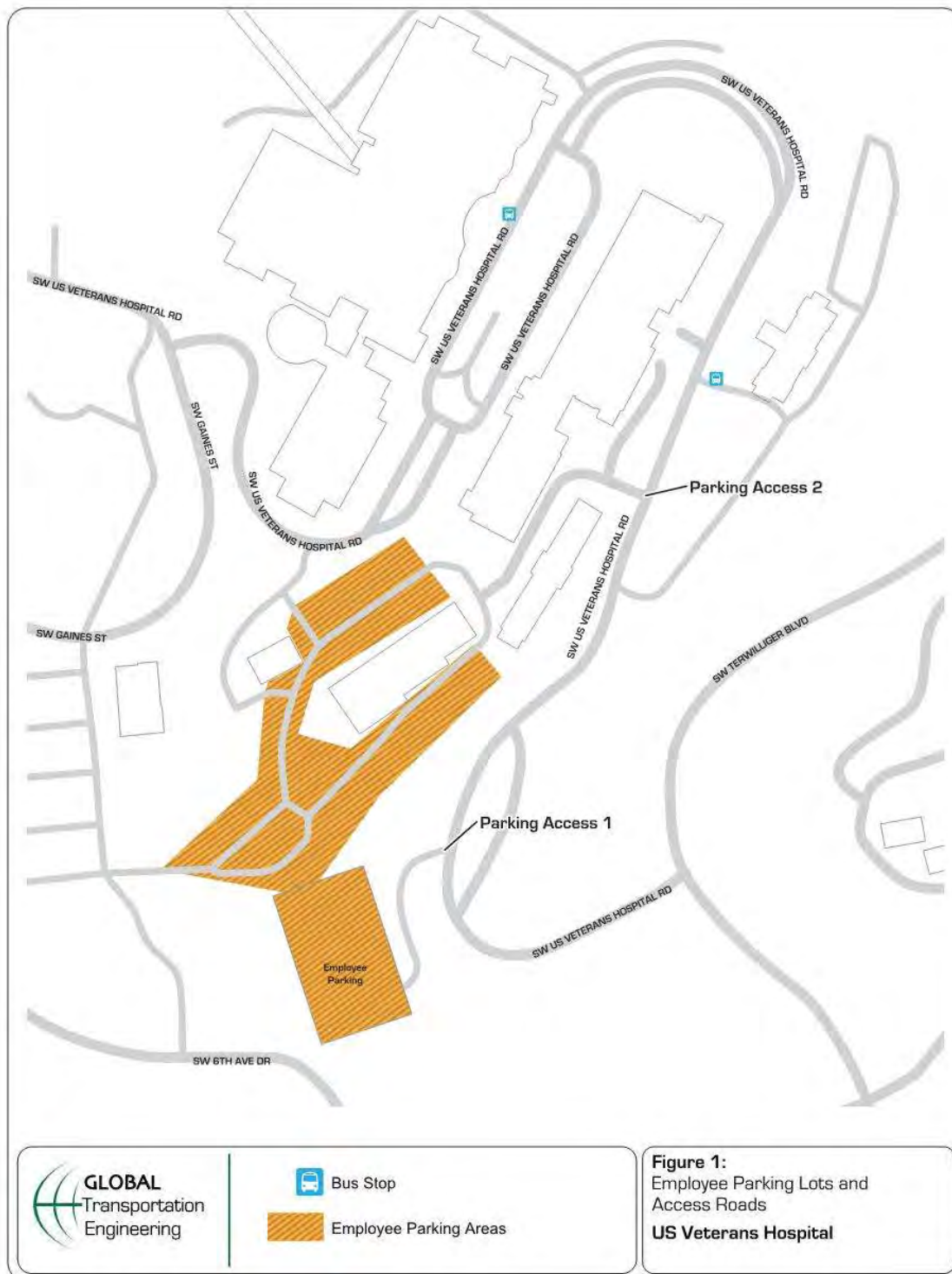


Figure 2: Site Map

Table 2: Existing Conditions in Site Vicinity

Roadway	Posted Speed Limit	Sidewalks	Bike Facilities	Lane Geometry	On-Street Parking	Transit Route
SW Terwilliger Blvd	25 mph	Multi-use Path on East Side of Street	Bike lanes both sides	One 11.5' lanes in each direction, 5' bike lanes	No	Bus Lines 8, 61, 64, 65, 66, 68, and 190
SW Capitol Hwy	30 mph	No	Westbound bike lane, eastbound bike sharrows	Two 11' westbound lanes, one 11' eastbound lane	No	Bus Lines 44, 45, 54, 55, 56
SW US Veterans Hospital Rd	15 mph	Intermittent Sidewalks	No	One 12' lane in each direction, 12' left turn lanes at major intersections / accesses, pick-up/drop-off area at main hospital entrance	Intermittent (Reserved for Employees/ Vanpool)	Bus Line 56
SW Sam Jackson Park Rd	25 mph	Intermittent	No	One 11' lane in each direction	Yes	Bus Lines 6 and 68
SW Campus Dr	20 mph	One side	No	One 11' lane in each direction	No	Tram Terminal, Bus Line 190
SW Gaines St	20 mph	Sidewalk/ Multi-use Path on East Side of Street	No	One 11' lane in each direction	No	Bus Lines 8, 61, 64, 65, 66, 68

Crash Analysis

Crash data for a five-year period from January 2012 through December 2016 was obtained from the Oregon Department of Transportation and was reviewed to identify any traffic safety concerns at the study intersections. A copy of the crash data is included in Appendix A.

The crash rates presented in Table 3 are based on the number of crashes per million entering vehicles (MEV). Typically, an intersection is not considered unsafe unless its crash rate exceeds the threshold of 1.0 crashes per MEV.

Table 3: Crash Rate Results

Intersection	Crash History (yrs)	Number of Crashes	Crashes per Year	Annual Traffic Entering (veh/yr)	Crash Rate per M.E.V.*
SW Terwilliger Blvd / SW Capitol Hwy	5	11	2.25	9,121,350	0.247
SW Terwilliger Blvd / SW US Veterans Hospital Rd	5	4	0.8	3,525,900	0.227
SW Terwilliger Blvd / SW Sam Jackson Park Rd	5	8	1.6	3,730,300	0.429
SW Terwilliger Blvd / SW Campus Dr	5	7	1.4	3,445,600	0.406
SW US Veterans Hospital Rd / SW Gaines St	5	0	0	708,100	0

*M.E.V. – million entering vehicles

The intersection of Terwilliger Boulevard at Capitol Highway had 11 crashes reported during the analysis period. Five of the crashes were rear-end collisions, five were turning-movement collisions, and one was an angle-type collision. Four of the crashes were bicycle collisions, none of which share common causes or characteristics beyond drivers failing to yield the right-of-way to cyclists.

The intersection of Terwilliger Boulevard at Veterans Hospital Road had 4 crashes reported during the analysis period. Three of the crashes were turning-movement collisions and one was a rear-end collision. None of the collisions shared directional commonalities.

The intersection of Terwilliger Boulevard at Sam Jackson Park Road had 8 crashes reported during the analysis period. Five of the crashes were rear-end collisions, two were turning-movement collisions, and one was a fixed-object collision. The rear-end collisions were largely caused by drivers following too closely to vehicles in front of them.

The intersection of Terwilliger Boulevard at Campus Drive had 7 crashes reported during the analysis period. Three of the crashes were rear-end collisions, three were turning-movement collisions, and one was a fixed-object collision. One of the turning-movement collisions involved a cyclist.

The intersection of Veterans Hospital Road at Gaines Street had no crashes reported during the analysis period.

TRAFFIC DATA ANALYSIS

2019 Existing Traffic Volumes

Peak hour traffic count data were gathered on a typical weekday during the AM peak period (7:00 AM – 9:00 AM) and the PM peak hour period (4:00 PM – 6:00 PM) on April 4, 2019 at the five study area intersections. Figure 3 illustrates the existing traffic volumes during the AM peak hour and PM peak hour. The peak hour traffic count data can be found in Appendix B.

2029 Background Traffic Volumes (No-build Conditions)

The 2029 background traffic is comprised of the existing traffic volumes factored with a traffic growth. No in-process developments were determined to impact the study area intersections. Traffic growth near the site has been estimated using a growth rate of 1% per year. The 2029 background traffic volumes are presented in Figure 4.

2029 Total Traffic Volumes (Build Conditions)

Trip rates presented in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, Tenth Edition, were utilized to estimate the site's trip generation. The site's trip generation is based on trip rates identified for the Hospital (ITE 610) land use. Table 4 presents the trip generation estimate for the site. The VA expansion is expected to generate 2,659 net daily trips, 298 net AM peak hour trips, and 402 net PM peak hour trips.

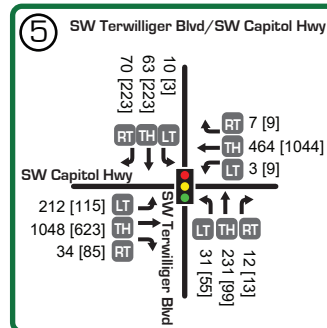
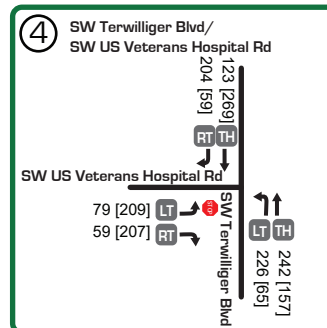
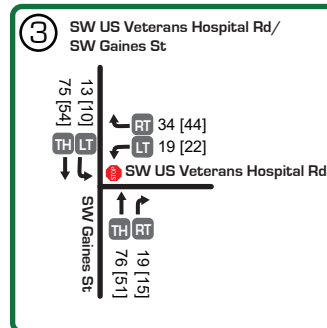
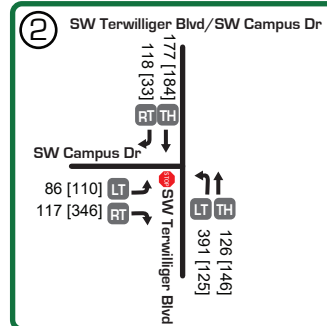
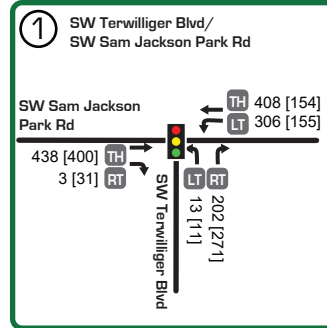
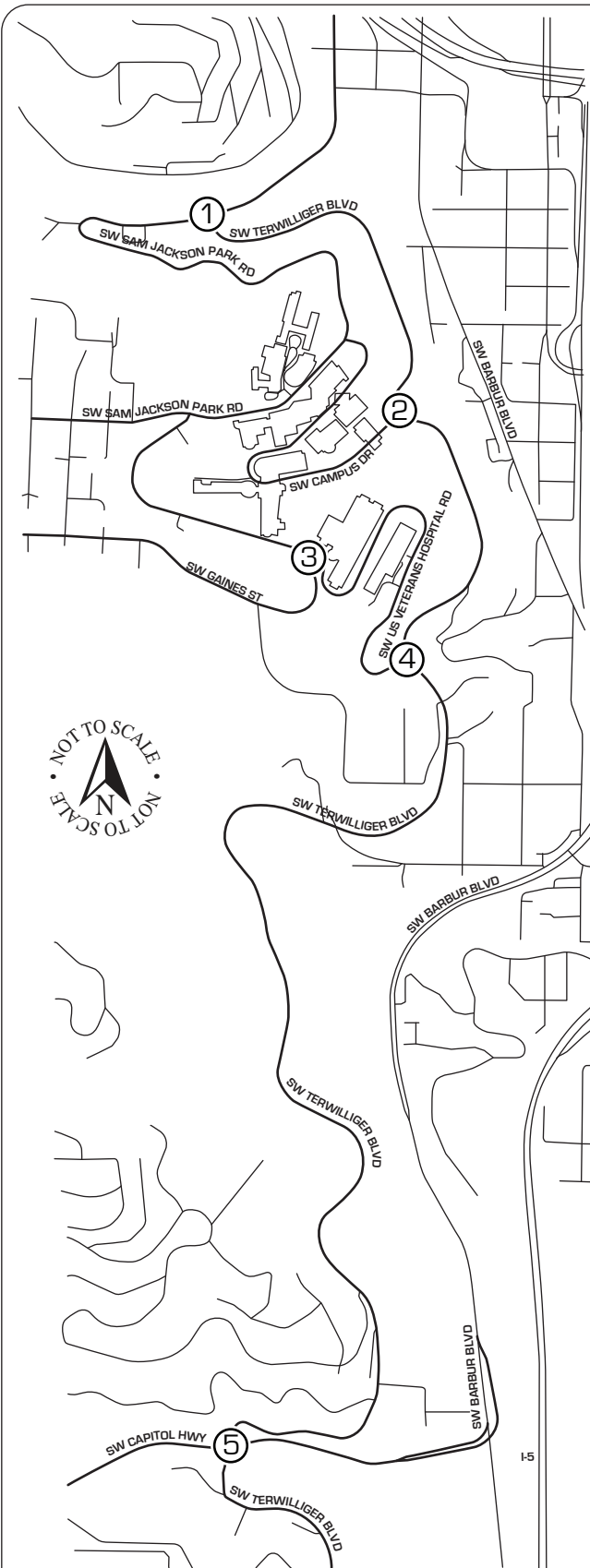
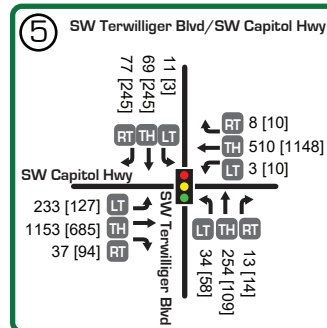
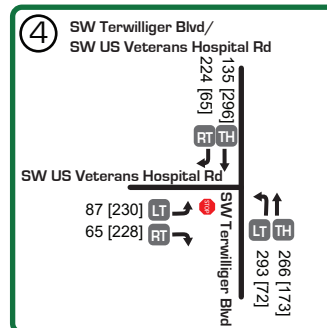
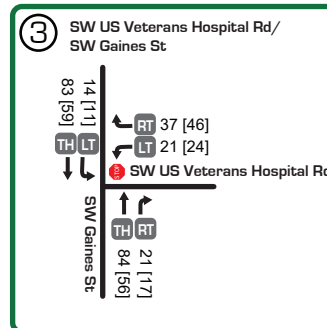
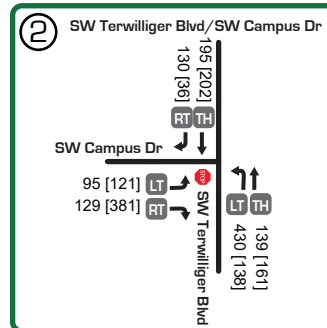
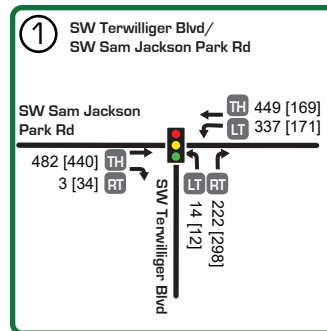
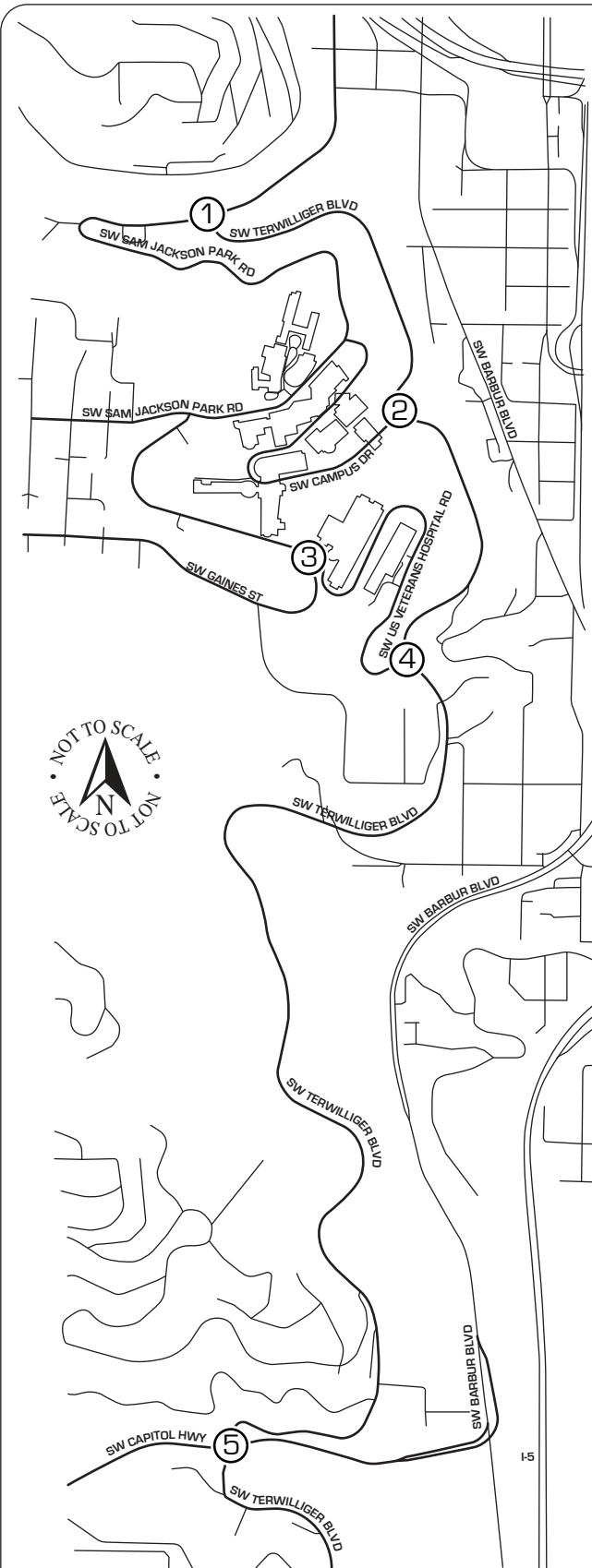


Figure 3:
2019 Existing Conditions



AM [PM] = Peak Hour Traffic Volumes

↶ = Lane Configuration

LT TH RT = Left/Through/Right

⊗ = Intersection

STOP = Stop Sign

⬆ ⬇ ⬆ = Traffic Light

Figure 4:
2029 Background Conditions

Trip Generation

The site-generated trips shown in Table 4 were distributed to the study area intersections based on the layout of the site and engineering judgment. Trip distribution percentages and trip assignments are presented in Figure 5.

Trip generation for the medical center expansion was developed based on the reported departmental gross square footage of 248,000 square feet, and ITE trip generation rates were taken from Land Use Code 610: *Hospital*.

The 2029 total traffic volumes are the summation of background traffic volumes and the site generated trips. The total traffic peak hour volumes are presented in Figure 6.

Table 4: Projected trip generation for the VA Expansion

ITE Land Use	Size (ksf)	Weekday						
		ADT	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
PROPOSED SITE								
Hospital (#610)	248							
Generation Rate ¹		10.72	1.20	72%	28%	1.62	26%	74%
Site Trips		2,659	298	215	83	402	105	297

¹ Source: *Trip Generation*, 10th Edition, ITE, 2017, average rates.

INTERSECTION PERFORMANCE

Operating Standards

Per the City of Portland's Title 17 Public Improvements Administrative Rules, operational standards for the intersections associated with this study are Level of Service (LOS) D or better for signalized intersections and LOS E or better for unsignalized intersections. The City's Administrative Rules for traffic capacity analysis states:

"TRN-10.27 For signalized intersections, adequate level of service is LOS D, based on a weighted average of vehicle delay for the intersection.

For stop-controlled intersections, adequate level of service is LOS E. Level of service for two-way stop-controlled intersections is based on individual vehicle movement, and all-way stop-controlled intersections is based on a weighted average of vehicle delay for the intersection."

Capacity Analysis

The existing and 2029 forecasted traffic volume data was used to evaluate traffic operations at the study intersections. The Synchro traffic operations analysis software (Version 9.0) was used to determine the level of service for each scenario considered. Synchro is based on the 2010 Highway Capacity Manual methodology. Table 5a summarizes the AM peak hour analysis results and Table 5b summarizes the PM peak hour analysis results. Copies of the capacity analysis calculations are presented in Appendix C.

Table 5a: Intersection Performance Summary - AM Peak Hour

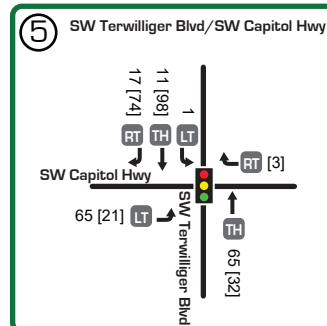
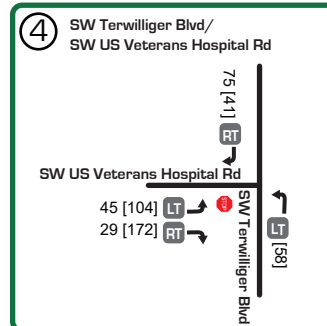
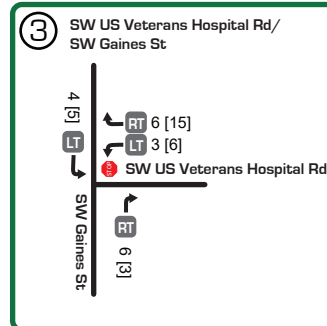
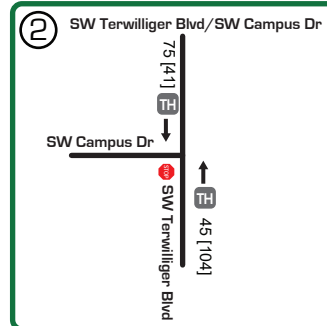
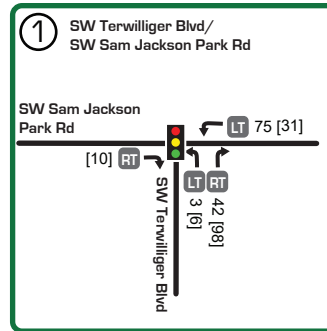
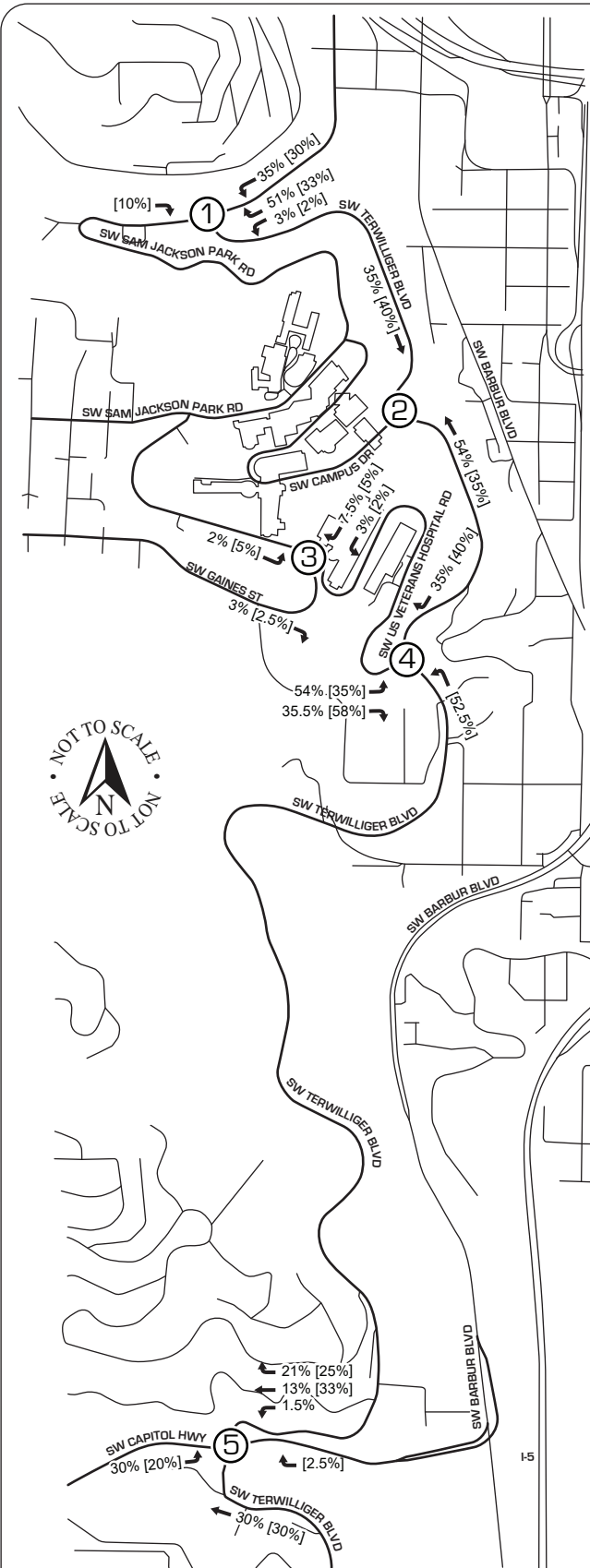
Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
UNSIGNALIZED INTERSECTIONS									
SW US Veterans Hospital Road/SW Gaines St	11.5 - WB	B	0.040	11.7 - WB	B	0.045	11.9 - WB	B	0.053
SW US Veterans Hospital Road/SW Terwilliger Blvd	41.1 - EB	E	0.626	76.8 - EB	F	0.840	>120 - EB	F	>1.0
SW Terwilliger Blvd/SW Campus Dr	>120 - EB	F	>1.0	>120 - EB	F	>1.0	>120 - EB	F	>1.0
SIGNALIZED INTERSECTIONS									
SW Terwilliger Blvd/SW Sam Jackson Park Rd	29.6	C	0.670	39.0	D	0.740	40.9	D	0.790
SW Terwilliger Blvd/SW Capitol Hwy	36.4	D	0.920	49.0	D	1.010	60.6	E	1.060

Notes: 2010 Highway Capacity Manual methodology used in analysis, Synchro v9. EB - Eastbound, WB - Westbound.

Table 5b: Intersection Performance Summary - PM Peak Hour

Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
UNSIGNALIZED INTERSECTIONS									
SW US Veterans Hospital Road/SW Gaines St	10.1 - WB	B	0.034	10.2 - WB	B	0.038	10.4 - WB	B	0.049
SW US Veterans Hospital Road/SW Terwilliger Blvd	38.8 - EB	E	0.845	71.4 - EB	F	1.005	>120 - EB	F	>1.0
SW Terwilliger Blvd/SW Campus Dr	30.2 - EB	D	0.798	44.6 - EB	E	0.908	89 - EB	F	1.070
SIGNALIZED INTERSECTIONS									
SW Terwilliger Blvd/SW Sam Jackson Park Rd	18.7	B	0.500	21.6	C	0.550	22.1	C	0.600
SW Terwilliger Blvd/SW Capitol Hwy	28.5	C	0.810	34.8	C	0.890	72.7	E	1.050

Notes: 2010 Highway Capacity Manual methodology used in analysis, Synchro v9. EB - Eastbound, WB - Westbound.



AM [PM] = Peak Hour Traffic Volumes

↔ = Lane Configuration

LT TH RT = Left/Through/Right

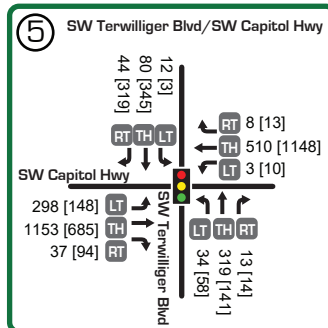
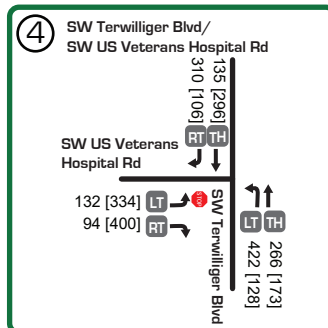
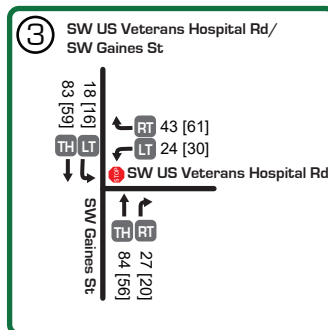
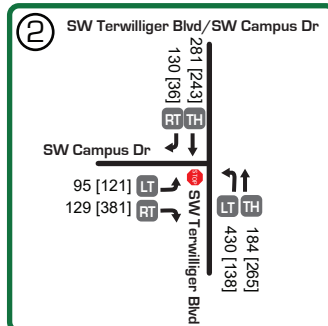
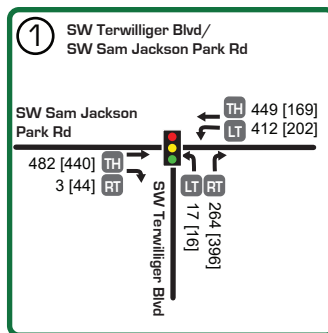
(X) = Intersection

STOP = Stop Sign

🚦 = Traffic Light

Figure 5:

Trip Assignment and Distribution



AM [PM] = Peak Hour Traffic Volumes

↑ = Lane Configuration

LT TH RT = Left/Through/Right

(X) = Intersection

STOP = Stop Sign

⬆ ⬆ ⬆ = Traffic Light

Figure 6:
2029 Build-Out Conditions

The intersection of Terwilliger Boulevard at Capitol Highway operates at LOS 'D' under existing and 2029 background conditions, and at LOS 'E' during the 2029 build-out conditions during both the AM and PM peak periods (reference Table 5a and Table 5b). Adjusting the signal timing at the build-out scenario to allow more time north-south travel within cycles could bring the LOS to an acceptable 'D' during both peak periods.

The intersection of Terwilliger Boulevard at Sam Jackson Park Road operates at LOS 'C' during the AM peak period and LOS 'B' during the PM peak period under existing conditions. It operates at LOS 'D' during the AM peak period and LOS 'C' during the PM peak period under both future scenarios. No mitigations are necessary or recommended for this intersection.

The intersection of Terwilliger Boulevard at Campus Drive operates at LOS 'F' under existing conditions during the AM peak period under all scenarios. During the PM peak period, the intersection operates at LOS 'D' under existing conditions, 'E' under 2029 background conditions, and 'F' under build-out conditions. Installation of a traffic signal would mitigate projected performance issues at this intersection.

The intersection of Veterans Hospital Road at Gaines Street operates at LOS 'B' during the AM and PM peak periods under all analysis scenarios. No mitigations are necessary or recommended.

The intersection of Terwilliger Boulevard at Veterans Hospital Road operates at LOS E during the AM and PM peak periods under existing conditions. It is projected to operate at LOS F during both peak hours under all future scenarios. Installation of a traffic signal would mitigate projected performance issues at this intersection.

HCM Reports for these scenarios are presented in Appendix D.

Mitigations

Due to failing levels of performance, it is recommended that traffic signals are installed at the intersections of Terwilliger Boulevard at Campus Drive and Terwilliger Boulevard at Veterans Hospital Road. A proportional share is proposed for mitigations at the intersection of Terwilliger Boulevard at Campus Drive, since the current understanding is both OHSU and Southwest Corridor Transit Improvements are also developing in the area. Tables 6a and 6b outline intersection performance under mitigated conditions.

Table 6a: Mitigated Intersection Performance Summary - AM Peak Hour

Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Terwilliger Boulevard at Veterans Hospital Road	7.7	A	0.63	7.6	A	0.63	21.4	C	0.88
Terwilliger Boulevard at Campus Drive	15.9	B	0.79	14.2	B	0.76	19.4	B	0.85

Notes: Highway Capacity Manual methodology used in analysis, Synchro v9.

Table 6b: Mitigated Intersection Performance Summary - PM Peak Hour

Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Terwilliger Boulevard at Veterans Hospital Road	9.4	A	0.56	9.7	A	0.58	22.8	C	0.85
Terwilliger Boulevard at Campus Drive	8.2	A	0.51	8.4	A	0.53	9.5	A	0.59

Notes: Highway Capacity Manual methodology used in analysis, Synchro v9.

Queueing Analysis

Queueing was examined for the proposed traffic signals at the intersections of Veterans Hospital Road and Campus Drive at Terwilliger Boulevard under 2029 build out conditions for both peak hours. Based on a Synchro (HCM) queueing analysis for these scenarios, northbound left-turn lanes are recommended for the AM peak hour build-out conditions and eastbound left-turn lanes are recommended for the PM peak hour build-out conditions at both intersections to accommodate the peak hour queues. Providing turn lanes with 100 feet of storage will accommodate the average queues for all scenarios. HCM reports for the mitigated capacity and queueing scenarios are presented in Appendix E.

WARRANT REVIEW

Traffic Signal Warrants

The peak hour signal warrant presented in the *Manual on Uniform Traffic Control Devices* (MUTCD) was reviewed for the following locations:

- Terwilliger Boulevard at Veterans Hospital Road
- Terwilliger Boulevard at Campus Drive

Based on the 2019 existing traffic volumes, the peak hour signal warrant is met at both study intersections. Traffic signals are explored in the earlier Mitigations section. The traffic signal warrants for the VA medical center expansion are included in Appendix G.

PROPOSED USE CONFORMANCE WITH THE PBOT TRANSPORTATION ELEMENT OF THE COMPREHENSIVE PLAN

The existing site is zoned EX – Central Employment. The proposed use does not change this existing land use zoning designation. Based on a study of the Comprehensive Plan, the transportation system can support the proposed development. In addition to the previous discussed intersection capacity and warrant analysis, the following factors were also evaluated:

Site Access and Connectivity

The site will directly access Veterans Hospital Road approximately 400 feet west of its intersection with Terwilliger Boulevard. The 298 AM and 402 PM peak hour site trips will largely impact the nearby intersection of Terwilliger Boulevard at Veterans Hospital Road. Mitigations are outlined in the previously submitted queueing analysis and in the Results and Recommendations section of this report.

On-Street Parking Impacts

On-street parking is not expected to be impacted by the proposed development. Currently there is no designated on-street parking present along Terwilliger Boulevard, Capitol Highway, and Veterans Hospital Road, the heavily affected roadways near the project site. There is limited restricted on-street parking on Campus Drive and Sam Jackson Park Road that will not be impacted by the development.

Transit Service and Connectivity

Transit circulation will not change with the site operation. The site will not create a significant increase in ridership demand that would constitute a need to change transit service. Currently Trimet's Bus Routes 6, 8, 44, 45, 55, 56, 61, 64, 65, 66, 68, and 190 serve the study area, as well as the Portland Aerial Tram.

Impacts to Pedestrian and Bicycle Facilities

Pedestrian and bicycle facilities may be impacted at the intersections of Terwilliger Boulevard at Veterans Hospital Road and Campus Drive. Additional pedestrian facilities are outlined in the Planned Local Street Improvements section of this report. No additional bicycle facilities are planned or recommended.

Neighborhood Impacts

The site is within a designated Central Employment zone. The types of traffic associated with the proposed site will be those associated with hospital use which will predominately be passenger vehicles and small heavy

vehicles such as ambulances, trucks, and delivery vans. The increase in traffic due to site trips will not change the traffic characteristics of the neighborhood. The type of development is also consistent with the Marquam Hill District Plan.

Safety for All Modes

Safety may be impacted at the intersections of Terwilliger Boulevard at Veterans Hospital Road and Campus Drive based on the increased traffic flow due to site trips. The mitigative measures outlined in the Intersection Performance and Warrant Review sections would include any appropriate safety measures. Safety for all travel modes will not be affected by the addition of this facility to the area at other study intersections.

Planned Local Street Improvements

According to the City of Portland TSP, a pedestrian trail that aligns with the Gibbs Street right-of-way is proposed for development under the 11-20 year long range plan.¹ This pedestrian trail would meet the eastern side of the intersection of Terwilliger Blvd at Campus Drive. As this is a long-range plan that is not yet funded, it is not proposed as part of the conditions for approval of this project. OHSU and Oregon Metro are proposing expansions in the site vicinity. This trail is a part of the Southwest Corridor expansion, proposed by Oregon Metro as the Marquam Hill Connection². No other projects were found to be planned for the project area.

RESULTS AND RECOMMENDATIONS

The VA Hospital is proposed for a 248,000 square foot expansion. The site is expected to generate 2,659 net daily trips, 298 net AM peak hour trips, and 402 net PM peak hour trips.

Crash data for a five-year period from January 2012 through December 2016 was evaluated based on the number of crashes per million entering vehicles (MEV). The highest crash rate found at any of the study area intersections was 0.429. No apparent safety concerns were found at any of the study intersections.

The intersections of Terwilliger Boulevard at Veterans Hospital Road and Campus Drive operate at LOS 'E' and 'F' under 2019 existing conditions, respectively. They are both projected to operate at LOS 'F' under 2029 background conditions without the addition of site trips from the proposed development. Based on these findings, and on the necessary turn-lane and signal warrant analyses, it is recommended that traffic signals are installed at the intersections of Terwilliger Boulevard at Veterans Hospital Road and Terwilliger Boulevard at Campus Drive to alleviate delays and improve intersection performance.

Based on a queueing analysis for the proposed traffic signals at the intersections of Veterans Hospital Road and Campus Drive at Terwilliger Boulevard under 2029 build out conditions, northbound and eastbound left-turn lanes are proposed to accommodate the projected average queueing.

The proposed site conforms to the City of Portland's Transportation Element of the Comprehensive Plan. There are no known impacts to the transportation system including: access, on-street parking, transit service, transit connectivity, pedestrian facilities, bike facilities, neighborhood impacts, and safety for all modes.

¹ <https://www.portlandoregon.gov/transportation/article/690967>, TSP ID 90088, page 362.

² <https://www.oregonmetro.gov/sites/default/files/2017/10/06/Marquam-Hill-Version1-Decision-Briefing-Book-083017.pdf>

Appendix A: Crash Data

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at SAM JACKSON PARK RD, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

1 - 4 of 8 Crash records shown.

SER#	P	R	S	W	DATE	CLASS	CITY STREET	INT-TYPE	SPCL USE																											
INVEST	E	A	U	C	O	DAY	DIST	FIRST STREET	RD CHAR	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR	QTY	MOVE	A	S																	
RD DPT	E	L	G	H	R	TIME	FROM	SECOND STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC	INJ	G	E	LICNS	PED														
UNLOC?	D	C	S	L	K	LAT	LONG	LRS	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE								
11850	N	N	N			10/06/2016	17	SW TERWILLIGER BLVD	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE	0	STRGHT									013	29								
NO RPT						TH	0	SW SAM JACKSON PARK RD	E		TRF SIGNAL	N	DRY	REAR		PRVTE	E -W									000		00								
N						2P			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	28	F	OTH-Y		026	000		29								
N						45 30 10.32	-122 41 15.22																OR<25													
															02	NONE	0	STOP																		
																PRVTE	E -W									011	013	00								
																PSNGR CAR		01	DRVR	NONE	44	F	OR-Y		000	000		00								
																							OR<25													
															03	NONE	0	STOP									022	00								
																PRVTE	E -W									000	000	00								
																PSNGR CAR		01	DRVR	INJC	43	F	OTH-Y		000			00								
																							N-RES													
															03	NONE	0	STOP									022	00								
																PRVTE	E -W									000	000	00								
																PSNGR CAR		02	PSNG	INJC	00	F			000			00								
01679	N	N	N			02/20/2013	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	RAIN	S-1STOP	01	NONE	0	STRGHT										07								
NONE						WE	0	SW TERWILLIGER BLVD	S		TRF SIGNAL	N	WET	REAR		PRVTE	S -N									000		00								
N						4P			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y		026	000		07								
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															02	NONE	0	STOP									011	00								
																PRVTE	S -N									000	000	00								
																PSNGR CAR		01	DRVR	INJC	49	F	OR-Y		000			00								
																							OR<25													
01653	N	N	N			02/07/2014	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE	0	STRGHT										29								
NONE						FR	0	SW TERWILLIGER BLVD	S		TRF SIGNAL	N	WET	REAR		PRVTE	S -N									000		00								
N						4P			06	1		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	60	F	OR-Y		026,014	000		29								
N						45 30 10.3237919	-122 41 15.2202119																OR<25													
															02	NONE	0	STOP									011	00								
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																PSNGR CAR		01	DRVR	NONE	70	F	OR-Y		000			00								
																							OR>25													
08557	N	N	N			08/10/2015	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	UNKN	0	TURN-R										08								
NONE						MO	0	SW TERWILLIGER BLVD	S		TRF SIGNAL	N	DRY	TURN		UNKN	W -S									000		00								
N						8A			06	1		N	DAY	INJ		UNKNOWN		01	DRVR	NONE	00	Unk	UNK		001	000		08								
N						45 30 10.32 15.22																	UNK													
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																PSNGR CAR		01	DRVR	INJC	32	M	OR-Y		000			00								
																							OR<25													

Disclaimer: The information contained in this report is compiled from individual driver and police crash reports submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submittal of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirement, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at SAM JACKSON PARK RD, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

5 - 8 of 8 Crash records shown.

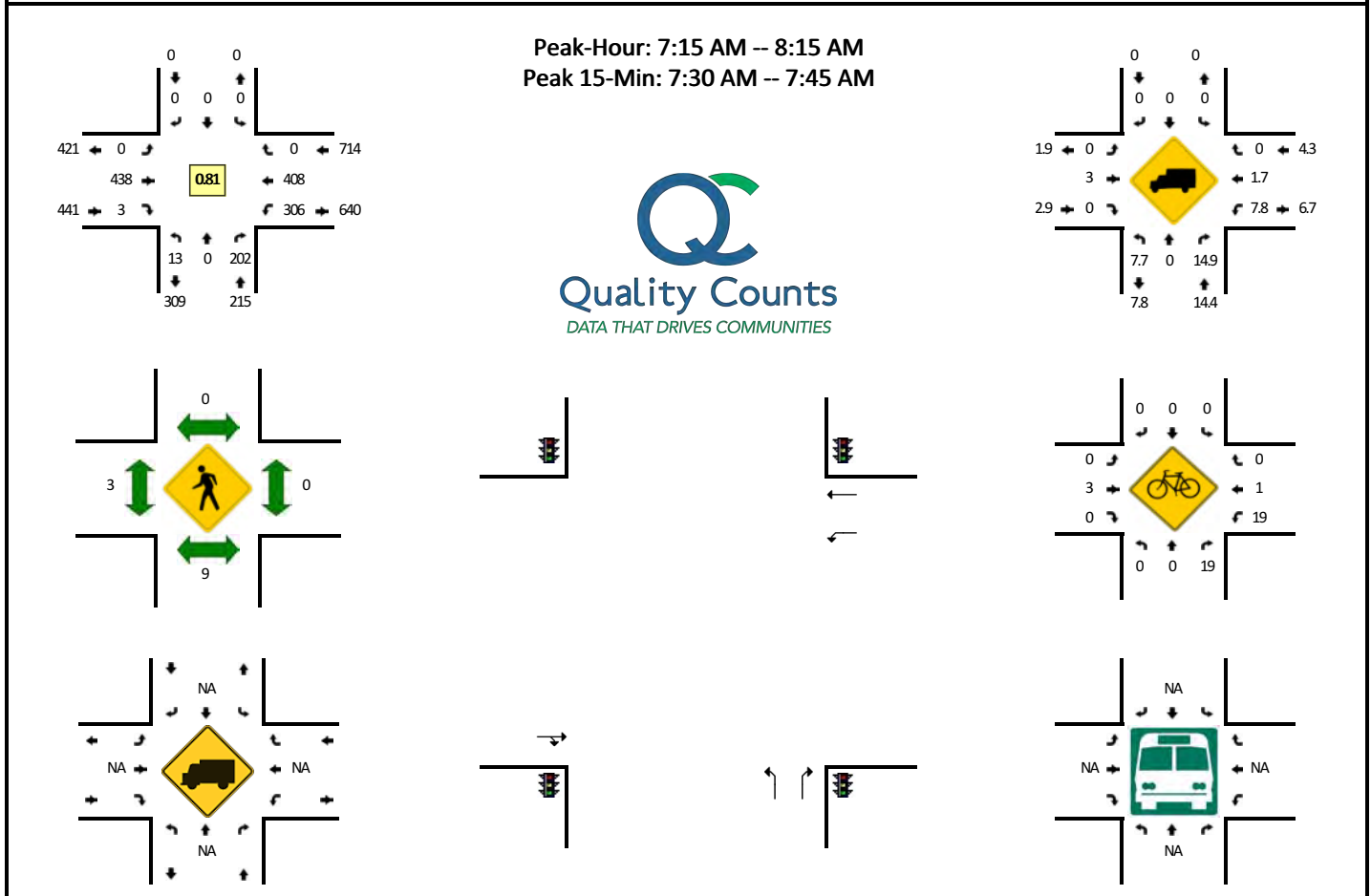
SER#	P	R	S	W	DATE	CLASS	CITY STREET	INT-TYPE	SPCL USE																				
INVEST	E	A	U	C	O	DAY	DIST	FIRST STREET	RD CHAR	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR QTY	MOVE	A	S											
RD DPT	E	L	G	H	R	TIME	FROM	SECOND STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC	INJ	G	E	LICNS	PED							
UNLOC?	D	C	S	L	K	LAT	LONG	LRS	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE	
00491	N	N	N			01/15/2013	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE	0	STRGHT											
NONE						TU	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	DRY	REAR	UNKN	W	-E									000		00	
N						10A			06	0		N	DAY	PDO	PSNGR	CAR		01	DRVR	NONE	00	M	UNK		026	000		07	
N						45 30	-122 41																UNK						
						10.3237919	15.220176																						
															02	NONE	0	STOP											
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11833	Y	N	N			11/02/2013	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	Y	CLR	FIX OBJ	01	NONE	0	STRGHT									079		01
NONE						SA	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	WET	FIX	PRVTE	E	-W									000	079	00	
N						9A			05	0		N	DAY	PDO	PSNGR	CAR		01	DRVR	NONE	60	F	OR-Y		047,080	017		01	
N						45 30	-122 41																OR<25						
						10.3237919	15.220176																						
06261	N	N	N	N	N	06/14/2012	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	UNKN	9	TURN-R										08	
CITY						TH	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	DRY	TURN	UNKN	W	-S									000		00	
N						11A			04	0		N	DAY	PDO	PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		001,007	000		00	
N						45 30	-122 41																UNK						
						10.3638043	14.7142804																						
															02	NONE	0	TURN-L											
															PRVTE	S	-W									000		00	
															PSNGR	CAR		01	DRVR	NONE	46	F	OR-Y		000	000		00	
																							OR<25						
12502	N	N	N			11/20/2014	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	RAIN	S-1STOP	01	NONE	0	TURN-R										07	
NONE						TH	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	WET	REAR	PRVTE	S	-E									000		00	
N						4P			04	0		N	DUSK	INJ	PSNGR	CAR		01	DRVR	NONE	48	F	OR-Y		026	000		07	
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Appendix B: Existing Traffic Count Volumes

LOCATION: SW Terwilliger Blvd -- SW Sam Jackson Park Rd
CITY/STATE: Multnomah, OR

QC JOB #: 14944207
DATE: Thu, Apr 4 2019

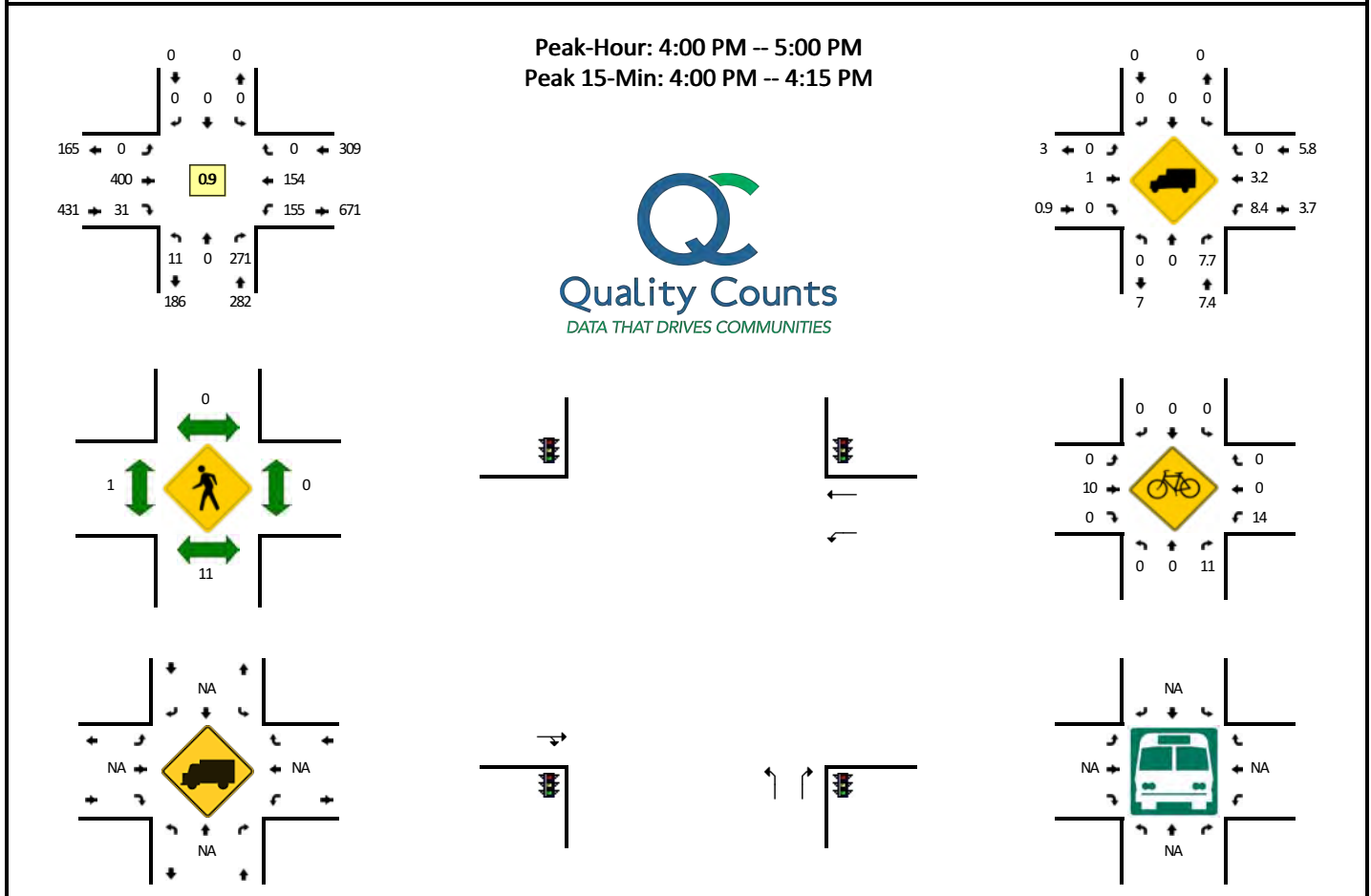


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Sam Jackson Park Rd (Eastbound)				SW Sam Jackson Park Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	0	19	0	0	0	0	0	0	24	1	0	34	31	0	0	110	
7:05 AM	0	0	9	0	0	0	0	0	0	21	0	0	31	33	0	0	94	
7:10 AM	1	0	11	0	0	0	0	0	0	16	0	0	18	23	0	0	69	
7:15 AM	2	0	14	0	0	0	0	0	0	30	0	0	27	21	0	0	94	
7:20 AM	0	0	16	0	0	0	0	0	0	27	1	0	27	37	0	0	108	
7:25 AM	0	0	11	0	0	0	0	0	0	26	0	0	23	22	0	0	82	
7:30 AM	0	0	20	0	0	0	0	0	0	54	0	0	34	39	0	0	147	
7:35 AM	2	0	24	0	0	0	0	0	0	59	1	0	24	25	0	0	135	
7:40 AM	2	0	26	0	0	0	0	0	0	63	0	0	18	31	0	0	140	
7:45 AM	0	0	17	0	0	0	0	0	0	35	0	0	41	51	0	0	144	
7:50 AM	0	0	9	0	0	0	0	0	0	25	0	0	27	47	0	0	108	
7:55 AM	0	0	21	0	0	0	0	0	0	40	0	0	24	23	0	0	108	
8:00 AM	4	0	21	0	0	0	0	0	0	29	1	0	24	39	0	0	118	1339
8:05 AM	2	0	15	0	0	0	0	0	0	25	0	0	18	33	0	0	93	1347
8:10 AM	1	0	8	0	0	0	0	0	0	25	0	0	19	40	0	0	93	1346
8:15 AM	1	0	12	0	0	0	0	0	0	25	0	0	20	29	0	0	87	1370
8:20 AM	2	0	13	0	0	0	0	0	0	27	1	0	23	35	0	0	101	1363
8:25 AM	2	0	12	0	0	0	0	0	0	24	0	0	19	32	0	0	89	1356
8:30 AM	0	0	17	0	0	0	0	0	0	25	0	0	15	28	0	0	85	1363
8:35 AM	0	0	15	0	0	0	0	0	0	19	0	0	15	28	0	0	95	1301
8:40 AM	1	0	14	0	0	0	0	0	0	29	0	0	28	33	0	0	91	1261
8:45 AM	0	0	18	0	0	0	0	0	0	22	0	0	23	24	0	0	86	1212
8:50 AM	0	0	20	0	0	0	0	0	0	19	1	0	24	22	0	0	95	1154
8:55 AM	2	0	19	0	0	0	0	0	0	28	1	0	26	29	0	0	94	1141
																		1127
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	16	0	280	0	0	0	0	0	0	704	4	0	304	380	0	0	1688	
Heavy Trucks	0	0	20	0	0	0	0	0	0	16	0	0	20	4	0	0	60	
Pedestrians		16				0				4				0			20	
Bicycles	0	0	6		0	0	0		0	1	0		3	0	0		10	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW Sam Jackson Park Rd
CITY/STATE: Multnomah, OR

QC JOB #: 14944208
DATE: Thu, Apr 4 2019

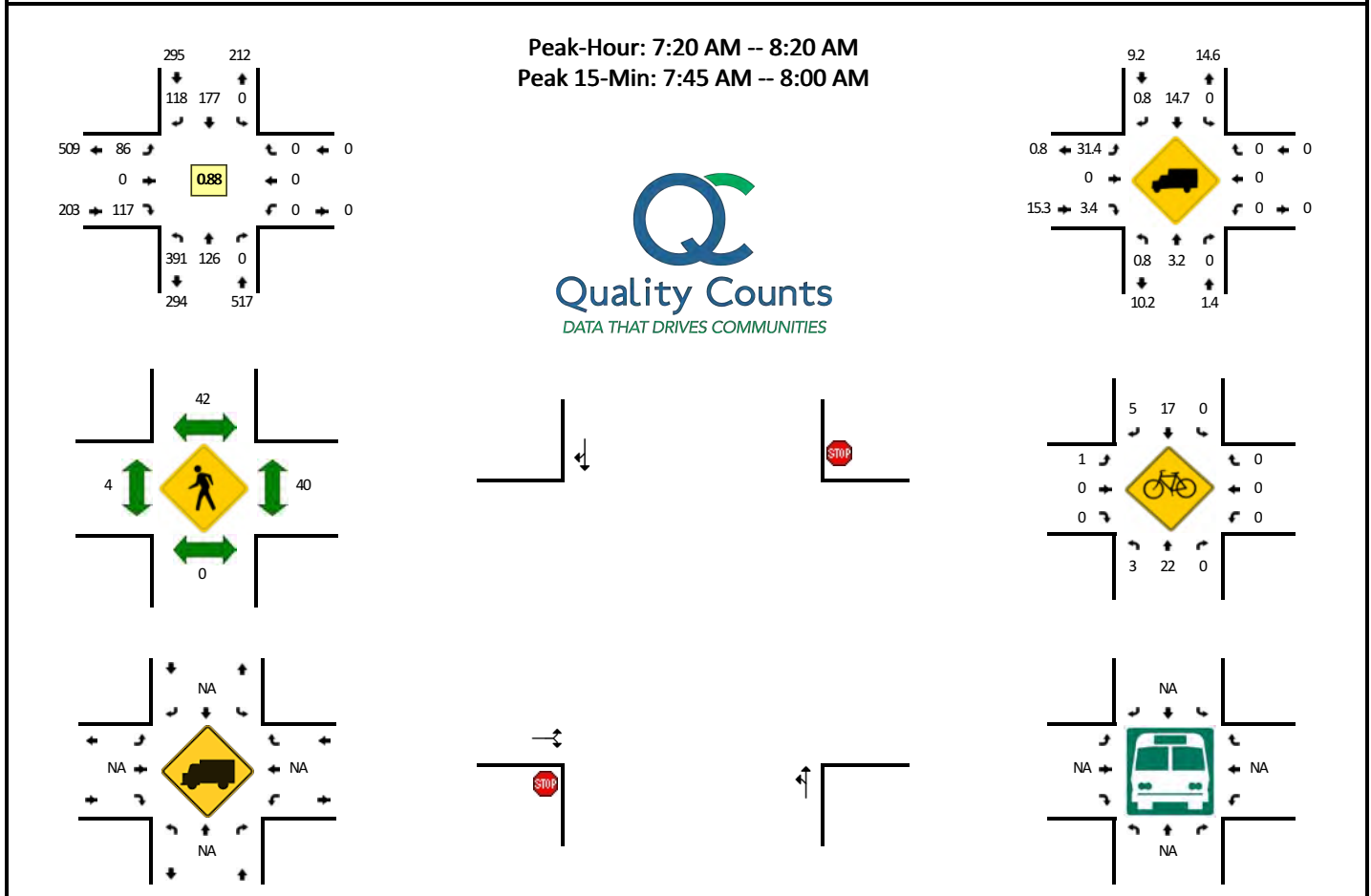


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Sam Jackson Park Rd (Eastbound)				SW Sam Jackson Park Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	0	23	0	0	0	0	0	0	40	3	0	13	17	0	0	98	
4:05 PM	1	0	29	0	0	0	0	0	0	30	2	0	9	18	0	0	89	
4:10 PM	0	0	28	0	0	0	0	0	0	43	4	0	9	14	0	0	98	
4:15 PM	2	0	17	0	0	0	0	0	0	23	1	0	11	12	0	0	66	
4:20 PM	0	0	5	0	0	0	0	0	0	23	1	0	13	15	0	0	57	
4:25 PM	1	0	13	0	0	0	0	0	0	40	8	0	11	11	0	0	84	
4:30 PM	0	0	15	0	0	0	0	0	0	39	2	0	11	11	0	0	78	
4:35 PM	2	0	37	0	0	0	0	0	0	29	5	0	15	8	0	0	96	
4:40 PM	0	0	33	0	0	0	0	0	0	29	4	0	18	13	0	0	97	
4:45 PM	0	0	15	0	0	0	0	0	0	39	0	0	12	11	0	0	77	
4:50 PM	2	0	27	0	0	0	0	0	0	36	1	0	12	13	0	0	91	
4:55 PM	1	0	29	0	0	0	0	0	0	29	0	0	21	11	0	0	91	1022
5:00 PM	0	0	21	0	0	0	0	0	0	28	1	0	9	15	0	0	74	998
5:05 PM	0	0	16	0	0	0	0	0	0	34	2	0	13	16	0	0	81	990
5:10 PM	1	0	14	0	0	0	0	0	0	20	4	0	13	8	0	0	60	952
5:15 PM	0	0	12	0	0	0	0	0	0	38	8	0	10	13	0	0	81	967
5:20 PM	0	0	13	0	0	0	0	0	0	35	0	0	15	8	0	0	71	981
5:25 PM	0	0	30	0	0	0	0	0	0	22	3	0	17	13	0	0	85	982
5:30 PM	1	0	20	0	0	0	0	0	0	33	4	0	16	12	0	0	86	990
5:35 PM	0	0	25	0	0	0	0	0	0	24	0	0	20	12	0	0	81	975
5:40 PM	0	0	25	0	0	0	0	0	0	30	1	0	19	23	0	0	98	976
5:45 PM	0	0	21	0	0	0	0	0	0	38	0	0	12	15	0	0	86	985
5:50 PM	0	0	12	0	0	0	0	0	0	19	0	0	14	18	0	0	63	957
5:55 PM	1	0	27	0	0	0	0	0	0	29	1	0	9	11	0	0	78	944
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	12	0	320	0	0	0	0	0	0	452	36	0	124	196	0	0	1140	
Heavy Trucks	0	0	20	0	0	0	0	0	0	0	0	0	16	8	0	0	44	
Pedestrians		8				0				0				0			8	
Bicycles	0	0	2		0	0	0		0	4	0		3	0	0		9	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW Campus Dr
CITY/STATE: Multnomah, OR

QC JOB #: 14944205
DATE: Thu, Apr 4 2019

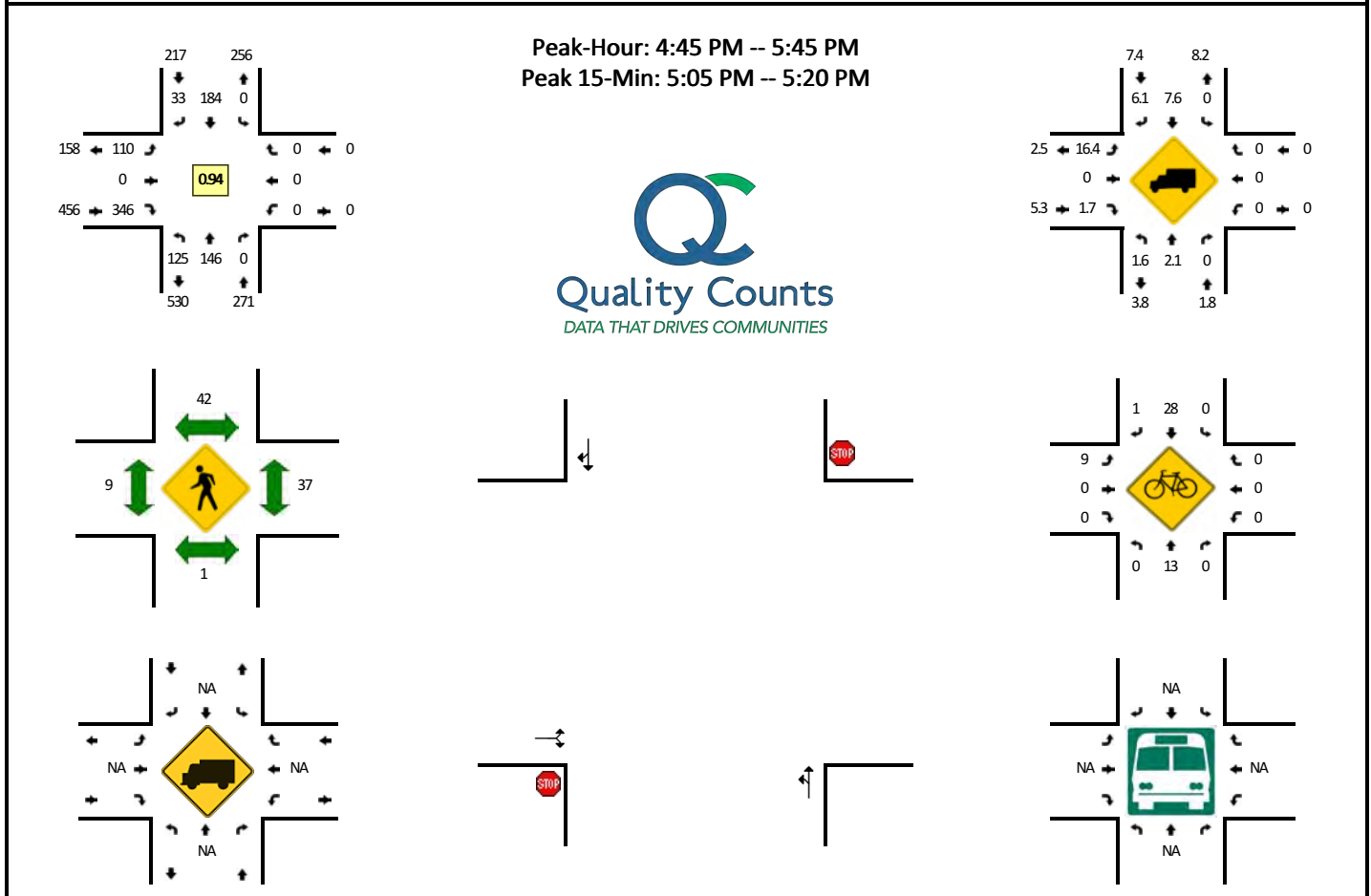


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	33	11	0	0	0	16	11	0	5	0	5	0	0	0	0	0	81	
7:05 AM	17	6	0	0	0	23	8	0	4	0	4	0	0	0	0	0	62	
7:10 AM	27	7	0	0	0	11	12	0	6	0	3	0	0	0	0	0	66	
7:15 AM	32	9	0	0	0	16	8	0	7	0	6	0	0	0	0	0	78	
7:20 AM	31	13	0	0	0	17	7	0	5	0	5	0	0	0	0	0	78	
7:25 AM	23	11	0	0	0	12	14	0	3	0	10	0	0	0	0	0	73	
7:30 AM	19	17	0	0	0	19	10	0	6	0	10	0	0	0	0	0	81	
7:35 AM	34	12	0	0	0	9	13	0	11	0	16	0	0	0	0	0	95	
7:40 AM	26	11	0	0	0	14	11	0	12	0	15	0	0	0	0	0	89	
7:45 AM	35	8	0	0	0	23	16	0	8	0	11	0	0	0	0	0	101	
7:50 AM	45	4	0	0	0	13	8	0	6	0	7	0	0	0	0	0	83	
7:55 AM	47	11	0	0	0	17	11	0	9	0	11	0	0	0	0	0	106	993
8:00 AM	30	11	0	0	0	14	10	0	12	0	9	0	0	0	0	0	86	998
8:05 AM	31	12	0	0	0	16	3	0	3	0	11	0	0	0	0	0	76	1012
8:10 AM	33	6	0	0	0	12	8	0	5	0	2	0	0	0	0	0	66	1012
8:15 AM	37	10	0	0	0	11	7	0	6	0	10	0	0	0	0	0	81	1015
8:20 AM	30	7	0	0	0	14	13	0	7	0	4	0	0	0	0	0	75	1012
8:25 AM	30	7	0	0	0	14	13	0	7	0	4	0	0	0	0	0	75	1014
8:30 AM	34	7	0	0	0	8	6	0	8	0	6	0	0	0	0	0	69	1002
8:35 AM	32	12	0	0	0	17	8	0	5	0	3	0	0	0	0	0	77	984
8:40 AM	29	12	0	0	0	18	5	0	4	0	1	0	0	0	0	0	69	964
8:45 AM	31	9	0	0	0	16	9	0	6	0	5	0	0	0	0	0	76	939
8:50 AM	37	12	0	0	0	15	8	0	9	0	7	0	0	0	0	0	88	944
8:55 AM	31	10	0	0	0	19	10	0	6	0	7	0	0	0	0	0	83	921
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	508	92	0	0	0	212	140	0	92	0	116	0	0	0	0	0	1160	
Heavy Trucks	4	8	0	0	0	24	0	0	32	0	4	0	0	0	0	0	72	
Pedestrians		0				52				0				48			100	
Bicycles	1	5	0		0	3	1		0	0	0		0	0	0		10	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW Campus Dr
CITY/STATE: Multnomah, OR

QC JOB #: 14944206
DATE: Thu, Apr 4 2019

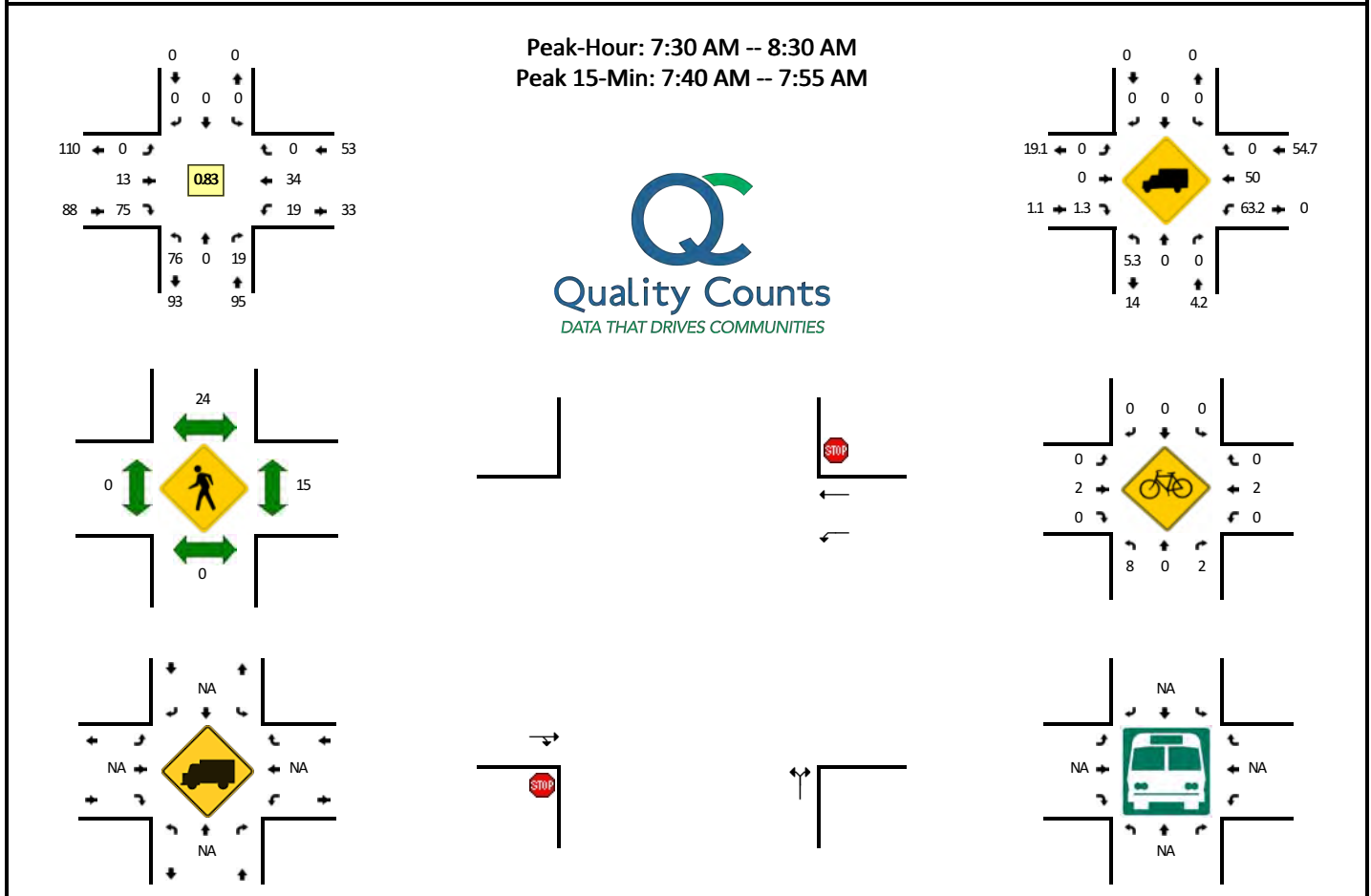


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	9	0	0	0	13	4	0	14	0	28	0	0	0	0	0	73	
4:05 PM	8	15	0	0	0	8	3	0	17	0	27	0	0	0	0	0	78	
4:10 PM	12	19	0	0	0	9	2	0	11	0	44	0	0	0	0	0	97	
4:15 PM	9	14	0	0	0	11	2	0	5	0	18	0	0	0	0	0	59	
4:20 PM	12	14	0	0	0	10	3	0	11	0	30	0	0	0	0	0	80	
4:25 PM	11	14	0	0	0	22	4	0	5	0	23	0	0	0	0	0	79	
4:30 PM	6	9	0	0	0	12	1	0	15	0	36	0	0	0	0	0	79	
4:35 PM	6	19	0	0	0	13	8	0	8	0	23	0	0	0	0	0	77	
4:40 PM	8	11	0	0	0	17	2	0	10	0	25	0	0	0	0	0	73	
4:45 PM	11	16	0	0	0	9	4	0	12	0	36	0	0	0	0	0	88	
4:50 PM	11	17	0	0	0	13	4	0	6	0	17	0	0	0	0	0	68	
4:55 PM	5	13	0	0	0	15	7	0	7	0	27	0	0	0	0	0	74	925
5:00 PM	11	9	0	0	0	7	2	0	10	0	30	0	0	0	0	0	69	921
5:05 PM	7	11	0	0	0	11	3	0	10	0	38	0	0	0	0	0	80	923
5:10 PM	6	18	0	0	0	20	2	0	9	0	32	0	0	0	0	0	87	913
5:15 PM	15	12	0	0	0	20	1	0	12	0	24	0	0	0	0	0	84	938
5:20 PM	8	12	0	0	0	20	0	0	10	0	29	0	0	0	0	0	79	937
5:25 PM	12	5	0	0	0	15	0	0	7	0	31	0	0	0	0	0	70	928
5:30 PM	11	6	0	0	0	22	1	0	4	0	36	0	0	0	0	0	80	929
5:35 PM	18	15	0	0	0	16	5	0	9	0	22	0	0	0	0	0	85	937
5:40 PM	10	12	0	0	0	16	4	0	14	0	24	0	0	0	0	0	80	944
5:45 PM	6	7	0	0	0	11	3	0	9	0	21	0	0	0	0	0	57	913
5:50 PM	9	15	0	0	0	7	2	0	6	0	13	0	0	0	0	0	52	897
5:55 PM	11	16	0	0	0	10	5	0	8	0	15	0	0	0	0	0	65	888
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	112	164	0	0	0	204	24	0	124	0	376	0	0	0	0	0	1004	
Heavy Trucks	0	0	0	0	0	12	0	0	20	0	4	0	0	0	0	0	36	
Pedestrians	0	0	0	0	0	52	0	0	0	12	0	0	0	44	0	0	108	
Bicycles	0	5	0	0	0	6	1	0	3	0	0	0	0	0	0	0	15	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Gaines St -- SW US Veterans Hospital Rd
CITY/STATE: Multnomah, OR

QC JOB #: 14944201
DATE: Thu, Apr 4 2019

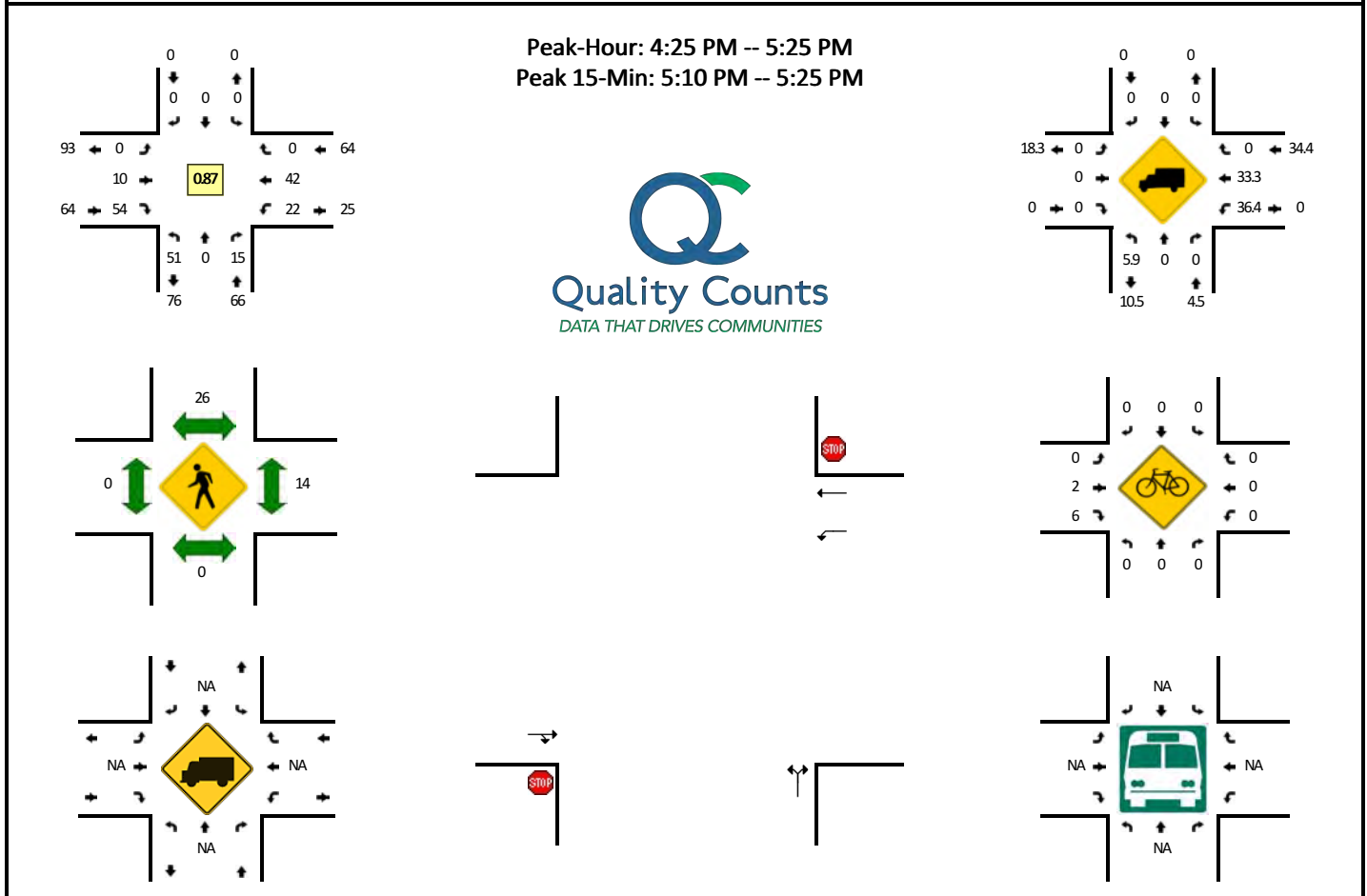


5-Min Count Period Beginning At	SW Gaines St (Northbound)				SW Gaines St (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	0	1	0	0	0	0	0	0	0	5	0	1	2	0	0	15	
7:05 AM	1	0	3	0	0	0	0	0	0	5	0	0	1	3	0	0	13	
7:10 AM	8	0	3	0	0	0	0	0	0	1	8	0	4	3	0	0	27	
7:15 AM	5	0	1	0	0	0	0	0	0	2	1	0	1	1	0	0	11	
7:20 AM	6	0	2	0	0	0	0	0	0	1	2	0	0	2	0	0	13	
7:25 AM	5	0	1	0	0	0	0	0	0	4	4	0	1	1	0	0	16	
7:30 AM	4	0	1	0	0	0	0	0	0	1	5	0	1	2	0	0	14	
7:35 AM	9	0	0	0	0	0	0	0	0	1	9	0	2	4	0	0	25	
7:40 AM	6	0	0	0	0	0	0	0	0	0	9	0	1	3	0	1	20	
7:45 AM	8	0	0	0	0	0	0	0	0	1	9	0	2	4	0	0	24	
7:50 AM	11	0	4	0	0	0	0	0	0	3	4	0	2	3	0	0	27	
7:55 AM	6	0	3	0	0	0	0	0	0	1	3	0	0	1	0	0	14	219
8:00 AM	4	0	6	0	0	0	0	0	0	1	10	0	2	2	0	0	25	229
8:05 AM	4	0	1	0	0	0	0	0	0	1	3	0	1	2	0	0	12	228
8:10 AM	5	0	1	0	0	0	0	0	0	1	6	0	2	2	0	0	17	218
8:15 AM	11	0	1	0	0	0	0	0	0	2	4	0	1	3	0	0	22	229
8:20 AM	5	0	0	0	0	0	0	0	0	0	4	0	3	2	0	0	14	230
8:25 AM	3	0	2	0	0	0	0	0	0	1	9	0	1	6	0	0	22	236
8:30 AM	7	0	1	0	0	0	0	0	0	1	1	0	1	3	0	0	14	236
8:35 AM	4	0	1	0	0	0	0	0	0	2	5	0	1	5	0	0	18	229
8:40 AM	4	0	0	0	0	0	0	0	0	1	2	0	1	2	0	0	10	219
8:45 AM	7	0	1	0	0	0	0	0	0	0	7	0	1	2	0	0	18	213
8:50 AM	7	0	0	0	0	0	0	0	0	2	13	0	3	1	0	0	26	212
8:55 AM	5	0	1	0	0	0	0	0	0	0	3	0	0	3	0	1	13	211
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	100	0	16	0	0	0	0	0	0	16	88	0	20	40	0	4	284	
Heavy Trucks	4	0	0	0	0	0	0	0	0	0	0	0	12	20	0	0	36	
Pedestrians		0				20				0				20			40	
Bicycles	3	0	0		0	0	0		0	0	0		0	1	0		4	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Gaines St -- SW US Veterans Hospital Rd
CITY/STATE: Multnomah, OR

QC JOB #: 14944202
DATE: Thu, Apr 4 2019

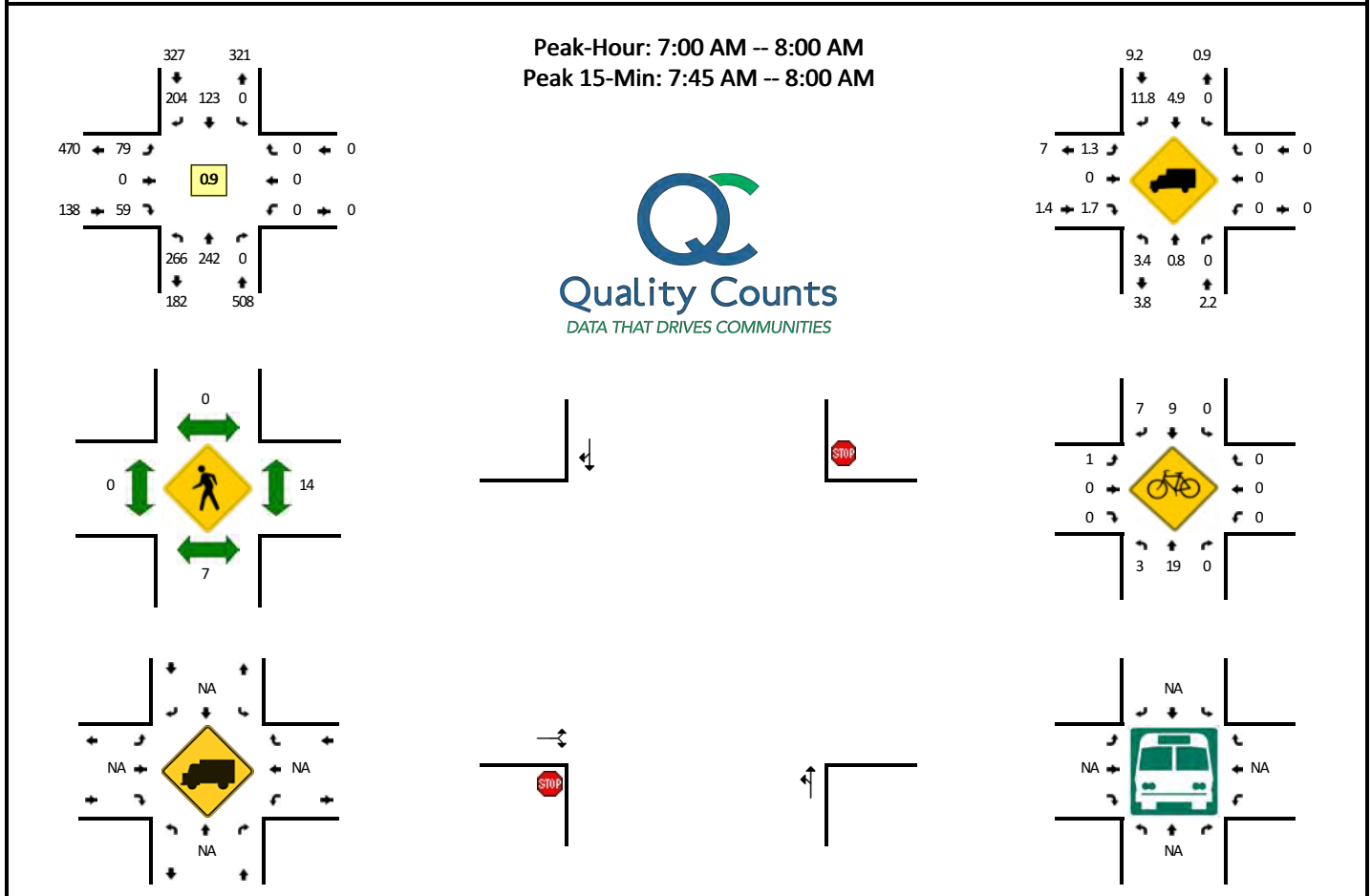


5-Min Count Period Beginning At	SW Gaines St (Northbound)				SW Gaines St (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	0	0	0	0	0	0	0	0	0	7	0	1	5	0	0	14	
4:05 PM	2	0	1	0	0	0	0	0	0	0	8	0	2	3	0	0	16	
4:10 PM	5	0	1	0	0	0	0	0	0	1	3	0	4	6	0	0	20	
4:15 PM	1	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	9	
4:20 PM	2	0	1	0	0	0	0	0	0	3	4	0	4	6	0	0	20	
4:25 PM	4	0	0	0	0	0	0	0	0	2	8	0	1	1	0	0	16	
4:30 PM	2	0	3	0	0	0	0	0	0	1	5	0	4	3	0	0	18	
4:35 PM	4	0	2	0	0	0	0	0	0	0	5	0	4	4	0	0	19	
4:40 PM	2	0	2	0	0	0	0	0	0	0	6	0	2	5	0	0	17	
4:45 PM	3	0	2	0	0	0	0	0	0	1	1	0	2	3	0	0	12	
4:50 PM	2	0	0	0	0	0	0	0	0	0	2	0	2	5	0	0	11	
4:55 PM	3	0	0	0	0	0	0	0	0	0	4	0	1	2	0	0	10	182
5:00 PM	4	0	3	0	0	0	0	0	0	0	2	0	1	4	0	0	14	182
5:05 PM	9	0	0	0	0	0	0	0	0	1	6	0	1	4	0	0	21	187
5:10 PM	5	0	1	0	0	0	0	0	0	0	4	0	2	4	0	0	16	183
5:15 PM	9	0	1	0	0	0	0	0	0	1	4	0	1	1	0	0	17	191
5:20 PM	4	0	1	0	0	0	0	0	0	4	7	0	1	6	0	0	23	194
5:25 PM	4	0	2	0	0	0	0	0	0	0	4	0	2	1	0	0	13	191
5:30 PM	4	0	1	0	0	0	0	0	0	0	7	0	1	5	0	0	18	191
5:35 PM	3	0	4	0	0	0	0	0	0	0	5	0	3	5	0	0	20	192
5:40 PM	3	0	0	0	0	0	0	0	0	2	4	0	0	2	0	0	11	186
5:45 PM	1	0	1	0	0	0	0	0	0	0	3	0	3	4	0	0	12	186
5:50 PM	3	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	9	184
5:55 PM	0	0	1	0	0	0	0	0	0	0	3	0	1	1	0	0	6	180
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	72	0	12	0	0	0	0	0	0	20	60	0	16	44	0	0	224	
Heavy Trucks	4	0	0		0	0	0		0	0	0		8	16	0		28	
Pedestrians		0				32				0				20			52	
Bicycles	0	0	0		0	0	0		0	0	3		0	0	0		3	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd
CITY/STATE: Multnomah, OR

QC JOB #: 14944203
DATE: Thu, Apr 4 2019

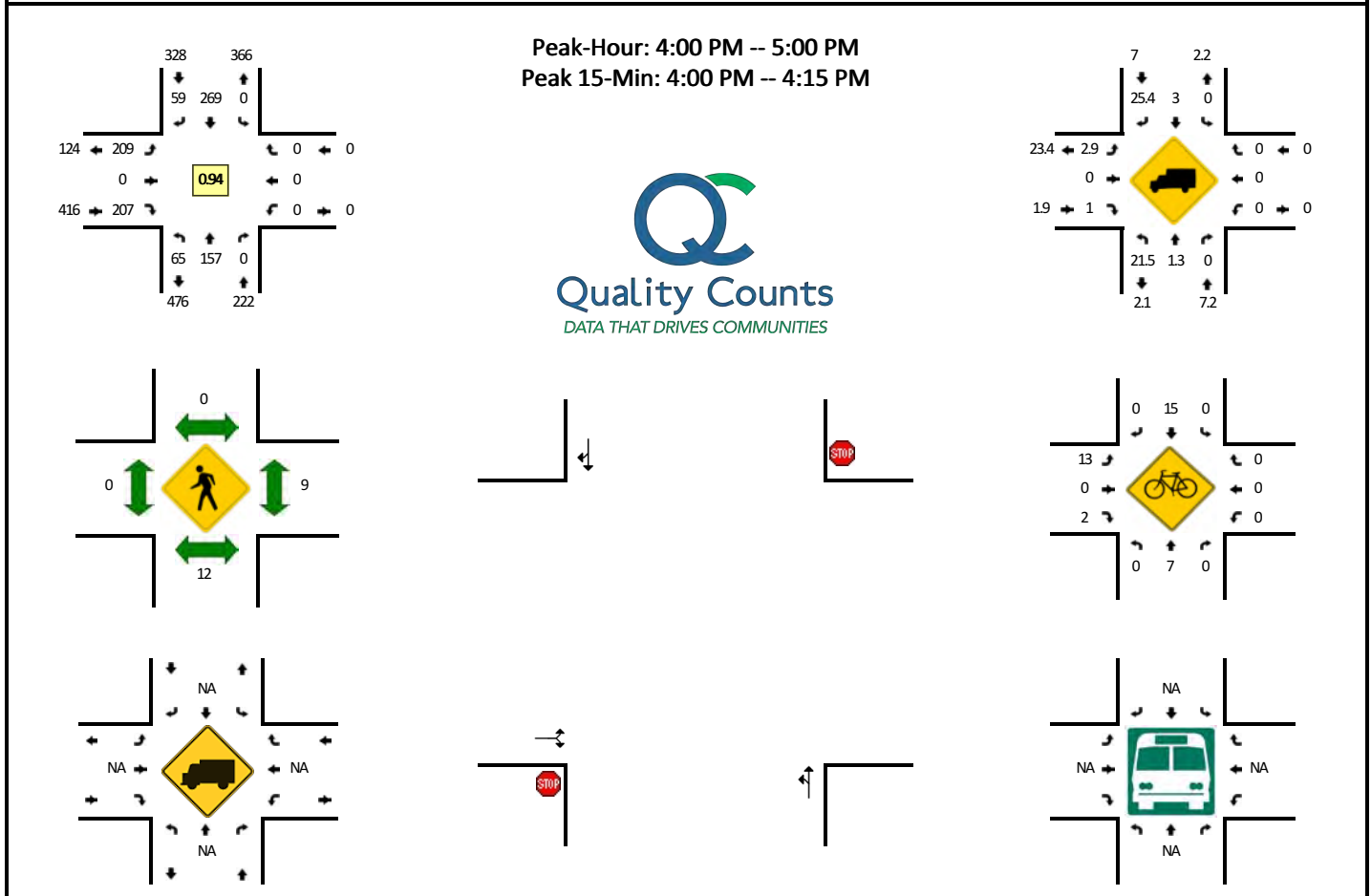


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	20	17	0	0	0	9	16	0	9	0	7	0	0	0	0	0	78	
7:05 AM	17	13	0	0	0	9	26	0	4	0	6	0	0	0	0	0	75	
7:10 AM	29	14	0	0	0	5	14	0	6	0	1	0	0	0	0	0	69	
7:15 AM	21	17	0	0	0	3	18	0	10	0	5	0	0	0	0	0	74	
7:20 AM	31	14	0	0	0	10	25	0	4	0	6	0	0	0	0	0	90	
7:25 AM	23	19	0	0	0	10	15	0	8	0	7	0	0	0	0	0	82	
7:30 AM	21	16	0	0	0	11	17	0	16	0	6	0	0	0	0	0	87	
7:35 AM	19	15	0	0	0	14	14	0	5	0	5	0	0	0	0	0	72	
7:40 AM	18	22	0	0	0	15	12	0	5	0	4	0	0	0	0	0	76	
7:45 AM	20	25	0	0	0	12	19	0	4	0	6	0	0	0	0	0	86	
7:50 AM	27	44	0	0	0	12	13	0	5	0	2	0	0	0	0	0	103	
7:55 AM	20	26	0	0	0	13	15	0	3	0	4	0	0	0	0	0	81	973
8:00 AM	16	22	0	0	0	9	10	0	7	0	4	0	0	0	0	0	68	963
8:05 AM	18	25	0	0	0	11	16	0	4	0	4	0	0	0	0	0	78	966
8:10 AM	10	25	0	0	0	8	12	0	5	0	1	0	0	0	0	0	61	958
8:15 AM	16	22	0	0	0	7	8	0	2	0	4	0	0	0	0	0	59	943
8:20 AM	17	34	0	0	0	9	10	0	2	0	2	0	0	0	0	0	74	927
8:25 AM	15	21	0	0	0	11	16	0	3	0	6	0	0	0	0	0	72	917
8:30 AM	18	29	0	0	0	7	15	0	4	0	1	0	0	0	0	0	74	904
8:35 AM	14	19	0	0	0	10	10	0	6	0	2	0	0	0	0	0	61	893
8:40 AM	14	22	0	0	0	6	18	0	10	0	6	0	0	0	0	0	76	893
8:45 AM	9	35	0	0	0	11	13	0	4	0	3	0	0	0	0	0	75	882
8:50 AM	15	21	0	0	0	6	17	0	6	0	3	0	0	0	0	0	68	847
8:55 AM	11	25	0	0	0	10	8	0	5	0	4	0	0	0	0	0	63	829
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	268	380	0	0	0	148	188	0	48	0	48	0	0	0	0	0	1080	
Heavy Trucks	4	4	0	0	0	4	28	0	4	0	4	0	0	0	0	0	48	
Pedestrians		4				0				0				8			12	
Bicycles	0	7	0		0	2	2		0	0	0		0	0	0		11	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd
CITY/STATE: Multnomah, OR

QC JOB #: 14944204
DATE: Thu, Apr 4 2019

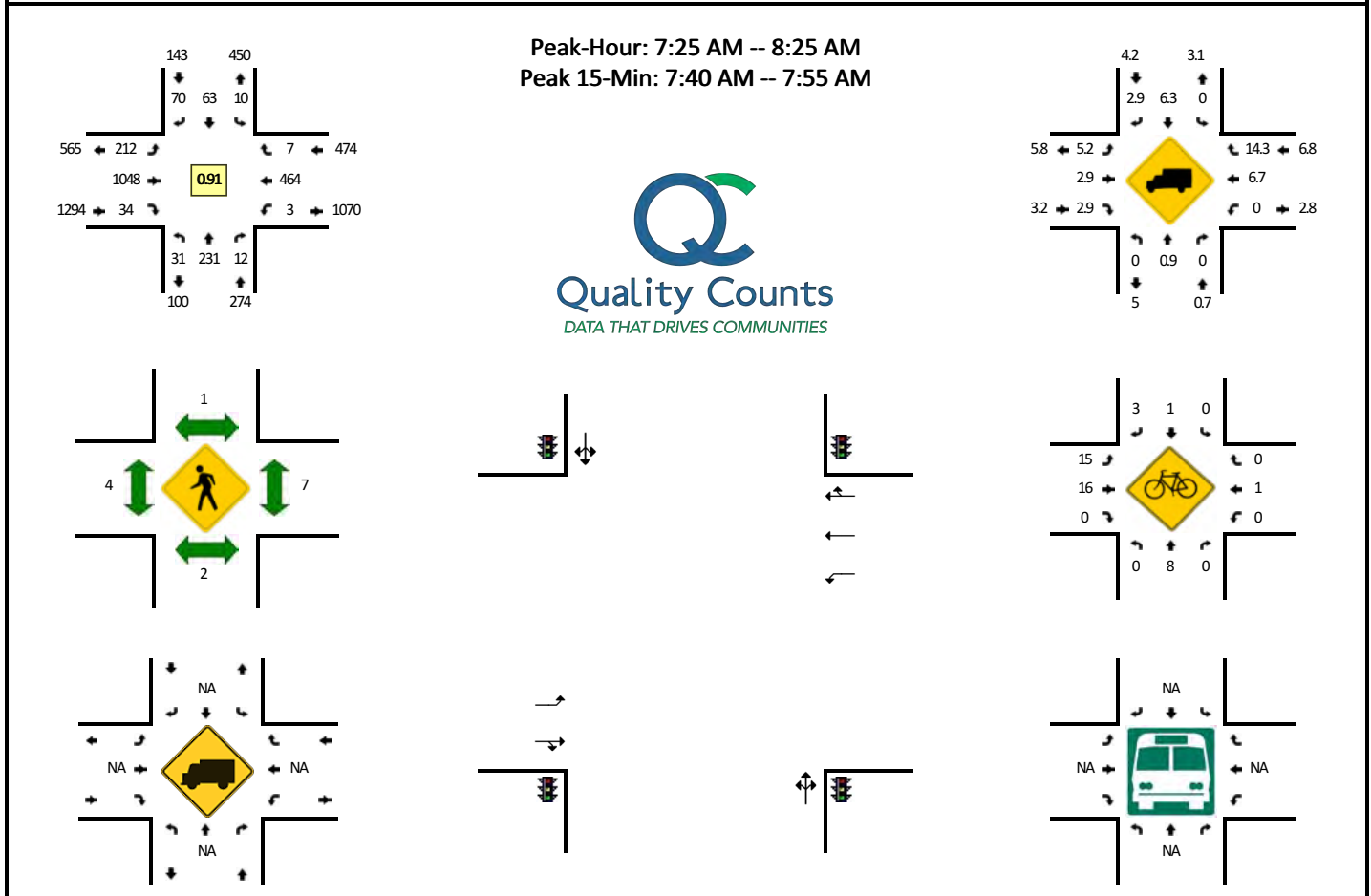


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	13	0	0	0	24	5	0	18	0	19	0	0	0	0	0	83	
4:05 PM	7	16	0	0	0	18	6	0	15	0	23	0	0	0	0	0	85	
4:10 PM	5	10	0	0	0	32	1	0	25	0	16	0	0	0	0	0	89	
4:15 PM	6	18	0	0	0	19	4	0	16	0	16	0	0	0	0	0	79	
4:20 PM	6	13	0	0	0	16	2	0	20	0	16	0	0	0	0	0	73	
4:25 PM	4	14	0	0	0	23	7	0	11	0	17	0	0	0	0	0	76	
4:30 PM	4	6	0	0	0	33	6	0	15	0	22	0	0	0	0	0	86	
4:35 PM	6	4	0	0	0	18	4	0	26	0	17	0	0	0	0	0	75	
4:40 PM	6	15	0	0	0	21	8	0	22	0	13	0	0	0	0	0	85	
4:45 PM	6	18	0	0	0	25	3	0	14	0	22	0	0	0	0	0	88	
4:50 PM	4	18	0	0	0	15	3	0	15	0	12	0	0	0	0	0	67	
4:55 PM	7	12	0	0	0	25	10	0	12	0	14	0	0	0	0	0	80	966
5:00 PM	7	16	0	0	0	21	2	0	15	0	6	0	0	0	0	0	67	950
5:05 PM	3	13	0	0	0	24	3	0	13	0	10	0	0	0	0	0	66	931
5:10 PM	1	26	0	0	0	23	4	0	14	0	14	0	0	0	0	0	82	924
5:15 PM	4	21	0	0	0	32	4	0	7	0	11	0	0	0	0	0	79	924
5:20 PM	3	13	0	0	0	25	4	0	9	0	15	0	0	0	0	0	69	920
5:25 PM	5	8	0	0	0	38	4	0	6	0	17	0	0	0	0	0	78	922
5:30 PM	0	12	0	0	0	36	2	0	7	0	18	0	0	0	0	0	75	911
5:35 PM	5	18	0	0	0	33	5	0	7	0	13	0	0	0	0	0	81	917
5:40 PM	5	16	0	0	0	22	5	0	12	0	11	0	0	0	0	0	71	903
5:45 PM	3	10	0	0	0	22	3	0	6	0	8	0	0	0	0	0	52	867
5:50 PM	2	11	0	0	0	15	1	0	16	0	8	0	0	0	0	0	53	853
5:55 PM	6	17	0	0	0	17	3	0	7	0	5	0	0	0	0	0	55	828
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	64	156	0	0	0	296	48	0	232	0	232	0	0	0	0	0	1028	
Heavy Trucks	16	4	0	0	0	8	16	0	8	0	4	0	0	0	0	0	56	
Pedestrians		8				0				0				4			12	
Bicycles	0	3	0		0	4	0		2	0	0		0	0	0		9	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW Capitol Hwy
CITY/STATE: Multnomah, OR

QC JOB #: 14944209
DATE: Thu, Apr 4 2019

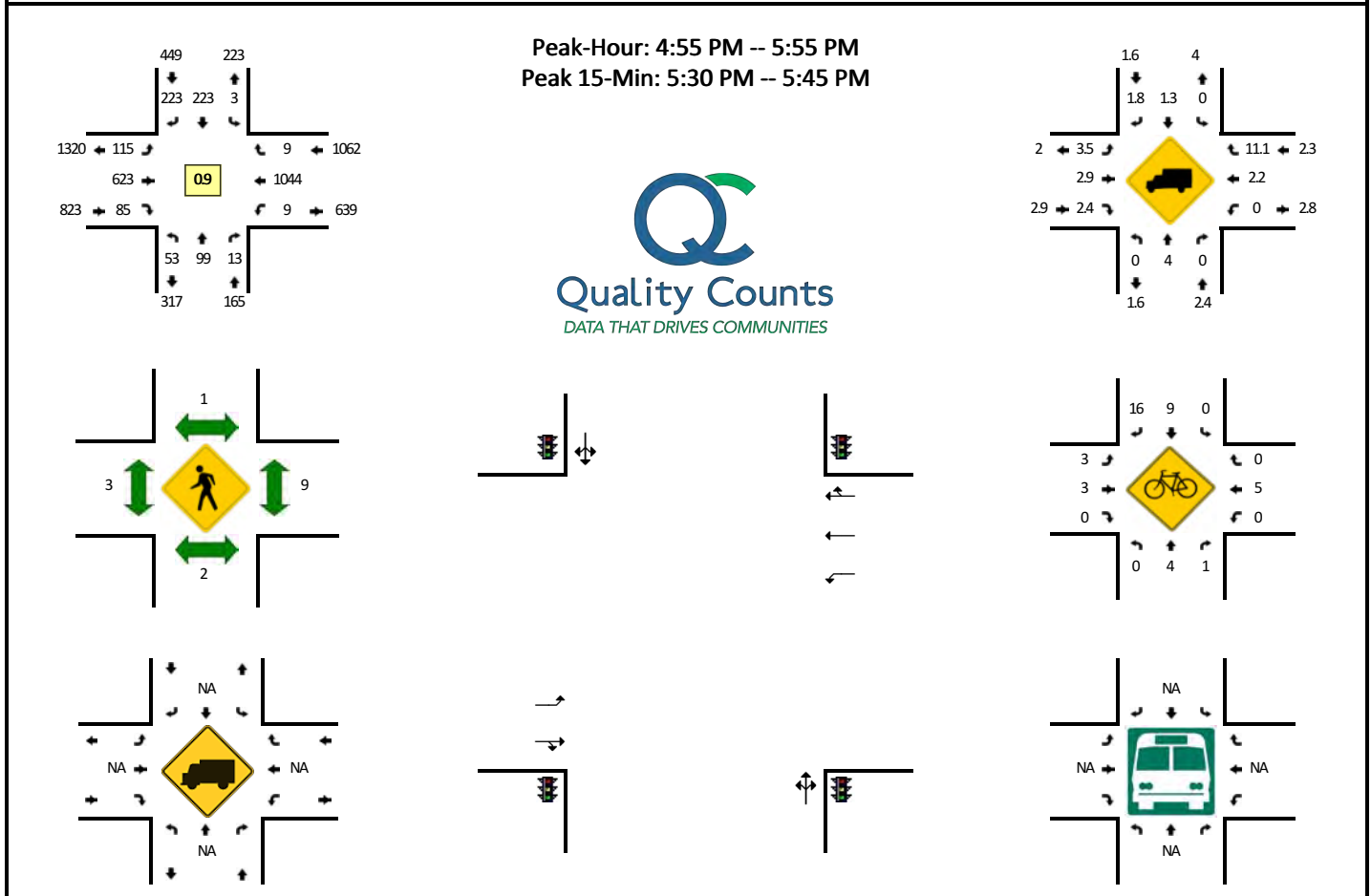


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Capitol Hwy (Eastbound)				SW Capitol Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	17	0	0	1	5	5	0	8	33	0	0	0	18	0	0	87	
7:05 AM	1	13	0	0	1	2	4	0	12	80	1	0	0	34	0	0	148	
7:10 AM	4	20	0	0	0	4	6	0	14	65	3	0	0	24	0	0	140	
7:15 AM	8	15	1	0	1	1	4	0	12	90	5	0	0	41	0	0	178	
7:20 AM	1	8	0	0	1	4	3	0	20	64	4	0	0	42	0	0	147	
7:25 AM	3	17	0	0	1	4	6	0	11	89	1	0	0	33	0	0	165	
7:30 AM	0	24	0	0	1	4	5	0	10	86	2	0	0	39	0	0	171	
7:35 AM	2	21	0	0	1	8	5	0	21	83	3	0	0	36	0	0	180	
7:40 AM	4	16	2	0	1	6	11	0	18	93	1	0	0	45	0	0	197	
7:45 AM	3	26	0	0	1	6	10	0	32	78	5	0	0	41	0	0	202	
7:50 AM	6	23	1	0	0	6	8	0	14	94	4	0	0	44	1	0	201	
7:55 AM	1	8	1	0	1	5	6	0	21	95	3	0	1	49	1	0	192	2008
8:00 AM	5	17	0	0	0	3	3	0	19	75	7	0	0	40	1	0	170	2091
8:05 AM	0	13	3	0	2	10	4	0	10	88	1	0	1	48	3	0	183	2126
8:10 AM	3	24	2	0	0	5	4	0	14	91	3	0	0	35	0	0	181	2167
8:15 AM	3	21	1	0	0	2	5	0	23	87	1	0	1	29	1	0	174	2163
8:20 AM	1	21	2	0	2	4	3	0	19	89	3	0	0	25	0	0	169	2185
8:25 AM	2	12	0	0	0	7	5	0	23	70	4	0	0	31	4	0	158	2178
8:30 AM	4	17	0	0	0	8	3	0	16	77	4	0	0	42	2	0	173	2180
8:35 AM	3	14	0	0	0	4	5	0	14	96	2	0	0	39	1	0	178	2178
8:40 AM	4	8	1	0	0	3	3	0	19	80	7	0	1	33	2	0	161	2142
8:45 AM	3	13	0	0	0	5	5	0	14	84	4	0	0	39	0	0	167	2107
8:50 AM	5	19	0	0	1	9	5	0	13	90	4	0	0	40	0	0	186	2092
8:55 AM	7	13	0	0	0	5	3	0	9	55	1	0	2	43	0	0	138	2038
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	52	260	12	0	8	72	116	0	256	1060	40	0	0	520	4	0	2400	
Heavy Trucks	0	0	0	0	0	4	0	0	4	32	4	0	0	32	0	0	76	
Pedestrians		4				0				4				4			12	
Bicycles	0	5	0		0	0	1		3	6	0		0	0	0		15	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW Capitol Hwy
CITY/STATE: Multnomah, OR

QC JOB #: 14944210
DATE: Thu, Apr 4 2019



5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Capitol Hwy (Eastbound)				SW Capitol Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	7	1	0	0	14	17	0	9	65	5	0	1	71	1	0	194	
4:05 PM	9	5	2	0	0	14	23	0	7	71	5	0	2	65	1	0	204	
4:10 PM	8	7	0	0	0	20	28	0	3	53	11	0	0	73	1	0	204	
4:15 PM	8	8	1	0	1	23	17	0	10	60	12	0	0	95	2	0	237	
4:20 PM	5	4	0	0	0	10	10	0	9	69	9	0	1	82	1	0	200	
4:25 PM	6	8	1	0	0	25	22	0	6	45	9	0	1	57	1	0	181	
4:30 PM	4	2	0	0	0	18	18	0	2	66	7	0	0	82	0	0	199	
4:35 PM	4	7	1	0	0	15	25	0	11	61	6	0	0	92	2	0	224	
4:40 PM	6	8	0	0	0	25	13	0	9	70	7	0	2	92	0	0	232	
4:45 PM	2	3	1	0	1	17	30	0	9	50	7	0	0	65	0	0	185	
4:50 PM	7	3	2	0	2	27	22	0	4	37	7	0	2	86	1	0	200	
4:55 PM	3	3	2	0	0	6	12	0	22	49	9	0	0	81	1	0	188	2448
5:00 PM	6	7	2	0	0	23	19	0	11	46	9	0	1	87	2	0	213	2467
5:05 PM	1	5	0	0	0	14	15	0	16	59	13	0	0	83	0	0	206	2469
5:10 PM	2	11	1	0	1	14	21	0	8	44	7	0	0	88	0	0	197	2462
5:15 PM	5	13	0	0	0	15	25	0	7	47	6	0	0	87	0	0	205	2430
5:20 PM	9	10	1	0	0	20	21	0	3	62	1	0	1	73	0	0	201	2431
5:25 PM	7	5	1	0	1	19	23	0	4	39	6	0	1	79	2	0	187	2437
5:30 PM	2	12	3	0	0	18	13	0	10	63	3	0	2	102	1	0	229	2467
5:35 PM	4	8	0	0	1	38	25	0	6	46	10	0	0	101	1	0	240	2483
5:40 PM	5	13	0	0	0	22	22	0	6	67	8	0	0	83	1	0	227	2478
5:45 PM	3	4	1	0	0	26	14	0	4	50	5	0	1	79	0	0	187	2480
5:50 PM	6	8	2	0	0	8	13	0	18	51	8	0	3	101	1	0	219	2499
5:55 PM	2	10	1	0	0	12	11	0	9	50	6	0	1	64	2	0	168	2479
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	44	132	12	0	4	312	240	0	88	704	84	0	8	1144	12	0	2784	
Heavy Trucks	0	4	0		0	4	0		0	20	0		0	40	4		72	
Pedestrians		4				0				0				8			12	
Bicycles	0	1	0		0	6	4		1	1	0		0	2	0		15	
Railroad																		
Stopped Buses																		

Comments:

Appendix C: Volume Calculations

Volume Calculations

Terwilliger Blvd at Sam Jackson Rd AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	13	0	202	0	0	0	0	438	3	306	408	0
0.01												
2029 Background Traffic Volume	14.3	0	222.2	0	0	0	0	481.8	3.3	336.6	448.8	0
Site generated trips	3	0	42	0	0	0	0	0	0	75	0	0
2029 Total Traffic Volumes	17.3	0	264.2	0	0	0	0	481.8	3.3	411.6	448.8	0

Terwilliger Blvd at Sam Jackson Rd PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	11	0	271	0	0	0	0	400	31	155	154	0
0.01												
2029 Background Traffic Volume	12.1	0	298.1	0	0	0	0	440	34.1	170.5	169.4	0
Site generated trips	6	0	98	0	0	0	0	0	10	31	0	0
2029 Total Traffic Volumes	18.1	0	396.1	0	0	0	0	440	44.1	201.5	169.4	0

Terwilliger Blvd at Campus Drive AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	391	126	0	0	177	118	86	0	117	0	0	0
0.01												
2029 Background Traffic Volume	430.1	138.6	0	0	194.7	129.8	94.6	0	128.7	0	0	0
Site generated trips	0	45	0	0	86	0	0	0	0	0	0	0
2029 Total Traffic Volumes	430.1	183.6	0	0	280.7	129.8	94.6	0	128.7	0	0	0

Terwilliger Blvd at Campus Drive PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	125	146	0	0	184	33	110	0	346	0	0	0
0.01												
2029 Background Traffic Volume	137.5	160.6	0	0	202.4	36.3	121	0	380.6	0	0	0
Site generated trips	0	104	0	0	41	0	0	0	0	0	0	0
2029 Total Traffic Volumes	137.5	264.6	0	0	243.4	36.3	121	0	380.6	0	0	0

Gaines St at Veterans Hospital Rd AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	76	0	19	0	0	0	0	13	75	19	34	0
0.01												
2029 Background Traffic Volume	83.6	0	20.9	0	0	0	0	14.3	82.5	20.9	37.4	0
Site generated trips	0	0	6	0	0	0	0	4	0	3	6	0
2029 Total Traffic Volumes	83.6	0	26.9	0	0	0	0	18.3	82.5	23.9	43.4	0

Gaines St at Veterans Hospital Rd PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	51	0	15	0	0	0	0	10	54	22	42	0
0.01												
2029 Background Traffic Volume	56.1	0	16.5	0	0	0	0	11	59.4	24.2	46.2	0
Site generated trips	0	0	3	0	0	0	0	5	0	6	15	0
2029 Total Traffic Volumes	56.1	0	19.5	0	0	0	0	16	59.4	30.2	61.2	0

Terwilliger Blvd at Veterans Hospital Rd AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	266	242	0	0	123	204	79	0	59	0	0	0
0.01												
2029 Background Traffic Volume	292.6	266.2	0	0	135.3	224.4	86.9	0	64.9	0	0	0
Site generated trips	129	0	0	0	0	86	45	0	29	0	0	0
2029 Total Traffic Volumes	421.6	266.2	0	0	135.3	310.4	131.9	0	93.9	0	0	0

Terwilliger Blvd at Veterans Hospital Rd PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	65	157	0	0	269	59	209	0	207	0	0	0
0.01												
2029 Background Traffic Volume	71.5	172.7	0	0	295.9	64.9	229.9	0	227.7	0	0	0
Site generated trips	56	0	0	0	0	41	104	0	172	0	0	0
2029 Total Traffic Volumes	127.5	172.7	0	0	295.9	105.9	333.9	0	399.7	0	0	0

Terwilliger Blvd at Capitol Hwy AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	31	231	12	10	63	70	212	1048	34	3	464	7
0.01												
2029 Background Traffic Volume	34.1	254.1	13.2	11	69.3	77	233.2	1152.8	37.4	3.3	510.4	7.7
Site generated trips	0	65	0	1	11	17	65	0	0	0	0	0
2029 Total Traffic Volumes	34.1	319.1	13.2	12	80.3	94	298.2	1152.8	37.4	3.3	510.4	7.7

Terwilliger Blvd at Capitol Hwy PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	53	99	13	3	223	223	115	623	85	9	1044	9
0.01												
2029 Background Traffic Volume	58.3	108.9	14.3	3.3	245.3	245.3	126.5	685.3	93.5	9.9	1148.4	9.9
Site generated trips	0	32	0	0	98	74	21	0	0	0	0	3
2029 Total Traffic Volumes	58.3	140.9	14.3	3.3	343.3	319.3	147.5	685.3	93.5	9.9	1148.4	12.9

Appendix D: HCM Reports

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Hill Rd

05/06/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↱	↰	↱	↱
Traffic Volume (vph)	438	3	306	408	13	202
Future Volume (vph)	438	3	306	408	13	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	541	4	378	504	16	249
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	545	0	378	504	16	249
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		27.3	35.5	19.5	76.0
Effective Green, g (s)	26.2		27.3	35.5	19.5	76.0
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	580		548	794	391	1309
v/s Ratio Prot	c0.30		c0.23	0.27	0.01	c0.11
v/s Ratio Perm						0.07
v/c Ratio	0.94		0.69	0.63	0.04	0.19
Uniform Delay, d1	27.7		24.3	18.8	24.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	25.1		3.6	1.7	0.2	0.1
Delay (s)	52.8		27.9	20.4	24.8	0.4
Level of Service	D		C	C	C	A
Approach Delay (s)	52.8			23.6	1.9	
Approach LOS	D			C	A	
Intersection Summary						
HCM 2000 Control Delay			29.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			83.2		Sum of lost time (s)	13.2
Intersection Capacity Utilization			53.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						




HCM 2010 TWSC
2: SW Terwilliger Blvd & SW Campus Drive

05/06/2019

Intersection

Int Delay, s/veh 80.5

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations						
Traffic Vol, veh/h	86	117	391	126	177	118
Future Vol, veh/h	86	117	391	126	177	118
Conflicting Peds, #/hr	48	48	48	0	0	52
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	88	88	88	88	88	88
Heavy Vehicles, %	32	3	1	3	15	1
Mvmt Flow	98	133	444	143	201	134

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	1399	368	387	0	-	0
Stage 1	320	-	-	-	-	-
Stage 2	1079	-	-	-	-	-
Critical Hdwy	6.72	6.23	4.11	-	-	-
Critical Hdwy Stg 1	5.72	-	-	-	-	-
Critical Hdwy Stg 2	5.72	-	-	-	-	-
Follow-up Hdwy	3.788	3.327	2.209	-	-	-
Pot Cap-1 Maneuver	133	675	1177	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 68	612	1119	-	-	-
Mov Cap-2 Maneuver	~ 68	-	-	-	-	-
Stage 1	364	-	-	-	-	-
Stage 2	272	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	382.7	7.8	0
HCM LOS	F		

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR





Capacity (veh/h)	1119	-	139	-	-
HCM Lane V/C Ratio	0.397	-	1.66	-	-
HCM Control Delay (s)	10.3	0	382.7	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	1.9	-	16.7	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	34	76	19	13	75
Future Vol, veh/h	19	34	76	19	13	75
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	23	41	92	23	16	90

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	265	143	0	0	139
Stage 1	128	-	-	-	-
Stage 2	137	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1
Critical Hdwy Stg 1	6.03	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2
Pot Cap-1 Maneuver	610	792	-	-	1457
Stage 1	767	-	-	-	-
Stage 2	760	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	581	763	-	-	1424
Mov Cap-2 Maneuver	581	-	-	-	-
Stage 1	749	-	-	-	-
Stage 2	740	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 581 763	1424	-
HCM Lane V/C Ratio	-	- 0.039 0.054	0.011	-
HCM Control Delay (s)	-	- 11.5 10	7.6	0
HCM Lane LOS	-	- B B	A	A
HCM 95th %tile Q(veh)	-	- 0.1 0.2	0	-

Intersection

Int Delay, s/veh 8.3

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 79 59 266 242 123 204

Future Vol, veh/h 79 59 266 242 123 204

Conflicting Peds, #/hr 8 8 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 90 90 90 90 90 90

Heavy Vehicles, % 1 2 3 1 5 12

Mvmt Flow 88 66 296 269 137 227

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1120 259 364 0 - 0

Stage 1 251 - - - - -

Stage 2 869 - - - - -

Critical Hdwy 6.41 6.22 4.13 - - -

Critical Hdwy Stg 1 5.41 - - - - -

Critical Hdwy Stg 2 5.41 - - - - -

Follow-up Hdwy 3.509 3.318 2.227 - - -

Pot Cap-1 Maneuver 229 780 1189 - - -

Stage 1 793 - - - - -

Stage 2 412 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 162 774 1189 - - -

Mov Cap-2 Maneuver 162 - - - - -

Stage 1 561 - - - - -

Stage 2 412 - - - - -

Approach EB NB SB

HCM Control Delay, s 41.5 4.7 0

HCM LOS E

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1189 - 245 - -

HCM Lane V/C Ratio 0.249 - 0.626 - -

HCM Control Delay (s) 9 0 41.5 - -




















HCM Lane LOS A A E - -

HCM 95th %tile Q(veh) 1 - 3.8 - -

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

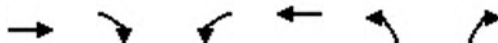
05/06/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Future Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1858			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95			0.96	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1773			1615	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	233	1152	37	3	510	8	34	254	13	11	69	77
RTOR Reduction (vph)	0	0	13	0	1	0	0	2	0	0	28	0
Lane Group Flow (vph)	233	1152	24	3	517	0	0	299	0	0	129	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Effective Green, g (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Actuated g/C Ratio	0.17	0.66	0.66	0.01	0.50			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	294	1218	1008	15	1677			376			342	
v/s Ratio Prot	c0.14	c0.62		0.00	0.15							
v/s Ratio Perm			0.02					c0.17			0.08	
v/c Ratio	0.79	0.95	0.02	0.20	0.31			0.80			0.38	
Uniform Delay, d1	46.8	18.1	6.9	58.0	17.5			44.0			39.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	13.6	15.7	0.0	6.5	0.5			15.9			3.1	
Delay (s)	60.4	33.8	6.9	64.5	17.9			59.9			42.9	
Level of Service	E	C	A	E	B			E			D	
Approach Delay (s)		37.4			18.2			59.9			42.9	
Approach LOS		D			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			36.4			HCM 2000 Level of Service					D	
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			117.8			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			92.2%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Park Rd

05/06/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	↩
Traffic Volume (vph)	400	31	155	154	11	271
Future Volume (vph)	400	31	155	154	11	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1858		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1858		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	444	34	172	171	12	301
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	475	0	172	171	12	301
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		21.2	35.3	19.5	69.8
Effective Green, g (s)	26.1		21.2	35.3	19.5	69.8
Actuated g/C Ratio	0.34		0.28	0.46	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	629		460	845	457	1413
v/s Ratio Prot	c0.26		c0.10	0.09	0.01	c0.12
v/s Ratio Perm						0.08
v/c Ratio	0.75		0.37	0.20	0.03	0.21
Uniform Delay, d1	22.6		22.5	12.4	21.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.2		0.5	0.1	0.1	0.1
Delay (s)	30.8		23.1	12.6	21.7	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	30.8			17.8	1.3	
Approach LOS	C			B	A	
Intersection Summary						
HCM 2000 Control Delay			18.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			77.0		Sum of lost time (s)	13.2
Intersection Capacity Utilization			46.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC
2: SW Terwilliger Blvd & SW Campus Drive

05/06/2019

Intersection

Int Delay, s/veh 15.7

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations 

Traffic Vol, veh/h 110 346 125 146 184 33

Future Vol, veh/h 110 346 125 146 184 33

Conflicting Peds, #/hr 42 1 9 0 0 9

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 94 94 94 94 94 94

Heavy Vehicles, % 16 2 2 2 8 6

Mvmt Flow 117 368 133 155 196 35

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 686 224 240 0 - 0

Stage 1 223 - - - - -

Stage 2 463 - - - - -

Critical Hdwy 6.56 6.22 4.12 - - -

Critical Hdwy Stg 1 5.56 - - - - -

Critical Hdwy Stg 2 5.56 - - - - -

Follow-up Hdwy 3.644 3.318 2.218 - - -

Pot Cap-1 Maneuver 393 815 1327 - - -

Stage 1 782 - - - - -

Stage 2 605 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 343 807 1316 - - -

Mov Cap-2 Maneuver 343 - - - - -

Stage 1 689 - - - - -

Stage 2 600 - - - - -

Approach EB NB SB

HCM Control Delay, s 30.2 3.7 0

HCM LOS D

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1316 - 608 - -

HCM Lane V/C Ratio 0.101 - 0.798 - -





HCM Control Delay (s) 8 0 30.2 - -

HCM Lane LOS A A D - -

HCM 95th %tile Q(veh) 0.3 - 7.8 - -

Intersection

Int Delay, s/veh 3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	42	51	15	10	54
Future Vol, veh/h	22	42	51	15	10	54
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	25	48	59	17	11	62

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	166	108	0
Stage 1	82	-	-
Stage 2	84	-	-
Critical Hdwy	6.76	6.53	-
Critical Hdwy Stg 1	5.76	-	-
Critical Hdwy Stg 2	5.76	-	-
Follow-up Hdwy	3.824	3.597	-
Pot Cap-1 Maneuver	752	868	-
Stage 1	862	-	-
Stage 2	860	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	736	835	-
Mov Cap-2 Maneuver	736	-	-
Stage 1	851	-	-
Stage 2	853	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	-	736	835
HCM Lane V/C Ratio	-	-	0.034	0.058
HCM Control Delay (s)	-	-	10.1	9.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2

Intersection

Int Delay, s/veh 17.3

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 209 207 65 157 269 59

Future Vol, veh/h 209 207 65 157 269 59

Conflicting Peds, #/hr 0 12 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 94 94 94 94 94 94

Heavy Vehicles, % 3 1 22 1 3 25

Mvmt Flow 222 220 69 167 286 63

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 623 330 349 0 - 0

Stage 1 318 - - - - -

Stage 2 305 - - - - -

Critical Hdwy 6.43 6.21 4.32 - - -

Critical Hdwy Stg 1 5.43 - - - - -

Critical Hdwy Stg 2 5.43 - - - - -

Follow-up Hdwy 3.527 3.309 2.398 - - -

Pot Cap-1 Maneuver 448 714 1107 - - -

Stage 1 735 - - - - -

Stage 2 745 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 417 706 1107 - - -

Mov Cap-2 Maneuver 417 - - - - -

Stage 1 684 - - - - -

Stage 2 745 - - - - -

Approach EB NB SB

HCM Control Delay, s 38.8 2.5 0

HCM LOS E

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1107 - 524 - -

HCM Lane V/C Ratio 0.062 - 0.845 - -

HCM Control Delay (s) 8.5 0 38.8 - -




















HCM Lane LOS A A E - -

HCM 95th %tile Q(veh) 0.2 - 8.8 - -

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/06/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Future Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1801			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.58			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			1064			1725	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	128	692	94	10	1160	10	59	110	14	3	248	248
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	45	0
Lane Group Flow (vph)	128	692	29	10	1169	0	0	180	0	0	454	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	173	936	467	23	1495			322			523	
v/s Ratio Prot	c0.07	0.38		0.01	c0.33							
v/s Ratio Perm			0.02					0.17			c0.26	
v/c Ratio	0.74	0.74	0.06	0.43	0.78			0.56			0.87	
Uniform Delay, d1	36.4	16.1	20.6	40.7	20.6			24.3			27.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	15.2	5.2	0.1	12.6	4.1			6.8			14.1	
Delay (s)	51.6	21.3	20.6	53.3	24.8			31.1			41.5	
Level of Service	D	C	C	D	C			C			D	
Approach Delay (s)		25.5			25.0			31.1			41.5	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			28.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			83.1			Sum of lost time (s)			14.6			
Intersection Capacity Utilization			95.5%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Hill Rd

05/06/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↰	↰	↰	↰
Traffic Volume (vph)	482	3	337	449	14	222
Future Volume (vph)	482	3	337	449	14	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	595	4	416	554	17	274
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	599	0	416	554	17	274
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		28.1	35.7	19.5	76.8
Effective Green, g (s)	26.2		28.1	35.7	19.5	76.8
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	574		558	791	387	1310
v/s Ratio Prot	c0.33		c0.25	0.30	0.01	c0.13
v/s Ratio Perm						0.07
v/c Ratio	1.04		0.75	0.70	0.04	0.21
Uniform Delay, d1	28.9		24.8	19.8	25.0	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	49.4		5.4	2.8	0.2	0.1
Delay (s)	78.3		30.2	22.6	25.2	0.5
Level of Service	E		C	C	C	A
Approach Delay (s)	78.3			25.8	1.9	
Approach LOS	E			C	A	
Intersection Summary						
HCM 2000 Control Delay			39.0		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			84.0		Sum of lost time (s)	13.2
Intersection Capacity Utilization			57.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						




HCM 2010 TWSC
2: SW Terwilliger Blvd & SW Campus Drive

05/06/2019

Intersection

Int Delay, s/veh 149.1

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations						
Traffic Vol, veh/h	95	129	430	139	195	130
Future Vol, veh/h	95	129	430	139	195	130
Conflicting Peds, #/hr	48	48	48	0	0	52
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	88	88	88	88	88	88
Heavy Vehicles, %	31	3	1	3	15	1
Mvmt Flow	108	147	489	158	222	148

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	1532	396	422	0	-	0
Stage 1	348	-	-	-	-	-
Stage 2	1184	-	-	-	-	-
Critical Hdwy	6.71	6.23	4.11	-	-	-
Critical Hdwy Stg 1	5.71	-	-	-	-	-
Critical Hdwy Stg 2	5.71	-	-	-	-	-
Follow-up Hdwy	3.779	3.327	2.209	-	-	-
Pot Cap-1 Maneuver	110	651	1143	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	254	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 50	590	1086	-	-	-
Mov Cap-2 Maneuver	~ 50	-	-	-	-	-
Stage 1	315	-	-	-	-	-
Stage 2	241	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	723.2	8.3	0
HCM LOS	F		

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR





Capacity (veh/h)	1086	-	106	-	-
HCM Lane V/C Ratio	0.45	-	2.401	-	-
HCM Control Delay (s)	11	0	723.2	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	2.4	-	22.8	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	37	84	21	14	83
Future Vol, veh/h	21	37	84	21	14	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	25	45	101	25	17	100

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	287	153	0	0	150	0
Stage 1	138	-	-	-	-	-
Stage 2	149	-	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1	-
Critical Hdwy Stg 1	6.03	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2	-
Pot Cap-1 Maneuver	592	781	-	-	1444	-
Stage 1	759	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	563	752	-	-	1411	-
Mov Cap-2 Maneuver	563	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	729	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 563 752 1411	-	-
HCM Lane V/C Ratio	-	- 0.045 0.059 0.012	-	-
HCM Control Delay (s)	-	- 11.7 10.1 7.6	0	
HCM Lane LOS	-	- B B A A		
HCM 95th %tile Q(veh)	-	- 0.1 0.2 0	-	-

Intersection

Int Delay, s/veh 13.5

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations 

Traffic Vol, veh/h 87 65 293 266 135 224

Future Vol, veh/h 87 65 293 266 135 224

Conflicting Peds, #/hr 8 8 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length - - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 90 90 90 90 90 90

Heavy Vehicles, % 1 2 3 1 12 5

Mvmt Flow 97 72 326 296 150 249

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1231 283 399 0 - 0

Stage 1 275 - - - - -

Stage 2 956 - - - - -

Critical Hdwy 6.41 6.22 4.13 - - -

Critical Hdwy Stg 1 5.41 - - - - -

Critical Hdwy Stg 2 5.41 - - - - -

Follow-up Hdwy 3.509 3.318 2.227 - - -

Pot Cap-1 Maneuver 197 756 1154 - - -

Stage 1 774 - - - - -

Stage 2 375 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 130 750 1154 - - -

Mov Cap-2 Maneuver 130 - - - - -

Stage 1 512 - - - - -

Stage 2 375 - - - - -

Approach EB NB SB

HCM Control Delay, s 76.8 4.9 0

HCM LOS F

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1154 - 201 - -

HCM Lane V/C Ratio 0.282 - 0.84 - -

HCM Control Delay (s) 9.3 0 76.8 - -




















HCM Lane LOS A A F - -

HCM 95th %tile Q(veh) 1.2 - 6.2 - -

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy












05/06/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Future Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1583	3368			1859			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.93			0.94	
Satd. Flow (perm)	1719	1845	1527	1583	3368			1742			1582	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	256	1267	41	3	560	9	37	279	14	12	76	85
RTOR Reduction (vph)	0	0	14	0	1	0	0	2	0	0	29	0
Lane Group Flow (vph)	256	1267	27	3	568	0	0	328	0	0	144	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	14%	7%	0%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	21.5	78.9	78.9	1.0	58.6			25.0			25.0	
Effective Green, g (s)	21.5	78.9	78.9	1.0	58.6			25.0			25.0	
Actuated g/C Ratio	0.18	0.66	0.66	0.01	0.49			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	310	1224	1013	13	1659			366			332	
v/s Ratio Prot	c0.15	c0.69		0.00	0.17							
v/s Ratio Perm			0.02					c0.19			0.09	
v/c Ratio	0.83	1.04	0.03	0.23	0.34			0.90			0.43	
Uniform Delay, d1	46.9	20.0	6.9	58.6	18.4			45.7			40.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	16.2	35.2	0.0	8.9	0.6			27.1			4.1	
Delay (s)	63.1	55.2	6.9	67.5	19.0			72.8			44.9	
Level of Service	E	E	A	E	B			E			D	
Approach Delay (s)		55.3			19.2			72.8			44.9	
Approach LOS		E			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			49.0			HCM 2000 Level of Service					D	
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			118.9			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			99.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Park Rd

05/06/2019

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	34	171	169	12	298
Future Volume (vph)	440	34	171	169	12	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1857		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1857		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	489	38	190	188	13	331
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	524	0	190	188	13	331
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		22.1	35.4	19.6	70.8
Effective Green, g (s)	26.1		22.1	35.4	19.6	70.8
Actuated g/C Ratio	0.33		0.28	0.45	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	621		473	837	453	1414
v/s Ratio Prot	c0.28		c0.11	0.10	0.01	c0.13
v/s Ratio Perm						0.09
v/c Ratio	0.84		0.40	0.22	0.03	0.23
Uniform Delay, d1	24.1		22.6	13.0	22.0	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	13.1		0.6	0.1	0.1	0.1
Delay (s)	37.2		23.2	13.1	22.1	0.5
Level of Service	D		C	B	C	A
Approach Delay (s)	37.2			18.2	1.3	
Approach LOS	D			B	A	
Intersection Summary						
HCM 2000 Control Delay			21.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.55			
Actuated Cycle Length (s)			78.0		Sum of lost time (s)	13.2
Intersection Capacity Utilization			50.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						




HCM 2010 TWSC
2: SW Terwilliger Blvd & SW Campus Drive

05/06/2019

Intersection

Int Delay, s/veh 22.6

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations						
Traffic Vol, veh/h	121	381	138	161	202	36
Future Vol, veh/h	121	381	138	161	202	36
Conflicting Peds, #/hr	42	1	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	2	2	2	8	6
Mvmt Flow	129	405	147	171	215	38

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	750	244	262	0	-	0
Stage 1	243	-	-	-	-	-
Stage 2	507	-	-	-	-	-
Critical Hdwy	6.4	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	382	795	1302	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	328	787	1291	-	-	-
Mov Cap-2 Maneuver	328	-	-	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	604	-	-	-	-	-

Approach EB NB SB





HCM Control Delay, s	44.6	3.8	0
HCM LOS	E		

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h)	1291	-	588	-	-
HCM Lane V/C Ratio	0.114	-	0.908	-	-
HCM Control Delay (s)	8.1	0	44.6	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.4	-	11.2	-	-

Intersection

Int Delay, s/veh 3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	46	56	17	11	59
Future Vol, veh/h	24	46	56	17	11	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	28	53	64	20	13	68

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	182	114	0	0	98
Stage 1	88	-	-	-	-
Stage 2	94	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1
Critical Hdwy Stg 1	5.76	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2
Pot Cap-1 Maneuver	736	861	-	-	1508
Stage 1	857	-	-	-	-
Stage 2	851	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	720	828	-	-	1488
Mov Cap-2 Maneuver	720	-	-	-	-
Stage 1	846	-	-	-	-
Stage 2	843	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 720 828 1488	-	-
HCM Lane V/C Ratio	-	- 0.038 0.064 0.008	-	-
HCM Control Delay (s)	-	- 10.2 9.6 7.4	0	
HCM Lane LOS	-	- B A A	A	A
HCM 95th %tile Q(veh)	-	- 0.1 0.2 0	-	-

Intersection

Int Delay, s/veh 31.3

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 230 228 72 173 296 65

Future Vol, veh/h 230 228 72 173 296 65

Conflicting Peds, #/hr 0 12 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 94 94 94 94 94 94

Heavy Vehicles, % 3 1 22 1 3 25

Mvmt Flow 245 243 77 184 315 69

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 688 362 384 0 - 0

Stage 1 350 - - - - -

Stage 2 338 - - - - -

Critical Hdwy 6.43 6.21 4.32 - - -

Critical Hdwy Stg 1 5.43 - - - - -

Critical Hdwy Stg 2 5.43 - - - - -

Follow-up Hdwy 3.527 3.309 2.398 - - -

Pot Cap-1 Maneuver 411 685 1073 - - -

Stage 1 711 - - - - -

Stage 2 720 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 378 677 1073 - - -

Mov Cap-2 Maneuver 378 - - - - -

Stage 1 654 - - - - -

Stage 2 720 - - - - -

Approach EB NB SB

HCM Control Delay, s 71.4 2.5 0

HCM LOS F

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1073 - 485 - -

HCM Lane V/C Ratio 0.071 - 1.005 - -

HCM Control Delay (s) 8.6 0 71.4 - -




















HCM Lane LOS A A F - -

HCM 95th %tile Q(veh) 0.2 - 13.7 - -

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

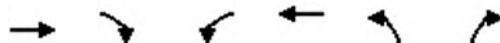
05/06/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Future Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1800			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.52			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			953			1725	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	141	761	104	11	1276	11	64	121	16	3	272	272
RTOR Reduction (vph)	0	0	65	0	1	0	0	4	0	0	45	0
Lane Group Flow (vph)	141	761	39	11	1286	0	0	197	0	0	502	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.5	42.4	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.5	42.4	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	177	939	466	23	1492			288			521	
v/s Ratio Prot	c0.08	0.41		0.01	c0.36							
v/s Ratio Perm			0.03					0.21			c0.29	
v/c Ratio	0.80	0.81	0.08	0.48	0.86			0.68			0.96	
Uniform Delay, d1	36.6	17.1	20.8	40.8	21.8			25.5			28.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	21.5	7.5	0.1	14.8	6.8			12.4			30.0	
Delay (s)	58.0	24.6	20.9	55.7	28.7			38.0			58.6	
Level of Service	E	C	C	E	C			D			E	
Approach Delay (s)		28.9			28.9			38.0			58.6	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			34.8			HCM 2000 Level of Service					C	
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			83.3			Sum of lost time (s)			14.6			
Intersection Capacity Utilization			103.7%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Hill Rd

05/06/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	↩
Traffic Volume (vph)	482	3	412	449	17	264
Future Volume (vph)	482	3	412	449	17	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1770	1759	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1770	1759	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	595	4	509	554	21	326
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	599	0	509	554	21	326
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	2%	8%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		29.1	35.8	19.5	77.8
Effective Green, g (s)	26.2		29.1	35.8	19.5	77.8
Actuated g/C Ratio	0.31		0.34	0.42	0.23	0.92
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	568		605	740	383	1310
v/s Ratio Prot	c0.33		c0.29	0.31	0.01	c0.15
v/s Ratio Perm						0.09
v/c Ratio	1.05		0.84	0.75	0.05	0.25
Uniform Delay, d1	29.4		25.8	20.8	25.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	53.0		10.3	4.2	0.3	0.1
Delay (s)	82.4		36.1	25.0	25.8	0.5
Level of Service	F		D	C	C	A
Approach Delay (s)	82.4			30.3	2.0	
Approach LOS	F			C	A	
Intersection Summary						
HCM 2000 Control Delay			40.9		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			85.0		Sum of lost time (s)	13.2
Intersection Capacity Utilization			61.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						




HCM 2010 TWSC
2: SW Terwilliger Blvd & SW Campus Drive

05/06/2019

Intersection

Int Delay, s/veh 214.5

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations						
Traffic Vol, veh/h	95	129	430	184	281	130
Future Vol, veh/h	95	129	430	184	281	130
Conflicting Peds, #/hr	48	48	48	0	0	52
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	88	88	88	88	88	88
Heavy Vehicles, %	32	3	1	3	15	1
Mvmt Flow	108	147	489	209	319	148

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	1680	493	519	0	-	0
Stage 1	445	-	-	-	-	-
Stage 2	1235	-	-	-	-	-
Critical Hdwy	6.72	6.23	4.11	-	-	-
Critical Hdwy Stg 1	5.72	-	-	-	-	-
Critical Hdwy Stg 2	5.72	-	-	-	-	-
Follow-up Hdwy	3.788	3.327	2.209	-	-	-
Pot Cap-1 Maneuver	~ 88	574	1052	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	239	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 35	521	1000	-	-	-
Mov Cap-2 Maneuver	~ 35	-	-	-	-	-
Stage 1	249	-	-	-	-	-
Stage 2	227	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	1173.2	8.4	0
HCM LOS	F		

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR





Capacity (veh/h)	1000	-	76	-	-
HCM Lane V/C Ratio	0.489	-	3.349	-	-
HCM Control Delay (s)	12	\$	1173.2	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	2.7	-	26	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	43	84	27	18	83
Future Vol, veh/h	24	43	84	27	18	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	29	52	101	33	22	100

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	301	157	0
Stage 1	142	-	-
Stage 2	159	-	-
Critical Hdwy	7.03	6.7	-
Critical Hdwy Stg 1	6.03	-	-
Critical Hdwy Stg 2	6.03	-	-
Follow-up Hdwy	4.067	3.75	-
Pot Cap-1 Maneuver	580	777	-
Stage 1	755	-	-
Stage 2	741	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	549	748	-
Mov Cap-2 Maneuver	549	-	-
Stage 1	738	-	-
Stage 2	718	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	-	549	748
HCM Lane V/C Ratio	-	-	0.053	0.069
HCM Control Delay (s)	-	-	11.9	10.2
HCM Lane LOS	-	-	B	B
HCM 95th %tile Q(veh)	-	-	0.2	0.2

Intersection

Int Delay, s/veh 145.2

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 132 94 422 266 135 310

Future Vol, veh/h 132 94 422 266 135 310

Conflicting Peds, #/hr 8 8 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 90 90 90 90 90 90

Heavy Vehicles, % 1 2 3 1 5 12

Mvmt Flow 147 104 469 296 150 344

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1564 330 494 0 - 0

Stage 1 322 - - - - -

Stage 2 1242 - - - - -

Critical Hdwy 6.41 6.22 4.13 - - -

Critical Hdwy Stg 1 5.41 - - - - -

Critical Hdwy Stg 2 5.41 - - - - -

Follow-up Hdwy 3.509 3.318 2.227 - - -

Pot Cap-1 Maneuver ~ 123 712 1064 - - -

Stage 1 737 - - - - -

Stage 2 274 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver ~ 58 707 1064 - - -

Mov Cap-2 Maneuver ~ 58 - - - - -

Stage 1 349 - - - - -

Stage 2 274 - - - - -

Approach EB NB SB

HCM Control Delay, s\$ 852.3 6.8 0

HCM LOS F

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1064 - 94 - -

HCM Lane V/C Ratio 0.441 - 2.671 - -

HCM Control Delay (s) 11 0\$ 852.3 - -

HCM Lane LOS B A F - -

HCM 95th %tile Q(veh) 2.3 - 23.6 - -









Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/06/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Future Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1863			1677	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.91			0.89	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1710			1490	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	327	1267	41	3	560	9	37	351	14	13	88	103
RTOR Reduction (vph)	0	0	13	0	1	0	0	1	0	0	31	0
Lane Group Flow (vph)	327	1267	28	3	568	0	0	401	0	0	173	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	25.0	81.8	81.8	1.0	58.0			25.0			25.0	
Effective Green, g (s)	25.0	81.8	81.8	1.0	58.0			25.0			25.0	
Actuated g/C Ratio	0.21	0.67	0.67	0.01	0.48			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	352	1239	1025	14	1600			350			305	
v/s Ratio Prot	c0.19	c0.69		0.00	0.17							
v/s Ratio Perm			0.02					c0.23			0.12	
v/c Ratio	0.93	1.02	0.03	0.21	0.35			1.15			0.57	
Uniform Delay, d1	47.5	20.0	6.7	60.0	20.1			48.4			43.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	30.1	31.4	0.0	7.6	0.6			94.0			7.5	
Delay (s)	77.6	51.4	6.7	67.6	20.7			142.4			51.0	
Level of Service	E	D	A	E	C			F			D	
Approach Delay (s)		55.5			21.0			142.4			51.0	
Approach LOS		E			C			F			D	
Intersection Summary												
HCM 2000 Control Delay			60.6			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			121.8			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			103.6%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Park Rd

05/08/2019




	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↘	↗	↘	↗
Traffic Volume (vph)	440	44	202	169	16	396
Future Volume (vph)	440	44	202	169	16	396
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1851		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1851		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	489	49	224	188	18	440
RTOR Reduction (vph)	4	0	0	0	0	0
Lane Group Flow (vph)	534	0	224	188	18	440
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		23.8	35.7	19.5	72.4
Effective Green, g (s)	26.1		23.8	35.7	19.5	72.4
Actuated g/C Ratio	0.33		0.30	0.45	0.24	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	606		499	827	442	1416
v/s Ratio Prot	c0.29		c0.13	0.10	0.01	c0.18
v/s Ratio Perm						0.11
v/c Ratio	0.88		0.45	0.23	0.04	0.31
Uniform Delay, d1	25.3		22.6	13.5	22.9	0.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	16.8		0.6	0.1	0.2	0.1
Delay (s)	42.0		23.2	13.6	23.1	0.6
Level of Service	D		C	B	C	A
Approach Delay (s)	42.0			18.8	1.5	
Approach LOS	D			B	A	
Intersection Summary						
HCM 2000 Control Delay			22.1		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			79.6		Sum of lost time (s)	13.2
Intersection Capacity Utilization			57.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC
2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

Intersection

Int Delay, s/veh 38.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	121	381	138	265	243	36
Future Vol, veh/h	121	381	138	265	243	36
Conflicting Peds, #/hr	42	1	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	16	2	2	2	8	6
Mvmt Flow	129	405	147	282	259	38





Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	905	288	306
Stage 1	287	-	-
Stage 2	618	-	-
Critical Hdwy	6.56	6.22	4.12
Critical Hdwy Stg 1	5.56	-	-
Critical Hdwy Stg 2	5.56	-	-
Follow-up Hdwy	3.644	3.318	2.218
Pot Cap-1 Maneuver	290	751	1255
Stage 1	731	-	-
Stage 2	512	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	245	744	1244
Mov Cap-2 Maneuver	245	-	-
Stage 1	623	-	-
Stage 2	507	-	-

Approach	EB	NB	SB
HCM Control Delay, s	89	2.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1244	-	499	-	-
HCM Lane V/C Ratio	0.118	-	1.07	-	-
HCM Control Delay (s)	8.3	0	89	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.4	-	16.5	-	-

Intersection

Int Delay, s/veh 4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	61	56	20	16	59
Future Vol, veh/h	30	61	56	20	16	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	34	70	64	23	18	68

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	194	116	0	0	101
Stage 1	90	-	-	-	-
Stage 2	104	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1
Critical Hdwy Stg 1	5.76	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2
Pot Cap-1 Maneuver	724	859	-	-	1504
Stage 1	855	-	-	-	-
Stage 2	842	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	705	827	-	-	1484
Mov Cap-2 Maneuver	705	-	-	-	-
Stage 1	844	-	-	-	-
Stage 2	831	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	705	827	1484
HCM Lane V/C Ratio	-	-	0.049	0.085	0.012
HCM Control Delay (s)	-	-	10.4	9.8	7.5
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	0

Intersection

Int Delay, s/veh 217.4

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 334 400 128 173 296 106

Future Vol, veh/h 334 400 128 173 296 106

Conflicting Peds, #/hr 0 12 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 94 94 94 94 94 94

Heavy Vehicles, % 3 1 22 1 3 25

Mvmt Flow 355 426 136 184 315 113

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 828 384 428 0 - 0

Stage 1 372 - - - - -

Stage 2 456 - - - - -

Critical Hdwy 6.43 6.21 4.32 - - -

Critical Hdwy Stg 1 5.43 - - - - -

Critical Hdwy Stg 2 5.43 - - - - -

Follow-up Hdwy 3.527 3.309 2.398 - - -

Pot Cap-1 Maneuver ~ 340 666 1032 - - -

Stage 1 695 - - - - -

Stage 2 636 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver ~ 290 658 1032 - - -

Mov Cap-2 Maneuver ~ 290 - - - - -

Stage 1 593 - - - - -

Stage 2 636 - - - - -

Approach EB NB SB

HCM Control Delay, s \$ 424 3.8 0

HCM LOS F

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1032 - 417 - -

HCM Lane V/C Ratio 0.132 - 1.873 - -

HCM Control Delay (s) 9 0 \$ 424 - -

HCM Lane LOS A A F - -

HCM 95th %tile Q(veh) 0.5 - 51.2 - -




















Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Future Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3529			1805			1733	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.39			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3529			722			1732	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	164	761	104	11	1276	14	64	157	16	3	383	354
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	42	0
Lane Group Flow (vph)	164	761	39	11	1289	0	0	234	0	0	698	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	179	940	465	23	1489			218			523	
v/s Ratio Prot	c0.09	0.41		0.01	c0.37							
v/s Ratio Perm			0.03					0.32			c0.40	
v/c Ratio	0.92	0.81	0.08	0.48	0.87			1.07			1.33	
Uniform Delay, d1	37.0	17.1	20.8	40.9	21.9			29.1			29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	43.6	7.5	0.1	14.8	7.0			81.1			163.3	
Delay (s)	80.7	24.6	20.9	55.7	28.9			110.2			192.4	
Level of Service	F	C	C	E	C			F			F	
Approach Delay (s)		33.1			29.2			110.2			192.4	
Approach LOS		C			C			F			F	
Intersection Summary												
HCM 2000 Control Delay			72.7			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			83.4			Sum of lost time (s)			14.6			
Intersection Capacity Utilization			107.1%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Appendix E: Mitigated Conditions HCM Reports

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Hill Rd

05/08/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↘	↗	↘	↗
Traffic Volume (vph)	438	3	306	408	13	202
Future Volume (vph)	438	3	306	408	13	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	541	4	378	504	16	249
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	545	0	378	504	16	249
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		27.3	35.5	19.5	76.0
Effective Green, g (s)	26.2		27.3	35.5	19.5	76.0
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	580		548	794	391	1309
v/s Ratio Prot	c0.30		c0.23	0.27	0.01	c0.11
v/s Ratio Perm						0.07
v/c Ratio	0.94		0.69	0.63	0.04	0.19
Uniform Delay, d1	27.7		24.3	18.8	24.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	25.1		3.6	1.7	0.2	0.1
Delay (s)	52.8		27.9	20.4	24.8	0.4
Level of Service	D		C	C	C	A
Approach Delay (s)	52.8			23.6	1.9	
Approach LOS	D			C	A	
Intersection Summary						
HCM 2000 Control Delay			29.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			83.2		Sum of lost time (s)	13.2
Intersection Capacity Utilization			53.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive





05/08/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	86	117	391	126	177	118
Future Volume (vph)	86	117	391	126	177	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.94			1.00	0.95	
Flpb, ped/bikes	1.00			0.96	1.00	
Frt	0.92			1.00	0.95	
Flt Protected	0.98			0.96	1.00	
Satd. Flow (prot)	1399			1726	1565	
Flt Permitted	0.98			0.58	1.00	
Satd. Flow (perm)	1399			1032	1565	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	98	133	444	143	201	134
RTOR Reduction (vph)	64	0	0	0	28	0
Lane Group Flow (vph)	167	0	0	587	307	0
Confl. Peds. (#/hr)	48	48	48			52
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	31%	3%	1%	3%	15%	1%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.8			47.1	47.1	
Effective Green, g (s)	12.8			47.1	47.1	
Actuated g/C Ratio	0.19			0.68	0.68	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	259			705	1069	
v/s Ratio Prot	c0.12				0.20	
v/s Ratio Perm				c0.57		
v/c Ratio	0.64			0.83	0.29	
Uniform Delay, d1	25.9			8.0	4.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	5.4			8.3	0.1	
Delay (s)	31.3			16.3	4.4	
Level of Service	C			B	A	
Approach Delay (s)	31.3			16.3	4.4	
Approach LOS	C			B	A	
Intersection Summary						
HCM 2000 Control Delay			15.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			68.9		Sum of lost time (s)	9.0
Intersection Capacity Utilization			72.5%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Intersection

Int Delay, s/veh 2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	34	76	19	13	75
Future Vol, veh/h	19	34	76	19	13	75
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	23	41	92	23	16	90

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	265	143	0	0	139
Stage 1	128	-	-	-	-
Stage 2	137	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1
Critical Hdwy Stg 1	6.03	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2
Pot Cap-1 Maneuver	610	792	-	-	1457
Stage 1	767	-	-	-	-
Stage 2	760	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	581	763	-	-	1424
Mov Cap-2 Maneuver	581	-	-	-	-
Stage 1	749	-	-	-	-
Stage 2	740	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 581 763	1424	-
HCM Lane V/C Ratio	-	- 0.039 0.054	0.011	-
HCM Control Delay (s)	-	- 11.5 10	7.6	0
HCM Lane LOS	-	- B B	A	A
HCM 95th %tile Q(veh)	-	- 0.1 0.2	0	-

HCM Signalized Intersection Capacity Analysis

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

05/08/2019











Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	79	59	266	242	123	204
Future Volume (vph)	79	59	266	242	123	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.99			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.94			1.00	0.92	
Flt Protected	0.97			0.97	1.00	
Satd. Flow (prot)	1693			1814	1570	
Flt Permitted	0.97			0.65	1.00	
Satd. Flow (perm)	1693			1219	1570	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	88	66	296	269	137	227
RTOR Reduction (vph)	49	0	0	0	68	0
Lane Group Flow (vph)	105	0	0	565	296	0
Confl. Peds. (#/hr)	8	8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	2%	3%	1%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	7.1			36.2	36.2	
Effective Green, g (s)	7.1			36.2	36.2	
Actuated g/C Ratio	0.14			0.69	0.69	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	229			843	1086	
v/s Ratio Prot	c0.06				0.19	
v/s Ratio Perm				c0.46		
v/c Ratio	0.46			0.67	0.27	
Uniform Delay, d1	20.8			4.6	3.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.4			2.1	0.1	
Delay (s)	22.3			6.7	3.2	
Level of Service	C			A	A	
Approach Delay (s)	22.3			6.7	3.2	
Approach LOS	C			A	A	
Intersection Summary						
HCM 2000 Control Delay			7.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			52.3		Sum of lost time (s)	9.0
Intersection Capacity Utilization			67.6%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

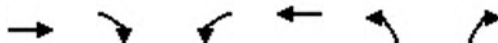
05/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Future Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1858			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95			0.96	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1773			1615	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	233	1152	37	3	510	8	34	254	13	11	69	77
RTOR Reduction (vph)	0	0	13	0	1	0	0	2	0	0	28	0
Lane Group Flow (vph)	233	1152	24	3	517	0	0	299	0	0	129	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Effective Green, g (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Actuated g/C Ratio	0.17	0.66	0.66	0.01	0.50			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	294	1218	1008	15	1677			376			342	
v/s Ratio Prot	c0.14	c0.62		0.00	0.15							
v/s Ratio Perm			0.02					c0.17			0.08	
v/c Ratio	0.79	0.95	0.02	0.20	0.31			0.80			0.38	
Uniform Delay, d1	46.8	18.1	6.9	58.0	17.5			44.0			39.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	13.6	15.7	0.0	6.5	0.5			15.9			3.1	
Delay (s)	60.4	33.8	6.9	64.5	17.9			59.9			42.9	
Level of Service	E	C	A	E	B			E			D	
Approach Delay (s)		37.4			18.2			59.9			42.9	
Approach LOS		D			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			36.4			HCM 2000 Level of Service					D	
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			117.8			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			92.2%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Park Rd

05/08/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	↩
Traffic Volume (vph)	400	31	155	154	11	271
Future Volume (vph)	400	31	155	154	11	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1858		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1858		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	444	34	172	171	12	301
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	475	0	172	171	12	301
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		21.2	35.3	19.5	69.8
Effective Green, g (s)	26.1		21.2	35.3	19.5	69.8
Actuated g/C Ratio	0.34		0.28	0.46	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	629		460	845	457	1413
v/s Ratio Prot	c0.26		c0.10	0.09	0.01	c0.12
v/s Ratio Perm						0.08
v/c Ratio	0.75		0.37	0.20	0.03	0.21
Uniform Delay, d1	22.6		22.5	12.4	21.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.2		0.5	0.1	0.1	0.1
Delay (s)	30.8		23.1	12.6	21.7	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	30.8			17.8	1.3	
Approach LOS	C			B	A	
Intersection Summary						
HCM 2000 Control Delay			18.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			77.0		Sum of lost time (s)	13.2
Intersection Capacity Utilization			46.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive





05/08/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	110	346	125	146	184	33
Future Volume (vph)	110	346	125	146	184	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.90			1.00	0.98	
Flt Protected	0.99			0.98	1.00	
Satd. Flow (prot)	1574			1816	1714	
Flt Permitted	0.99			0.74	1.00	
Satd. Flow (perm)	1574			1382	1714	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	117	368	133	155	196	35
RTOR Reduction (vph)	253	0	0	0	15	0
Lane Group Flow (vph)	232	0	0	288	216	0
Confl. Peds. (#/hr)	42	1	9			9
Confl. Bikes (#/hr)						28
Heavy Vehicles (%)	16%	2%	2%	2%	8%	6%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	9.3			11.4	11.4	
Effective Green, g (s)	9.3			11.4	11.4	
Actuated g/C Ratio	0.31			0.38	0.38	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	492			530	657	
v/s Ratio Prot	c0.15				0.13	
v/s Ratio Perm				c0.21		
v/c Ratio	0.47			0.54	0.33	
Uniform Delay, d1	8.2			7.1	6.5	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.7			1.1	0.3	
Delay (s)	8.9			8.3	6.7	
Level of Service	A			A	A	
Approach Delay (s)	8.9			8.3	6.7	
Approach LOS	A			A	A	
Intersection Summary						
HCM 2000 Control Delay			8.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			29.7		Sum of lost time (s)	9.0
Intersection Capacity Utilization			66.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Intersection

Int Delay, s/veh 3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	42	51	15	10	54
Future Vol, veh/h	22	42	51	15	10	54
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	25	48	59	17	11	62

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	166	108	0	0	90	0
Stage 1	82	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2	-
Pot Cap-1 Maneuver	752	868	-	-	1518	-
Stage 1	862	-	-	-	-	-
Stage 2	860	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	736	835	-	-	1498	-
Mov Cap-2 Maneuver	736	-	-	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	853	-	-	-	-	-

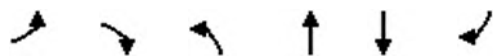
Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 736 835 1498	-	-
HCM Lane V/C Ratio	-	- 0.034 0.058 0.008	-	-
HCM Control Delay (s)	-	- 10.1 9.6 7.4	0	
HCM Lane LOS	-	- B A A	A	A
HCM 95th %tile Q(veh)	-	- 0.1 0.2 0	-	-

HCM Signalized Intersection Capacity Analysis

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

05/08/2019






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	209	207	65	157	269	59
Future Volume (vph)	209	207	65	157	269	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.93			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1669			1748	1722	
Flt Permitted	0.98			0.81	1.00	
Satd. Flow (perm)	1669			1441	1722	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	222	220	69	167	286	63
RTOR Reduction (vph)	85	0	0	0	18	0
Lane Group Flow (vph)	357	0	0	236	331	0
Confl. Peds. (#/hr)		12				
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	1%	22%	1%	3%	25%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	11.7			12.2	12.2	
Effective Green, g (s)	11.7			12.2	12.2	
Actuated g/C Ratio	0.36			0.37	0.37	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	593			534	638	
v/s Ratio Prot	c0.21				c0.19	
v/s Ratio Perm				0.16		
v/c Ratio	0.60			0.44	0.52	
Uniform Delay, d1	8.7			7.8	8.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.7			0.6	0.7	
Delay (s)	10.4			8.4	8.8	
Level of Service	B			A	A	
Approach Delay (s)	10.4			8.4	8.8	
Approach LOS	B			A	A	
Intersection Summary						
HCM 2000 Control Delay			9.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.56			
Actuated Cycle Length (s)			32.9		Sum of lost time (s)	9.0
Intersection Capacity Utilization			65.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Future Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1801			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.58			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			1064			1725	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	128	692	94	10	1160	10	59	110	14	3	248	248
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	45	0
Lane Group Flow (vph)	128	692	29	10	1169	0	0	180	0	0	454	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	173	936	467	23	1495			322			523	
v/s Ratio Prot	c0.07	0.38		0.01	c0.33							
v/s Ratio Perm			0.02					0.17			c0.26	
v/c Ratio	0.74	0.74	0.06	0.43	0.78			0.56			0.87	
Uniform Delay, d1	36.4	16.1	20.6	40.7	20.6			24.3			27.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	15.2	5.2	0.1	12.6	4.1			6.8			14.1	
Delay (s)	51.6	21.3	20.6	53.3	24.8			31.1			41.5	
Level of Service	D	C	C	D	C			C			D	
Approach Delay (s)		25.5			25.0			31.1			41.5	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			28.5			HCM 2000 Level of Service					C	
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			83.1			Sum of lost time (s)			14.6			
Intersection Capacity Utilization			95.5%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Hill Rd

05/08/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↱	↰	↱	↱
Traffic Volume (vph)	482	3	337	449	14	222
Future Volume (vph)	482	3	337	449	14	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	3	337	449	14	222
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	485	0	337	449	14	222
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		26.6	35.4	19.5	75.3
Effective Green, g (s)	26.2		26.6	35.4	19.5	75.3
Actuated g/C Ratio	0.32		0.32	0.43	0.24	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	585		538	799	394	1308
v/s Ratio Prot	c0.26		c0.20	0.24	0.01	c0.10
v/s Ratio Perm						0.06
v/c Ratio	0.83		0.63	0.56	0.04	0.17
Uniform Delay, d1	26.1		23.7	17.7	24.3	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	12.8		2.3	0.9	0.2	0.1
Delay (s)	38.9		26.0	18.6	24.4	0.4
Level of Service	D		C	B	C	A
Approach Delay (s)	38.9			21.8	1.9	
Approach LOS	D			C	A	
Intersection Summary						
HCM 2000 Control Delay			24.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			82.5		Sum of lost time (s)	13.2
Intersection Capacity Utilization			57.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive





05/08/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	95	129	430	139	195	130
Future Volume (vph)	95	129	430	139	195	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.94			1.00	0.95	
Flpb, ped/bikes	1.00			0.96	1.00	
Frt	0.92			1.00	0.95	
Flt Protected	0.98			0.96	1.00	
Satd. Flow (prot)	1398			1729	1568	
Flt Permitted	0.98			0.58	1.00	
Satd. Flow (perm)	1398			1049	1568	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	95	129	430	139	195	130
RTOR Reduction (vph)	64	0	0	0	29	0
Lane Group Flow (vph)	160	0	0	569	296	0
Confl. Peds. (#/hr)	48	48	48			52
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	32%	3%	1%	3%	15%	1%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.3			43.7	43.7	
Effective Green, g (s)	12.3			43.7	43.7	
Actuated g/C Ratio	0.19			0.67	0.67	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	264			705	1054	
v/s Ratio Prot	c0.11				0.19	
v/s Ratio Perm				c0.54		
v/c Ratio	0.61			0.81	0.28	
Uniform Delay, d1	24.1			7.6	4.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	3.9			6.7	0.1	
Delay (s)	28.0			14.4	4.4	
Level of Service	C			B	A	
Approach Delay (s)	28.0			14.4	4.4	
Approach LOS	C			B	A	
Intersection Summary						
HCM 2000 Control Delay			14.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			65.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			77.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Intersection

Int Delay, s/veh 2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	37	84	21	14	83
Future Vol, veh/h	21	37	84	21	14	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	21	37	84	21	14	83

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	245	134	0	0	129
Stage 1	119	-	-	-	-
Stage 2	126	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1
Critical Hdwy Stg 1	6.03	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2
Pot Cap-1 Maneuver	628	802	-	-	1469
Stage 1	775	-	-	-	-
Stage 2	769	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	599	772	-	-	1435
Mov Cap-2 Maneuver	599	-	-	-	-
Stage 1	757	-	-	-	-
Stage 2	751	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 599 772	1435	-
HCM Lane V/C Ratio	-	- 0.035 0.048	0.01	-
HCM Control Delay (s)	-	- 11.2 9.9	7.5	0
HCM Lane LOS	-	- B A	A	A
HCM 95th %tile Q(veh)	-	- 0.1 0.2	0	-

HCM Signalized Intersection Capacity Analysis

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

05/08/2019






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	87	65	293	266	135	224
Future Volume (vph)	87	65	293	266	135	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.99			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.94			1.00	0.92	
Flt Protected	0.97			0.97	1.00	
Satd. Flow (prot)	1693			1814	1570	
Flt Permitted	0.97			0.66	1.00	
Satd. Flow (perm)	1693			1223	1570	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	65	293	266	135	224
RTOR Reduction (vph)	49	0	0	0	69	0
Lane Group Flow (vph)	103	0	0	559	290	0
Confl. Peds. (#/hr)	8	8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	2%	3%	1%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	7.1			35.6	35.6	
Effective Green, g (s)	7.1			35.6	35.6	
Actuated g/C Ratio	0.14			0.69	0.69	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	232			842	1081	
v/s Ratio Prot	c0.06				0.18	
v/s Ratio Perm				c0.46		
v/c Ratio	0.44			0.66	0.27	
Uniform Delay, d1	20.5			4.6	3.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.4			2.0	0.1	
Delay (s)	21.8			6.6	3.2	
Level of Service	C			A	A	
Approach Delay (s)	21.8			6.6	3.2	
Approach LOS	C			A	A	
Intersection Summary						
HCM 2000 Control Delay			7.6		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			51.7		Sum of lost time (s)	9.0
Intersection Capacity Utilization			72.8%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Future Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1858			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95			0.96	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1773			1615	
Peak-hour factor, PHF	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. Flow (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
RTOR Reduction (vph)	0	0	13	0	1	0	0	2	0	0	28	0
Lane Group Flow (vph)	233	1153	24	3	517	0	0	299	0	0	129	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Effective Green, g (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Actuated g/C Ratio	0.17	0.66	0.66	0.01	0.50			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	294	1218	1008	15	1677			376			342	
v/s Ratio Prot	c0.14	c0.63		0.00	0.15							
v/s Ratio Perm			0.02					c0.17			0.08	
v/c Ratio	0.79	0.95	0.02	0.20	0.31			0.80			0.38	
Uniform Delay, d1	46.8	18.1	6.9	58.0	17.5			44.0			39.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	13.6	15.8	0.0	6.5	0.5			15.9			3.1	
Delay (s)	60.4	33.9	6.9	64.5	17.9			59.9			42.9	
Level of Service	E	C	A	E	B			E			D	
Approach Delay (s)		37.6			18.2			59.9			42.9	
Approach LOS		D			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			36.5			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			117.8			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			99.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Park Rd

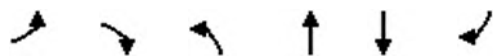
05/08/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↱	↰	↱	↱
Traffic Volume (vph)	440	34	171	169	12	298
Future Volume (vph)	440	34	171	169	12	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1858		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1858		1671	1845	1805	1495
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	440	34	171	169	12	298
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	471	0	171	169	12	298
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		21.2	35.3	19.5	69.8
Effective Green, g (s)	26.1		21.2	35.3	19.5	69.8
Actuated g/C Ratio	0.34		0.28	0.46	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	629		460	845	457	1413
v/s Ratio Prot	c0.25		c0.10	0.09	0.01	c0.12
v/s Ratio Perm						0.08
v/c Ratio	0.75		0.37	0.20	0.03	0.21
Uniform Delay, d1	22.5		22.5	12.4	21.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0		0.5	0.1	0.1	0.1
Delay (s)	30.5		23.0	12.5	21.7	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	30.5			17.8	1.3	
Approach LOS	C			B	A	
Intersection Summary						
HCM 2000 Control Delay			18.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			77.0		Sum of lost time (s)	13.2
Intersection Capacity Utilization			50.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive





05/08/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			W	W	
Traffic Volume (vph)	121	381	138	161	202	36
Future Volume (vph)	121	381	138	161	202	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.90			1.00	0.98	
Flt Protected	0.99			0.98	1.00	
Satd. Flow (prot)	1574			1816	1714	
Flt Permitted	0.99			0.74	1.00	
Satd. Flow (perm)	1574			1374	1714	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	121	381	138	161	202	36
RTOR Reduction (vph)	262	0	0	0	15	0
Lane Group Flow (vph)	240	0	0	299	223	0
Confl. Peds. (#/hr)	42	1	9			9
Confl. Bikes (#/hr)						28
Heavy Vehicles (%)	16%	2%	2%	2%	8%	6%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	9.4			11.6	11.6	
Effective Green, g (s)	9.4			11.6	11.6	
Actuated g/C Ratio	0.31			0.39	0.39	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	493			531	662	
v/s Ratio Prot	c0.15				0.13	
v/s Ratio Perm				c0.22		
v/c Ratio	0.49			0.56	0.34	
Uniform Delay, d1	8.3			7.2	6.5	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.8			1.4	0.3	
Delay (s)	9.1			8.6	6.8	
Level of Service	A			A	A	
Approach Delay (s)	9.1			8.6	6.8	
Approach LOS	A			A	A	
Intersection Summary						
HCM 2000 Control Delay			8.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			30.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			71.1%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Intersection

Int Delay, s/veh 3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	46	56	17	11	59
Future Vol, veh/h	24	46	56	17	11	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	24	46	56	17	11	59

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	160	105	0	0	87
Stage 1	79	-	-	-	-
Stage 2	81	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1
Critical Hdwy Stg 1	5.76	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2
Pot Cap-1 Maneuver	758	871	-	-	1522
Stage 1	865	-	-	-	-
Stage 2	863	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	742	838	-	-	1502
Mov Cap-2 Maneuver	742	-	-	-	-
Stage 1	854	-	-	-	-
Stage 2	856	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 742 838 1502	-	-
HCM Lane V/C Ratio	-	- 0.032 0.055 0.007	-	-
HCM Control Delay (s)	-	- 10 9.5 7.4	0	
HCM Lane LOS	-	- B A A	A	
HCM 95th %tile Q(veh)	-	- 0.1 0.2 0	-	

HCM Signalized Intersection Capacity Analysis

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

05/08/2019






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			W	W	
Traffic Volume (vph)	230	228	72	173	296	65
Future Volume (vph)	230	228	72	173	296	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.93			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1669			1747	1722	
Flt Permitted	0.98			0.81	1.00	
Satd. Flow (perm)	1669			1429	1722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	230	228	72	173	296	65
RTOR Reduction (vph)	84	0	0	0	18	0
Lane Group Flow (vph)	374	0	0	245	343	0
Confl. Peds. (#/hr)		12				
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	1%	22%	1%	3%	25%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.0			12.3	12.3	
Effective Green, g (s)	12.0			12.3	12.3	
Actuated g/C Ratio	0.36			0.37	0.37	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	601			527	636	
v/s Ratio Prot	c0.22				c0.20	
v/s Ratio Perm				0.17		
v/c Ratio	0.62			0.46	0.54	
Uniform Delay, d1	8.8			8.0	8.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	2.0			0.7	0.9	
Delay (s)	10.8			8.6	9.1	
Level of Service	B			A	A	
Approach Delay (s)	10.8			8.6	9.1	
Approach LOS	B			A	A	
Intersection Summary						
HCM 2000 Control Delay			9.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			33.3		Sum of lost time (s)	9.0
Intersection Capacity Utilization			71.2%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Future Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1801			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.59			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			1083			1725	
Peak-hour factor, PHF	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. Flow (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
RTOR Reduction (vph)	0	0	65	0	1	0	0	4	0	0	45	0
Lane Group Flow (vph)	127	685	29	10	1157	0	0	177	0	0	448	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	173	936	467	23	1495			328			523	
v/s Ratio Prot	c0.07	0.37		0.01	c0.33							
v/s Ratio Perm			0.02					0.16			c0.26	
v/c Ratio	0.73	0.73	0.06	0.43	0.77			0.54			0.86	
Uniform Delay, d1	36.3	16.0	20.6	40.7	20.5			24.1			27.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	14.9	5.0	0.1	12.6	4.0			6.2			13.0	
Delay (s)	51.2	21.1	20.6	53.3	24.5			30.3			40.2	
Level of Service	D	C	C	D	C			C			D	
Approach Delay (s)		25.2			24.8			30.3			40.2	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			28.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			83.1			Sum of lost time (s)			14.6			
Intersection Capacity Utilization			103.7%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Hill Rd

05/08/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↱	↰	↱	↱
Traffic Volume (vph)	482	3	412	449	17	264
Future Volume (vph)	482	3	412	449	17	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	3	412	449	17	264
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	485	0	412	449	17	264
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		28.1	35.7	19.5	76.8
Effective Green, g (s)	26.2		28.1	35.7	19.5	76.8
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	574		558	791	387	1310
v/s Ratio Prot	c0.26		c0.25	0.24	0.01	c0.12
v/s Ratio Perm						0.07
v/c Ratio	0.84		0.74	0.57	0.04	0.20
Uniform Delay, d1	27.0		24.7	18.3	25.0	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	14.2		5.1	0.9	0.2	0.1
Delay (s)	41.2		29.8	19.2	25.2	0.5
Level of Service	D		C	B	C	A
Approach Delay (s)	41.2			24.3	2.0	
Approach LOS	D			C	A	
Intersection Summary						
HCM 2000 Control Delay			25.5		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			84.0		Sum of lost time (s)	13.2
Intersection Capacity Utilization			61.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	95	129	430	184	411
v/c Ratio	0.38	0.36	0.64	0.14	0.35
Control Delay	26.3	8.3	12.5	4.1	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	8.3	12.5	4.1	4.7
Queue Length 50th (ft)	26	0	70	18	39
Queue Length 95th (ft)	72	38	#229	44	96
Internal Link Dist (ft)	152			148	196
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	515	601	747	1494	1293
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.18	0.21	0.58	0.12	0.32













Intersection Summary

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

HCM 2010 Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

									
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations									
Traffic Volume (veh/h)	95	129	430	184	281	130			
Future Volume (veh/h)	95	129	430	184	281	130			
Number	7	14	5	2	6	16			
Initial Q, veh	0	0	0	0	0	0			
Ped-Bike Adj (A_pbT)	1.00	1.00	0.98			0.94			
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1450	1845	1881	1845	1718	1900			
Adj Flow Rate, veh/h	95	129	430	184	281	130			
Adj No. of Lanes	1	1	1	1	1	0			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	31	3	1	3	15	15			
Opposing Right Turn Influence	Yes		Yes						
Cap, veh/h	176	200	697	1235	728	337			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
Prop Arrive On Green	0.13	0.13	0.67	0.67	0.67	0.67			
Ln Grp Delay, s/veh	20.7	21.9	8.8	2.7	0.0	3.5			
Ln Grp LOS	C	C	A	A		A			
Approach Vol, veh/h	224			614	411				
Approach Delay, s/veh	21.3			7.0	3.5				
Approach LOS	C			A	A				
Timer:		1	2	3	4	5	6	7	8
Assigned Phs			2		4		6		
Case No			6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s			34.1		10.1		34.1		
Change Period (Y+Rc), s			4.5		4.5		4.5		
Max Green (Gmax), s			42.9		18.1		42.9		
Max Allow Headway (MAH), s			5.3		4.0		5.3		
Max Q Clear (g_c+I1), s			23.0		5.5		7.1		
Green Ext Time (g_e), s			6.7		0.6		7.9		
Prob of Phs Call (p_c)			1.00		0.94		1.00		
Prob of Max Out (p_x)			0.21		0.00		0.04		
Left-Turn Movement Data									
Assigned Mvmt			5		7		1		
Mvmt Sat Flow, veh/h			964		1381		0		
Through Movement Data									
Assigned Mvmt			2		4		6		
Mvmt Sat Flow, veh/h			1845		0		1088		
Right-Turn Movement Data									
Assigned Mvmt			12		14		16		
Mvmt Sat Flow, veh/h			0		1568		504		
Left Lane Group Data									
Assigned Mvmt		0	5	0	7	0	1	0	0
Lane Assignment									

HCM 2010 Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	430	0	95	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	964	0	1381	0	0	0	0
Q Serve Time (g_s), s	0.0	15.9	0.0	2.9	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	21.0	0.0	2.9	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	964	0	1381	0	0	0	0
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	29.6	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	15.9	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	29.6	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	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	697	0	176	0	0	0	0
V/C Ratio (X)	0.00	0.62	0.00	0.54	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	987	0	565	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.9	0.0	18.1	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.9	0.0	2.6	0.0	0.0	0.0	0.0
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	8.8	0.0	20.7	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.1	0.0	1.1	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	4.2	0.0	1.2	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	1.07	0.00	0.38	0.00	0.00	0.00	0.00
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	0
Lane Assignment	T							
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	184	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1845	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1235	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1788	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
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	2.7	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0

HCM 2010 Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00
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	0
Lane Assignment				R		T+R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	129	0	411	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1568	0	1592	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	3.5	0.0	5.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	3.5	0.0	5.1	0.0	0.0
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	0.00	0.00	1.00	0.00	0.32	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	200	0	1066	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.65	0.00	0.39	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	641	0	1543	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	18.4	0.0	3.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	3.5	0.0	0.2	0.0	0.0
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	0.0	0.0	21.9	0.0	3.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.5	0.0	2.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.7	0.0	2.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.22	0.00	0.26	0.00	0.00
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	8.4
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary





2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	95	129	430	184	281	130		
Future Volume (veh/h)	95	129	430	184	281	130		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98			0.94		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1450	1845	1881	1845	1718	1900		
Adj Flow Rate, veh/h	95	129	430	184	281	130		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Percent Heavy Veh, %	31	3	1	3	15	15		
Cap, veh/h	176	200	697	1235	728	337		
Arrive On Green	0.13	0.13	0.67	0.67	0.67	0.67		
Sat Flow, veh/h	1381	1568	964	1845	1088	504		
Grp Volume(v), veh/h	95	129	430	184	0	411		
Grp Sat Flow(s),veh/h/ln	1381	1568	964	1845	0	1592		
Q Serve(g_s), s	2.9	3.5	15.9	1.6	0.0	5.1		
Cycle Q Clear(g_c), s	2.9	3.5	21.0	1.6	0.0	5.1		
Prop In Lane	1.00	1.00	1.00			0.32		
Lane Grp Cap(c), veh/h	176	200	697	1235	0	1066		
V/C Ratio(X)	0.54	0.65	0.62	0.15	0.00	0.39		
Avail Cap(c_a), veh/h	565	641	987	1788	0	1543		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	18.1	18.4	7.9	2.7	0.0	3.3		
Incr Delay (d2), s/veh	2.6	3.5	0.9	0.1	0.0	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.2	1.7	4.2	0.8	0.0	2.2		
LnGrp Delay(d),s/veh	20.7	21.9	8.8	2.7	0.0	3.5		
LnGrp LOS	C	C	A	A		A		
Approach Vol, veh/h	224			614	411			
Approach Delay, s/veh	21.3			7.0	3.5			
Approach LOS	C			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		34.1		10.1		34.1		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		42.9		18.1		42.9		
Max Q Clear Time (g_c+I1), s		23.0		5.5		7.1		
Green Ext Time (p_c), s		6.7		0.6		7.9		
Intersection Summary								
HCM 2010 Ctrl Delay			8.4					
HCM 2010 LOS			A					

Intersection

Int Delay, s/veh 3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	43	84	27	18	83
Future Vol, veh/h	24	43	84	27	18	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	24	43	84	27	18	83

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	256	137	0	0	135
Stage 1	122	-	-	-	-
Stage 2	134	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1
Critical Hdwy Stg 1	6.03	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2
Pot Cap-1 Maneuver	618	798	-	-	1462
Stage 1	772	-	-	-	-
Stage 2	762	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	588	769	-	-	1429
Mov Cap-2 Maneuver	588	-	-	-	-
Stage 1	754	-	-	-	-
Stage 2	741	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 588 769 1429	-	-
HCM Lane V/C Ratio	-	- 0.041 0.056 0.013	-	-
HCM Control Delay (s)	-	- 11.4 10 7.6	0	0
HCM Lane LOS	-	- B B A A		
HCM 95th %tile Q(veh)	-	- 0.1 0.2 0	-	-

Queues

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

05/08/2019



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	132	94	422	266	445
v/c Ratio	0.40	0.26	0.64	0.20	0.37
Control Delay	25.5	7.9	12.7	4.3	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.5	7.9	12.7	4.3	2.5
Queue Length 50th (ft)	38	0	70	28	14
Queue Length 95th (ft)	91	33	#228	63	48
Internal Link Dist (ft)	143			192	64
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	660	624	727	1510	1299
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.15	0.58	0.18	0.34













Intersection Summary

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

HCM 2010 Signalized Intersection Capacity Analysis

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

05/08/2019

									
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations									
Traffic Volume (veh/h)	132	94	422	266	135	310			
Future Volume (veh/h)	132	94	422	266	135	310			
Number	7	14	5	2	6	16			
Initial Q, veh	0	0	0	0	0	0			
Ped-Bike Adj (A_pbT)	1.00	1.00	1.00			0.98			
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1863	1845	1881	1729	1900			
Adj Flow Rate, veh/h	132	94	422	266	135	310			
Adj No. of Lanes	1	1	1	1	1	0			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	1	2	3	1	5	5			
Opposing Right Turn Influence	Yes		Yes						
Cap, veh/h	211	186	677	1298	317	729			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
Prop Arrive On Green	0.12	0.12	0.69	0.69	0.69	0.69			
Ln Grp Delay, s/veh	22.7	21.5	9.2	2.7	0.0	3.5			
Ln Grp LOS	C	C	A	A		A			
Approach Vol, veh/h	226			688	445				
Approach Delay, s/veh	22.2			6.7	3.5				
Approach LOS	C			A	A				
Timer:		1	2	3	4	5	6	7	8
Assigned Phs			2		4		6		
Case No			6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s			36.8		10.0		36.8		
Change Period (Y+Rc), s			4.5		4.5		4.5		
Max Green (Gmax), s			42.9		18.1		42.9		
Max Allow Headway (MAH), s			5.4		4.0		5.4		
Max Q Clear (g_c+I1), s			25.0		5.3		8.0		
Green Ext Time (g_e), s			7.3		0.5		9.3		
Prob of Phs Call (p_c)			1.00		0.95		1.00		
Prob of Max Out (p_x)			0.34		0.00		0.08		
Left-Turn Movement Data									
Assigned Mvmt			5		7		1		
Mvmt Sat Flow, veh/h			932		1792		0		
Through Movement Data									
Assigned Mvmt			2		4		6		
Mvmt Sat Flow, veh/h			1881		0		460		
Right-Turn Movement Data									
Assigned Mvmt			12		14		16		
Mvmt Sat Flow, veh/h			0		1583		1056		
Left Lane Group Data									
Assigned Mvmt		0	5	0	7	0	1	0	0
Lane Assignment									

HCM 2010 Signalized Intersection Capacity Analysis

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Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	422	0	132	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	932	0	1792	0	0	0	0
Q Serve Time (g_s), s	0.0	17.0	0.0	3.3	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	23.0	0.0	3.3	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	932	0	1792	0	0	0	0
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	32.3	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	26.3	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	32.3	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	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	677	0	211	0	0	0	0
V/C Ratio (X)	0.00	0.62	0.00	0.63	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	887	0	692	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	8.2	0.0	19.7	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.9	0.0	3.0	0.0	0.0	0.0	0.0
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	9.2	0.0	22.7	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.2	0.0	1.6	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	4.4	0.0	1.8	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	1.13	0.00	0.45	0.00	0.00	0.00	0.00
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	0
Lane Assignment	T							
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	266	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1881	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1298	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1723	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
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	2.7	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0

HCM 2010 Signalized Intersection Capacity Analysis

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2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00
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	0
Lane Assignment			R		T+R			
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	94	0	445	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1516	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	2.6	0.0	6.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	2.6	0.0	6.0	0.0	0.0
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	0.00	0.00	1.00	0.00	0.70	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	186	0	1046	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.50	0.00	0.43	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	612	0	1388	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	19.4	0.0	3.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.1	0.0	0.3	0.0	0.0
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	0.0	0.0	21.5	0.0	3.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.1	0.0	2.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.2	0.0	2.6	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.16	0.00	0.60	0.00	0.00
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	8.2
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd









05/08/2019

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	132	94	422	266	135	310		
Future Volume (veh/h)	132	94	422	266	135	310		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1881	1863	1845	1881	1729	1900		
Adj Flow Rate, veh/h	132	94	422	266	135	310		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Percent Heavy Veh, %	1	2	3	1	5	5		
Cap, veh/h	211	186	677	1298	317	729		
Arrive On Green	0.12	0.12	0.69	0.69	0.69	0.69		
Sat Flow, veh/h	1792	1583	932	1881	460	1056		
Grp Volume(v), veh/h	132	94	422	266	0	445		
Grp Sat Flow(s),veh/h/ln	1792	1583	932	1881	0	1516		
Q Serve(g_s), s	3.3	2.6	17.0	2.4	0.0	6.0		
Cycle Q Clear(g_c), s	3.3	2.6	23.0	2.4	0.0	6.0		
Prop In Lane	1.00	1.00	1.00			0.70		
Lane Grp Cap(c), veh/h	211	186	677	1298	0	1046		
V/C Ratio(X)	0.63	0.50	0.62	0.20	0.00	0.43		
Avail Cap(c_a), veh/h	692	612	887	1723	0	1388		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	19.7	19.4	8.2	2.6	0.0	3.2		
Incr Delay (d2), s/veh	3.0	2.1	0.9	0.1	0.0	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.8	1.2	4.4	1.2	0.0	2.6		
LnGrp Delay(d),s/veh	22.7	21.5	9.2	2.7	0.0	3.5		
LnGrp LOS	C	C	A	A		A		
Approach Vol, veh/h	226			688	445			
Approach Delay, s/veh	22.2			6.7	3.5			
Approach LOS	C			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		36.8		10.0		36.8		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		42.9		18.1		42.9		
Max Q Clear Time (g_c+I1), s		25.0		5.3		8.0		
Green Ext Time (p_c), s		7.3		0.5		9.3		
Intersection Summary								
HCM 2010 Ctrl Delay			8.2					
HCM 2010 LOS			A					

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Future Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1879			1677	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.94			0.92	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1768			1541	
Peak-hour factor, PHF	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. Flow (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
RTOR Reduction (vph)	0	0	12	0	1	0	0	1	0	0	31	0
Lane Group Flow (vph)	298	1153	25	3	517	0	0	365	0	0	155	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	0%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	23.7	80.5	80.5	1.0	58.0			25.0			25.0	
Effective Green, g (s)	23.7	80.5	80.5	1.0	58.0			25.0			25.0	
Actuated g/C Ratio	0.20	0.67	0.67	0.01	0.48			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	338	1232	1020	14	1617			366			319	
v/s Ratio Prot	c0.17	c0.63		0.00	0.15							
v/s Ratio Perm			0.02					c0.21			0.10	
v/c Ratio	0.88	0.94	0.02	0.21	0.32			1.00			0.49	
Uniform Delay, d1	47.0	17.7	6.7	59.4	19.2			47.7			42.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	22.5	14.3	0.0	7.6	0.5			46.5			5.2	
Delay (s)	69.6	32.0	6.8	66.9	19.7			94.2			47.3	
Level of Service	E	C	A	E	B			F			D	
Approach Delay (s)		38.9			20.0			94.2			47.3	
Approach LOS		D			B			F			D	
Intersection Summary												
HCM 2000 Control Delay			43.6			HCM 2000 Level of Service					D	
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			120.5			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			103.6%			ICU Level of Service				G		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SW Terwilliger Blvd & SW Sam Jackson Park Rd

05/08/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↱	↰	↱	↱
Traffic Volume (vph)	440	44	202	169	16	396
Future Volume (vph)	440	44	202	169	16	396
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1851		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1851		1671	1845	1805	1495
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	440	44	202	169	16	396
RTOR Reduction (vph)	4	0	0	0	0	0
Lane Group Flow (vph)	480	0	202	169	16	396
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		23.0	35.6	19.6	71.7
Effective Green, g (s)	26.1		23.0	35.6	19.6	71.7
Actuated g/C Ratio	0.33		0.29	0.45	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	612		487	832	448	1415
v/s Ratio Prot	c0.26		c0.12	0.09	0.01	c0.16
v/s Ratio Perm						0.10
v/c Ratio	0.78		0.41	0.20	0.04	0.28
Uniform Delay, d1	23.9		22.5	13.1	22.5	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	9.7		0.6	0.1	0.1	0.1
Delay (s)	33.6		23.1	13.2	22.6	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	33.6			18.6	1.4	
Approach LOS	C			B	A	
Intersection Summary						
HCM 2000 Control Delay			18.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			78.9		Sum of lost time (s)	13.2
Intersection Capacity Utilization			57.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019















Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	121	381	138	265	279
v/c Ratio	0.28	0.54	0.32	0.36	0.41
Control Delay	10.1	4.6	9.2	8.3	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	4.6	9.2	8.3	8.4
Queue Length 50th (ft)	11	0	11	22	22
Queue Length 95th (ft)	45	39	45	71	73
Internal Link Dist (ft)	152			148	196
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	1014	1143	709	1215	1129
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.33	0.19	0.22	0.25

Intersection Summary

HCM 2010 Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

									
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations									
Traffic Volume (veh/h)	121	381	138	265	243	36			
Future Volume (veh/h)	121	381	138	265	243	36			
Number	7	14	5	2	6	16			
Initial Q, veh	0	0	0	0	0	0			
Ped-Bike Adj (A_pbT)	1.00	1.00	0.99			0.94			
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1638	1863	1863	1863	1763	1900			
Adj Flow Rate, veh/h	121	381	138	265	243	36			
Adj No. of Lanes	1	1	1	1	1	0			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	16	2	2	2	8	8			
Opposing Right Turn Influence	Yes		Yes						
Cap, veh/h	496	504	530	731	584	87			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
Prop Arrive On Green	0.32	0.32	0.39	0.39	0.39	0.39			
Ln Grp Delay, s/veh	8.1	11.9	9.6	7.0	0.0	7.3			
Ln Grp LOS	A	B	A	A		A			
Approach Vol, veh/h	502			403	279				
Approach Delay, s/veh	11.0			7.9	7.3				
Approach LOS	B			A	A				
Timer:		1	2	3	4	5	6	7	8
Assigned Phs			2		4		6		
Case No			6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s			16.7		14.4		16.7		
Change Period (Y+Rc), s			4.5		4.5		4.5		
Max Green (Gmax), s			18.0		18.0		18.0		
Max Allow Headway (MAH), s			5.3		4.1		5.3		
Max Q Clear (g_c+I1), s			9.0		8.7		5.7		
Green Ext Time (g_e), s			2.8		1.3		3.3		
Prob of Phs Call (p_c)			1.00		0.99		1.00		
Prob of Max Out (p_x)			0.49		0.13		0.26		
Left-Turn Movement Data									
Assigned Mvmt			5		7		1		
Mvmt Sat Flow, veh/h			1088		1560		0		
Through Movement Data									
Assigned Mvmt			2		4		6		
Mvmt Sat Flow, veh/h			1863		0		1488		
Right-Turn Movement Data									
Assigned Mvmt			12		14		16		
Mvmt Sat Flow, veh/h			0		1583		220		
Left Lane Group Data									
Assigned Mvmt		0	5	0	7	0	1	0	0
Lane Assignment									

HCM 2010 Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	138	0	121	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1088	0	1560	0	0	0	0
Q Serve Time (g_s), s	0.0	3.3	0.0	1.8	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	7.0	0.0	1.8	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	1088	0	1560	0	0	0	0
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	12.2	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	12.2	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	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	530	0	496	0	0	0	0
V/C Ratio (X)	0.00	0.26	0.00	0.24	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	732	0	903	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	9.4	0.0	7.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0
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	9.6	0.0	8.1	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.0	0.0	0.8	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	1.0	0.0	0.8	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.25	0.00	0.23	0.00	0.00	0.00	0.00
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	0
Lane Assignment	T							
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	265	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	731	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1078	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
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	7.0	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0

HCM 2010 Signalized Intersection Capacity Analysis

2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
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	0
Lane Assignment				R	T+R			
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	381	0	279	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1709	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	6.7	0.0	3.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	6.7	0.0	3.7	0.0	0.0
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	0.00	0.00	1.00	0.00	0.13	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	504	0	671	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.76	0.00	0.42	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	916	0	989	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	9.5	0.0	6.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.4	0.0	0.0
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	0.0	0.0	11.9	0.0	7.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	2.9	0.0	1.7	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	3.2	0.0	1.8	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.42	0.00	0.20	0.00	0.00
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	9.0
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary





2: SW Terwilliger Blvd & SW Campus Drive

05/08/2019

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	121	381	138	265	243	36		
Future Volume (veh/h)	121	381	138	265	243	36		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	0.99			0.94		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1638	1863	1863	1863	1763	1900		
Adj Flow Rate, veh/h	121	381	138	265	243	36		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Percent Heavy Veh, %	16	2	2	2	8	8		
Cap, veh/h	496	504	530	731	584	87		
Arrive On Green	0.32	0.32	0.39	0.39	0.39	0.39		
Sat Flow, veh/h	1560	1583	1088	1863	1488	220		
Grp Volume(v), veh/h	121	381	138	265	0	279		
Grp Sat Flow(s),veh/h/ln	1560	1583	1088	1863	0	1709		
Q Serve(g_s), s	1.8	6.7	3.3	3.1	0.0	3.7		
Cycle Q Clear(g_c), s	1.8	6.7	7.0	3.1	0.0	3.7		
Prop In Lane	1.00	1.00	1.00			0.13		
Lane Grp Cap(c), veh/h	496	504	530	731	0	671		
V/C Ratio(X)	0.24	0.76	0.26	0.36	0.00	0.42		
Avail Cap(c_a), veh/h	903	916	732	1078	0	989		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	7.8	9.5	9.4	6.7	0.0	6.9		
Incr Delay (d2), s/veh	0.3	2.3	0.3	0.3	0.0	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.8	3.2	1.0	1.6	0.0	1.8		
LnGrp Delay(d),s/veh	8.1	11.9	9.6	7.0	0.0	7.3		
LnGrp LOS	A	B	A	A		A		
Approach Vol, veh/h	502			403	279			
Approach Delay, s/veh	11.0			7.9	7.3			
Approach LOS	B			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		16.7		14.4		16.7		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		18.0		18.0		18.0		
Max Q Clear Time (g_c+I1), s		9.0		8.7		5.7		
Green Ext Time (p_c), s		2.8		1.3		3.3		
Intersection Summary								
HCM 2010 Ctrl Delay			9.0					
HCM 2010 LOS			A					

Intersection

Int Delay, s/veh 4.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	61	56	20	16	59
Future Vol, veh/h	30	61	56	20	16	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	30	61	56	20	16	59

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	171	106	0	0	90
Stage 1	80	-	-	-	-
Stage 2	91	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1
Critical Hdwy Stg 1	5.76	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2
Pot Cap-1 Maneuver	747	870	-	-	1518
Stage 1	864	-	-	-	-
Stage 2	854	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	729	837	-	-	1498
Mov Cap-2 Maneuver	729	-	-	-	-
Stage 1	853	-	-	-	-
Stage 2	845	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 729 837 1498	-	-
HCM Lane V/C Ratio	-	- 0.041 0.073 0.011	-	-
HCM Control Delay (s)	-	- 10.2 9.6 7.4	0	0
HCM Lane LOS	-	- B A A	A	A
HCM 95th %tile Q(veh)	-	- 0.1 0.2 0	0	-

Queues

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

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Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	334	400	128	173	402
v/c Ratio	0.54	0.50	0.49	0.25	0.63
Control Delay	13.0	3.8	16.9	9.3	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	3.8	16.9	9.3	13.4
Queue Length 50th (ft)	44	0	17	20	48
Queue Length 95th (ft)	115	39	62	59	132
Internal Link Dist (ft)	143			90	64
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	980	1040	399	1052	954
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.34	0.38	0.32	0.16	0.42
Intersection Summary					

HCM 2010 Signalized Intersection Capacity Analysis

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd

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Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations									
Traffic Volume (veh/h)	334	400	128	173	296	106			
Future Volume (veh/h)	334	400	128	173	296	106			
Number	7	14	5	2	6	16			
Initial Q, veh	0	0	0	0	0	0			
Ped-Bike Adj (A_pbT)	1.00	1.00	1.00			0.97			
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1845	1881	1557	1881	1746	1900			
Adj Flow Rate, veh/h	334	400	128	173	296	106			
Adj No. of Lanes	1	1	1	1	1	0			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	3	1	22	1	3	3			
Opposing Right Turn Influence	Yes		Yes						
Cap, veh/h	575	523	395	803	519	186			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
Prop Arrive On Green	0.33	0.33	0.43	0.43	0.43	0.43			
Ln Grp Delay, s/veh	11.2	13.5	12.9	6.8	0.0	8.7			
Ln Grp LOS	B	B	B	A		A			
Approach Vol, veh/h	734			301	402				
Approach Delay, s/veh	12.5			9.4	8.7				
Approach LOS	B			A	A				
Timer:		1	2	3	4	5	6	7	8
Assigned Phs			2		4		6		
Case No			6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s			20.1		16.5		20.1		
Change Period (Y+Rc), s			4.5		4.5		4.5		
Max Green (Gmax), s			18.0		18.0		18.0		
Max Allow Headway (MAH), s			5.5		4.0		5.5		
Max Q Clear (g_c+I1), s			13.9		10.2		8.7		
Green Ext Time (g_e), s			1.7		1.8		3.2		
Prob of Phs Call (p_c)			1.00		1.00		1.00		
Prob of Max Out (p_x)			1.00		0.33		0.54		
Left-Turn Movement Data									
Assigned Mvmt			5		7		1		
Mvmt Sat Flow, veh/h			818		1757		0		
Through Movement Data									
Assigned Mvmt			2		4		6		
Mvmt Sat Flow, veh/h			1881		0		1216		
Right-Turn Movement Data									
Assigned Mvmt			12		14		16		
Mvmt Sat Flow, veh/h			0		1599		436		
Left Lane Group Data									
Assigned Mvmt		0	5	0	7	0	1	0	0
Lane Assignment									

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Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	128	0	334	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	818	0	1757	0	0	0	0
Q Serve Time (g_s), s	0.0	5.1	0.0	5.8	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	11.9	0.0	5.8	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	818	0	1757	0	0	0	0
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	15.6	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	15.6	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	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	395	0	575	0	0	0	0
V/C Ratio (X)	0.00	0.32	0.00	0.58	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	449	0	864	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.4	0.0	10.2	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.9	0.0	0.0	0.0	0.0
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	12.9	0.0	11.2	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.1	0.0	2.8	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	1.2	0.0	2.9	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.35	0.00	0.75	0.00	0.00	0.00	0.00
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	0
Lane Assignment	T							
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	173	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1881	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	803	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	926	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
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	6.8	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0

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2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
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	0
Lane Assignment			R		T+R			
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	400	0	402	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1599	0	1652	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	8.2	0.0	6.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	8.2	0.0	6.7	0.0	0.0
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	0.00	0.00	1.00	0.00	0.26	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	523	0	705	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.76	0.00	0.57	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	787	0	813	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	11.0	0.0	7.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5	0.0	0.7	0.0	0.0
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	0.0	0.0	13.5	0.0	8.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	3.6	0.0	3.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0
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	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	3.9	0.0	3.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.52	0.00	0.73	0.00	0.00
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	10.8
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary

4: SW Terwilliger Blvd & SW US Veterans Hospital Rd




















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Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	334	400	128	173	296	106		
Future Volume (veh/h)	334	400	128	173	296	106		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.97		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1845	1881	1557	1881	1746	1900		
Adj Flow Rate, veh/h	334	400	128	173	296	106		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Percent Heavy Veh, %	3	1	22	1	3	3		
Cap, veh/h	575	523	395	803	519	186		
Arrive On Green	0.33	0.33	0.43	0.43	0.43	0.43		
Sat Flow, veh/h	1757	1599	818	1881	1216	436		
Grp Volume(v), veh/h	334	400	128	173	0	402		
Grp Sat Flow(s),veh/h/ln	1757	1599	818	1881	0	1652		
Q Serve(g_s), s	5.8	8.2	5.1	2.1	0.0	6.7		
Cycle Q Clear(g_c), s	5.8	8.2	11.9	2.1	0.0	6.7		
Prop In Lane	1.00	1.00	1.00			0.26		
Lane Grp Cap(c), veh/h	575	523	395	803	0	705		
V/C Ratio(X)	0.58	0.76	0.32	0.22	0.00	0.57		
Avail Cap(c_a), veh/h	864	787	449	926	0	813		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	10.2	11.0	12.4	6.6	0.0	7.9		
Incr Delay (d2), s/veh	0.9	2.5	0.5	0.1	0.0	0.7		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.9	3.9	1.2	1.1	0.0	3.2		
LnGrp Delay(d),s/veh	11.2	13.5	12.9	6.8	0.0	8.7		
LnGrp LOS	B	B	B	A		A		
Approach Vol, veh/h	734			301	402			
Approach Delay, s/veh	12.5			9.4	8.7			
Approach LOS	B			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		20.1		16.5		20.1		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		18.0		18.0		18.0		
Max Q Clear Time (g_c+I1), s		13.9		10.2		8.7		
Green Ext Time (p_c), s		1.7		1.8		3.2		
Intersection Summary								
HCM 2010 Ctrl Delay			10.8					
HCM 2010 LOS			B					

HCM Signalized Intersection Capacity Analysis

5: SW Terwilliger Blvd & SW Capitol Hwy

05/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Future Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3529			1805			1733	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.47			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3529			859			1732	
Peak-hour factor, PHF	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. Flow (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	42	0
Lane Group Flow (vph)	148	685	29	10	1160	0	0	210	0	0	625	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	179	940	465	23	1489			259			523	
v/s Ratio Prot	c0.09	0.37		0.01	c0.33							
v/s Ratio Perm			0.02					0.24			c0.36	
v/c Ratio	0.83	0.73	0.06	0.43	0.78			0.81			1.20	
Uniform Delay, d1	36.7	16.0	20.7	40.8	20.8			26.9			29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	25.7	4.9	0.1	12.6	4.1			23.2			105.4	
Delay (s)	62.4	20.9	20.8	53.5	24.8			50.1			134.5	
Level of Service	E	C	C	D	C			D			F	
Approach Delay (s)		27.5			25.1			50.1			134.5	
Approach LOS		C			C			D			F	
Intersection Summary												
HCM 2000 Control Delay			52.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			83.4			Sum of lost time (s)			14.6			
Intersection Capacity Utilization			107.1%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Appendix F and G: Warrants Analysis Nomographs

LEFT TURN WARRANT ANALYSIS
Portland VA Hospital Expansion
SCENARIO: YEAR 2029 - AM PEAK HOUR
DATE: 4/25/2019

Unsignalized Intersections

No.	Intersection	Movement	Speed	PHF	Advancing Volume	Left Turn Volume	Opposing Volume	Calculations				HRB Warrant Met?	Notes
								LT %	Warrant Factor	5% Warrant Va	Va Warrant Threshold		
2	Terwilliger Blvd/Campus Drive	NBL	25	0.88	614	430	411	70.0%	0.48	502	239	Yes	
		SB	25	0.88	411	0	184	0.0%	N/A	650	N/A	N/A	
		EBL	20	0.88	224	95	895	42.4%	0.44	306	135	Yes	
		NBT+SBT	20	0.88	895	0	129	0.0%	N/A	691	N/A	N/A	
4	Terwilliger Blvd/Veterans Hospital	NBL	25	0.90	688	422	445	61.3%	0.45	483	216	Yes	
		SB	25	0.90	445	0	266	0.0%	N/A	591	N/A	N/A	
		EBL	20	0.90	226	132	401	58.4%	0.44	508	225	Yes	
		NBT+SBT	20	0.90	401	0	94	0.0%	N/A	717	N/A	N/A	

LEFT TURN WARRANT ANALYSIS

Portland VA Hospital Expansion

SCENARIO: YEAR 2029 - PM PEAK HOUR

DATE: 4/25/2019

Unsignalized Intersections

No.	Intersection	Movement	Speed	PHF	Advancing Volume	Left Turn Volume	Opposing Volume	Calculations				HRB Warrant Met?	Notes
								LT %	Warrant Factor	5% Warrant Va	Va Warrant Threshold		
2	Terwilliger Blvd/Campus Drive	NBL	25	0.88	614	430	411	70.0%	0.48	502	239	Yes	
		SB	25	0.88	411	0	184	0.0%	N/A	650	N/A	N/A	
		EBL	20	0.88	224	95	895	42.4%	0.44	306	135	Yes	
		NBT+SBT	20	0.88	895	0	129	0.0%	N/A	691	N/A	N/A	
4	Terwilliger Blvd/Veterans Hospital	NBL	25	0.90	688	422	445	61.3%	0.45	483	216	Yes	
		SB	25	0.90	445	0	266	0.0%	N/A	591	N/A	N/A	
		EBL	20	0.90	226	132	401	58.4%	0.44	508	225	Yes	
		NBT+SBT	20	0.90	401	0	94	0.0%	N/A	717	N/A	N/A	

RIGHT TURN WARRANT ANALYSIS

Portland VA Hospital Expansion

SCENARIO: YEAR 2029 - AM PEAK HOUR

DATE: 2/25/2019

Unsignalized Intersections

No.	Intersection	Movement	2-lane (1), Multi-lane (2)	Posted Speed	Advancing Volume	Right Turn Volume	Calculations					Notes
							NCHRP RT Volume	Taper Warrant	RT Lane Warrant	Meets NCHRP Taper	Meets NCHRP RT Lane	
2	Terwilliger Blvd/Campus Drive	NB	1	25	614	0	0	20	40	No	No	
		SBR	1	25	411	130	130	29	65	Yes	Yes	
		EBR	1	20	224	129	89	48	91	Yes	No	Very close to warranted.
							0	#N/A	#N/A	#N/A	#N/A	
4	Terwilliger Blvd/Veterans Hospital Road	NB	1	25	688	0	0	20	40	No	No	
		SBR	1	25	445	310	310	26	61	Yes	Yes	
		EBR	1	20	226	94	54	48	91	Yes	No	
							0	#N/A	#N/A	#N/A	#N/A	

RIGHT TURN WARRANT ANALYSIS
Portland VA Hospital Expansion
SCENARIO: YEAR 2029 - PM PEAK HOUR
DATE: 4/25/2019

Unsignalized Intersections

No.	Intersection	Movement	2-lane (1), Multi-lane (2)	Posted Speed	Advancing Volume	Right Turn Volume	Calculations					Notes
							NCHRP RT Volume	Taper Warrant	RT Lane Warrant	Meets NCHRP Taper	Meets NCHRP RT Lane	
2	Terwilliger Blvd/Campus Drive	NB	1	25	403	0	0	30	67	No	No	
		SBR	1	25	279	36	36	43	84	No	No	
		EBR	1	20	502	381	381	20	53	Yes	Yes	
							0	#N/A	#N/A	#N/A	#N/A	
4	Terwilliger Blvd/Veterans Hospital Road	NB	1	25	301	0	0	40	80	No	No	
		SBR	1	25	402	106	106	30	67	Yes	Yes	
		EBR	1	20	734	400	400	20	40	Yes	Yes	
							0	#N/A	#N/A	#N/A	#N/A	

Right Turn Lane Warrants

	2-Lane Highway			Multi-Lane Highway	
	Va	Taper	Lane	Taper	Lane
Unsignalized	10	69	119	40	90
	20	68	117	39	90
	30	67	116	39	90
	40	66	115	39	90
	50	65	113	39	90
	60	64	112	38	90
	70	63	111	38	90
	80	62	109	38	90
	90	61	108	37	90
	100	60	107	37	90
	110	59	105	37	90
	120	58	104	36	90
	130	57	103	36	90
	140	56	101	36	90
	150	55	100	36	90
	160	54	99	35	90
	170	53	97	35	90
	180	52	96	35	90
	190	51	95	34	90
	200	50	93	34	90
	210	49	92	34	90
	220	48	91	33	90
	230	47	89	33	90
	240	46	88	33	90
	250	45	87	33	90
	260	44	85	32	90
	270	43	84	32	90
	280	42	83	32	90
	290	41	81	31	90
	300	40	80	31	90
	310	39	79	31	90
	320	38	77	30	90
	330	37	76	30	90
	340	36	75	30	90
	350	35	73	30	90
	360	34	72	29	90
	370	33	71	29	90
	380	32	69	29	90
	390	31	68	28	90
	400	30	67	28	90
	410	29	65	28	90
	420	28	64	27	90
	430	27	63	27	90
	440	26	61	27	90
	450	25	60	27	90
	460	24	59	26	90
	470	23	57	26	90
	480	22	56	26	90

490	21	55	25	90
500	20	53	25	89
510	20	52	25	89
520	20	51	24	88
530	20	49	24	87
540	20	48	24	86
550	20	47	24	86
560	20	45	23	85
570	20	44	23	84
580	20	43	23	84
590	20	41	22	83
600	20	40	22	82
610	20	40	22	81
620	20	40	21	81
630	20	40	21	80
640	20	40	21	79
650	20	40	21	79
660	20	40	20	78
670	20	40	20	77
680	20	40	20	76
690	20	40	19	76
700	20	40	19	75
710	20	40	19	74
720	20	40	18	74
730	20	40	18	73
740	20	40	18	72
750	20	40	18	71
760	20	40	17	71
770	20	40	17	70
780	20	40	17	69
790	20	40	16	69
800	20	40	16	68
810	20	40	16	67
820	20	40	15	66
830	20	40	15	66
840	20	40	15	65
850	20	40	15	64
860	20	40	14	64
870	20	40	14	63
880	20	40	14	62
890	20	40	13	61
900	20	40	13	61
910	20	40	13	60
920	20	40	12	59
930	20	40	12	59
940	20	40	12	58
950	20	40	12	57
960	20	40	11	56
970	20	40	11	56
980	20	40	11	55
990	20	40	10	54
1000	20	40	10	54

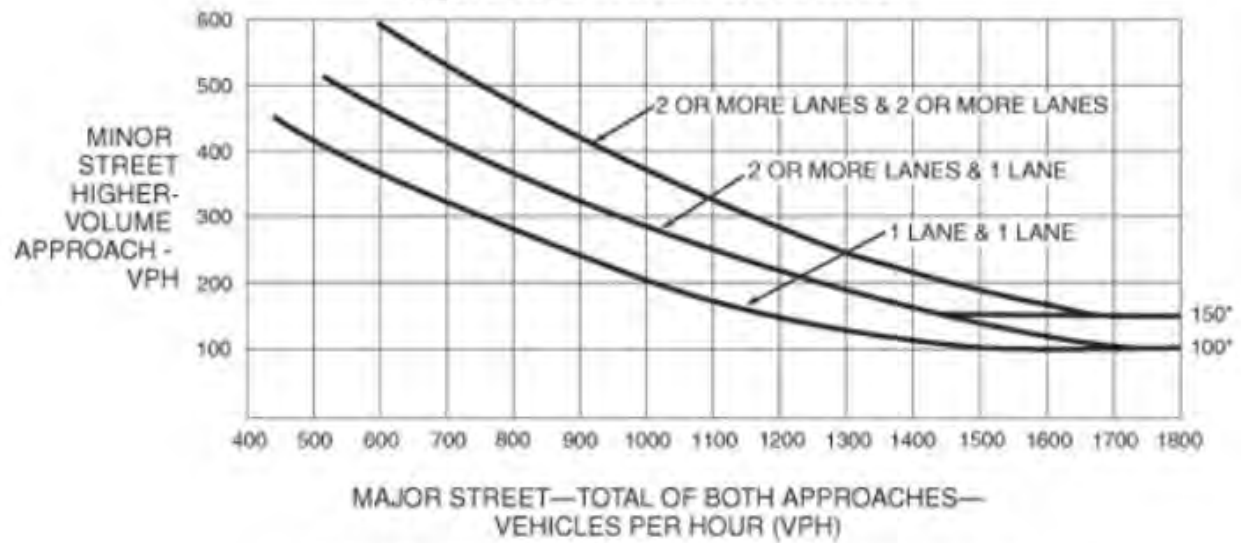
1010	20	40	10	53
1020	20	40	10	52
1030	20	40	10	51
1040	20	40	10	51
1050	20	40	10	50
1060	20	40	10	49
1070	20	40	10	49
1080	20	40	10	48
1090	20	40	10	47
1100	20	40	10	46
1110	20	40	10	46
1120	20	40	10	45
1130	20	40	10	44
1140	20	40	10	44
1150	20	40	10	43
1160	20	40	10	42
1170	20	40	10	41
1180	20	40	10	41
1190	20	40	10	40
1200	20	40	10	40

ODOT RT Lane Volume Criteria (less than 70 km/hr)

Note: RT Volumes below 20 do not meet criteria, but shoulder should be provided if above 700 vehicles

RT	Vol
1	700
5	700
10	700
15	700
20	700
25	663
30	625
35	588
40	550
45	513
50	475
55	438
60	400
65	363
70	325
75	288
80	250
85	213
90	175
95	138
100	100
105	63
110	25
113	0

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

¹ Obtained from Manual on Uniform Traffic Control Devices, FHWA, Chapter 4

Intersection	Major Street		Minor Street Higher Volume Approach		Signal Warrant Satisfaction
	Volume (VPH)	Lanes (#)	Volume (VPH)	Lanes (#)	
2019 Year - AM Peak Hour					
Terwilliger Blvd / Campus Drive	812	1	203	1	No
Terwilliger Blvd / Veterans Hospital Road	835	1	138	1	No
2019 Year - PM Peak Hour					
Terwilliger Blvd / Campus Drive	488	1	456	1	Yes
Terwilliger Blvd / Veterans Hospital Road	550	1	416	1	Yes
2029 Year Build Out - AM Peak Hour					
Terwilliger Blvd / Campus Drive	1025	1	224	1	Yes
Terwilliger Blvd / Veterans Hospital Road	1133	2	226	1	Yes
2029 Year Build Out - PM Peak Hour					
Terwilliger Blvd / Campus Drive	682	1	502	1	Yes
Terwilliger Blvd / Veterans Hospital Road	703	2	734	1	Yes

MEMORANDUM

DATE: April 30, 2019

TO: Emery Layton, PE, MLT

FROM: Dana Beckwith, PE, PTOE
Anastasia Roeszler, PE

SUBJECT: Portland VA Campus Parking and TDM Analysis

P18-113-000

This memorandum summarizes the queuing analysis associated with the proposed expansion of the Portland Veterans Administration Medical Center (VAMC). In addition to expanded medical facilities, the hospital expansion will include a new staff parking structure and additional floors added to an existing parking structure. The additional parking will be accessed through three existing parking lot entrances on SW US Veterans Hospital Road.

The purpose of this analysis is to identify potential impacts to SW US Veterans Hospital Road due to increased queuing by traffic that will be generated by the proposed hospital and parking expansion, and identify measures, if necessary, to mitigate those impacts. This traffic impact analysis is based on performance standards established by the US Department of Veterans Affairs, the City of Portland, and the Institute of Transportation Engineers.

The following intersections were evaluated as part of this traffic impact analysis:

- SW US Veterans Hospital Road and staff parking structure (Building 108) access (Parking Access 1)
- SW US Veterans Hospital Road and staff parking Lot 5 access (Parking Access 2)
- SW US Veterans Hospital Road and staff parking Lot 4 access (Parking Access 3)

This memorandum includes the following:

- Project Description
- Inventory and Existing Conditions
- Transportation Demand Management
- Site Evaluation
- Traffic Volumes
- Queue Analysis
- Results and Recommendations

PROJECT DESCRIPTION

The Portland VA Medical Center is located on Marquam Hill. SW US Veterans Hospital Road is the primary access road through the VAMC campus. SW US Veterans Hospital Road can be accessed from SW Terwilliger Boulevard to the east, and from SW Gaines Road to the west (See Figure 1 and Figure 2). Seven TriMet bus lines service the hospital, and a pedestrian bridge provides connectivity to Oregon Health and Science University (OHSU), which can be accessed by the Portland Aerial Tram.

This project will expand the Portland VA Medical Center, the existing parking structure, Building 108, within the existing employee parking area accessed by Parking Access 1 and Parking Access 2 by 150 spaces, and construct a new 450-space parking structure within Lot 4.

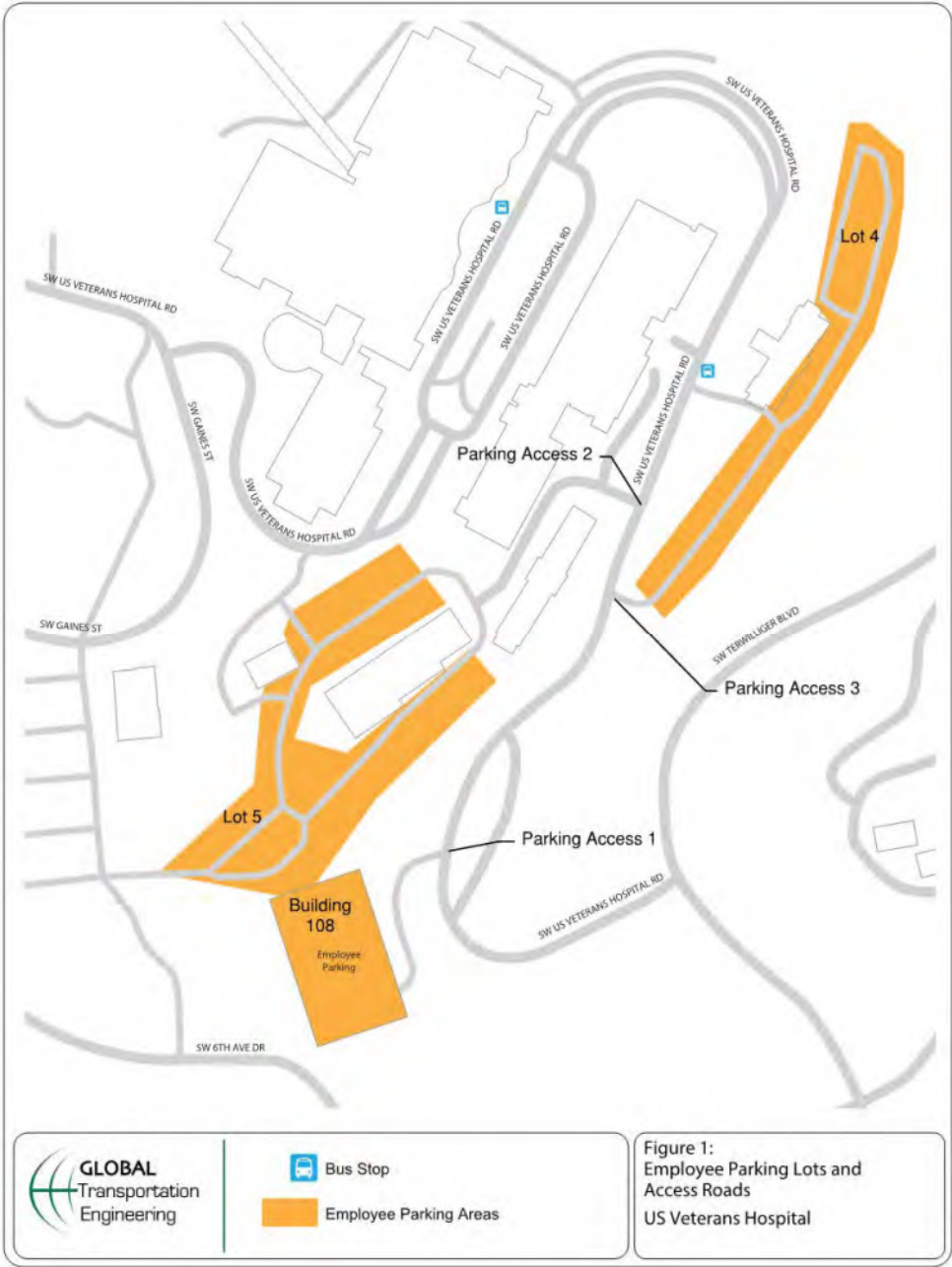


Figure 1: Site Map

INVENTORY AND EXISTING CONDITIONS

This section summarizes the inventory and evaluation of existing transportation conditions along SW US Veterans Hospital Road from SW Terwilliger Boulevard to SW Gaines Street. The inventory includes the study intersections previously identified in this report, and evaluates all modes of travel, including pedestrian, bicycle, transit, and motor vehicles. The inventory and data collected include:

- Street Functional Classification (See Table 1)
- Inventory of Existing Conditions (See Table 2)
 - Posted speed limits
 - Pedestrian and bicycle facility characteristics
 - Lane geometry
 - On-street parking
 - Transit route information

Table 1: City of Portland Functional Classification

Roadway	Functional Classification Classes ⁽¹⁾						
	Transit	Traffic	Emergency Response	Street Design	Bicycle	Pedestrian	Freight
SW US Veterans Hospital Road	Major Transit Priority Street	Neighborhood Collector	Minor Emergency Response	Community Corridor	City Bikeway	Local Service Walkway	Local Service Truck Street
SW Terwilliger Boulevard	Major Transit Priority Street	Neighborhood Collector	Major Emergency Response	Community Corridor	Major City Bikeway	City Walkway	Local Service Truck Street
SW Gaines Street	Major Transit Priority Street	Neighborhood Collector	Minor Emergency Response	Community Corridor	Local Service Bikeway	City Walkway	Local Service Truck Street

⁽¹⁾ Functional Classification based on the City of Portland website, www.portlandmaps.com

Table 2: Existing Conditions Within Study Area

Roadway	Posted Speed Limit	Sidewalks	Bike Lanes	Lane Geometry	On-Street Parking	Transit Routes
SW US Veterans Hospital Road	15 mph	Intermittent Sidewalks	No	Two 12' lanes in each direction, 12' left turn lanes at major intersections/accesses, pick-up/drop-off area at main entrance, parallel and angle parking in some areas	Yes, Reserved for Employees/ Vanpool	Bus Lines 8, 61, 64, 65, 66, 68, 190
SW Terwilliger Boulevard	25 mph	Multi-use Path on East Side of Street	Yes	Two 11.5' lanes in each direction, 5' bike lanes	No	Bus Lines 8, 65, 68
SW Gaines Street	20 mph	Sidewalk/Multi-use Path on East Side of Street	No	Two 11' lanes in each direction	No	Bus Line 8, 61, 64, 65, 66, 68

TRANSPORTATION DEMAND MANAGEMENT

Parking for both patients and employees is limited on the VAMC campus. VAMC employs approximately 4,500 staff, but the campus has only about 1000 staff parking spaces. For this reason, the VA Medical Center has adopted strategies to reduce single-occupancy vehicle trips to the VAMC campus. Federal VAMC employees are eligible for a \$255 per month non-tax subsidy that can be used to purchase TriMet passes, C-Tran bus and vanpool passes, Enterprise Vanpool services, and Portland Aerial Tram tickets. About 1000 VAMC staff are enrolled in this transit program. The VAMC only tracks enrollment in the transit program and parking card program, which provides access to the campus's 1000 staff parking spaces. VAMC does not have commuter information on the 2,500 employees that do not participate in the transit program or parking card program; many of these employees are non-federal employees and therefore are ineligible for the transit benefit. These employees likely park at OHSU, or self-fund transit passes.

Seven TriMet bus lines provide service to the VAMC campus. Line 8 provides frequent service from northeast and downtown Portland at 15-minute or better headways for most of the day, every day. Line 61 provides service from Beaverton, Line 64 provides service from Tigard, Line 65 provides service from southwest Portland, and Line 68 provides service from southeast and inner southwest Portland.

An additional connector shuttle provides service between VAMC and the OHSU campus. Additionally, a pedestrian bridge provides access between the VAMC and OHSU campuses, providing access to the Portland Aerial Tram.

The VAMC campus is accessible by popular bicycle routes. Although there are no bike lanes or other bicycle facilities on US Veterans Hospital Road, SW Terwilliger Boulevard, a major city bikeway that provides access to US Veterans Hospital Road, has bike lanes in both directions and a multi-use path on one side. Plentiful bicycle parking and bike valet is provided at the base of the Portland Aerial Tram in the South Waterfront. VAMC participates in the Federal Bicycle Benefit program, which provides subsidies to offset the cost of bicycle parking, but only about ten employees participate in the program.

VAMC has several programs in place for assisting veterans with transportation to and from their medical appointments. The Veterans Transportation Service (VTS) operates within a 20-mile radius of VAMC. VTS operates as a ride share service, picking up several patients on each trip. Rides must be scheduled in advance with the VTS office. Disabled American Veterans (DAV) is operated by a network of volunteers to provide transportation to Portland VAMC from other parts of the state. DAV shuttles operate on a fixed route, and rides must be scheduled at least four days in advance.

The VA also operates a shuttle bus between the Portland and Vancouver VA campuses. The shuttle operates Monday through Friday with one to two-hour headways from 7:15 AM to 6:45 PM.

Parking

Parking is limited on the VAMC campus. All parking on the campus is reserved for patients, visitors, or staff. VAMC issues parking cards that allow staff to access the approximately 1000 available parking spaces in staff parking lots, and parking permits that allow staff to park in reserved angle and parallel parking spaces along US Veterans Hospital Road. Day use Lot 1 requires a card swipe, but the lot is not currently gated. The remaining

staff parking lots, Lot 5, Building 108, Lot 4, and Lot 3, are all gated and require a card swipe to enter or exit. Patients and visitors may park in Lot 2 below Building 102. Additional RV-only patient parking is provided in Lot 7. See Figure 2 for building and parking lot locations.

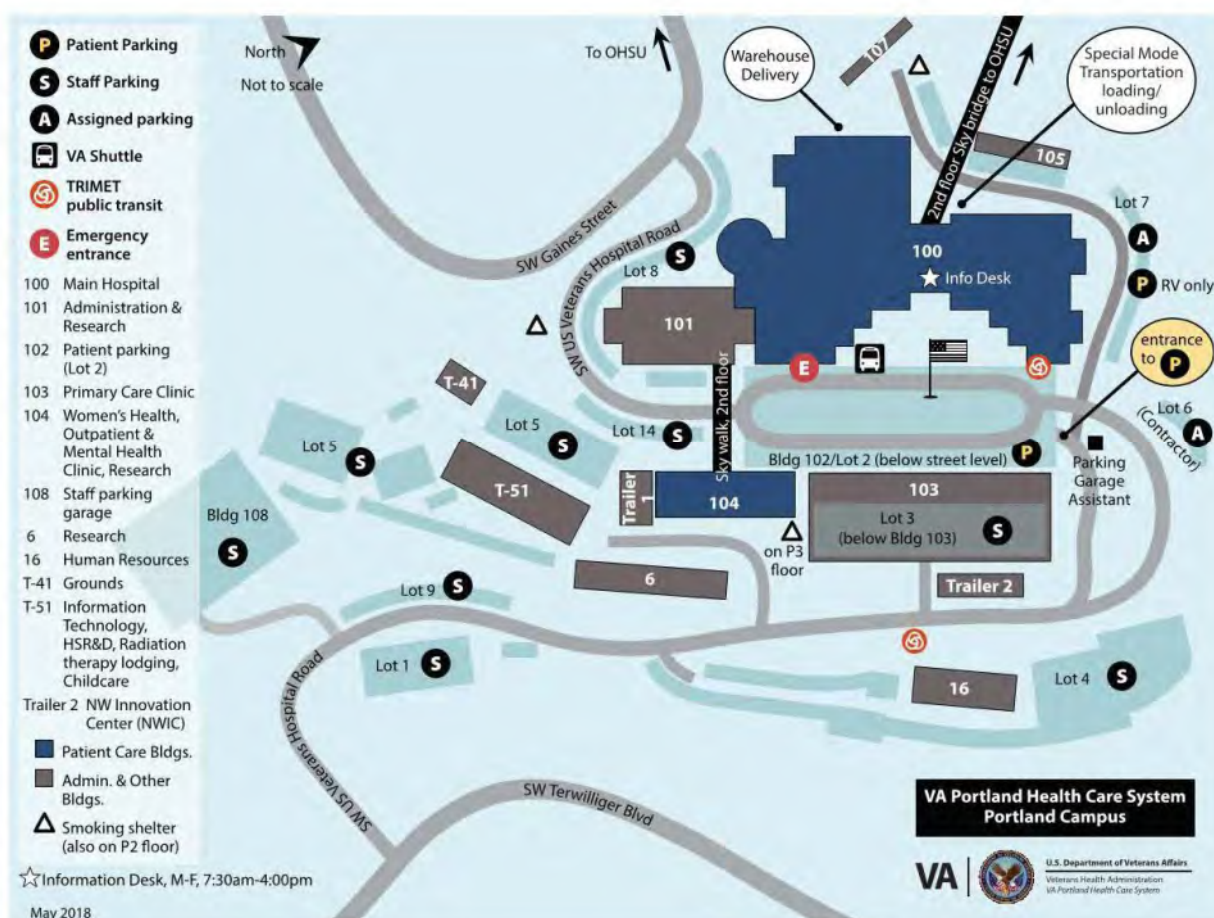


Figure 2: VAMC Site Plan

VAMC reserves a portion of parking cards for carpools of two, three, or four people. Currently, there are 172 carpools with over 400 VA staff members participating.

Campus-wide parking utilization varies by time of day and day of the week. Daytime utilization ranged from an average low of 79.1 percent utilization on Fridays to average high of 92 percent utilization on Tuesdays¹.

¹ Parking utilization information retrieved from VAMC Quarterly Parking Dashboard FY2018 Q3.

SITE EVALUATION

Two staff parking areas will be expanded with the proposed improvements. Building 108, which will be expanded by 150 parking spaces, can be accessed by Parking Access 1 and Parking Access 2. A new parking structure will be constructed within Lot 4, providing 450 additional spaces, which is accessed by Parking Access 3.

Parking Access 1 is located on SW US Veterans Hospital Road approximately 400 feet from SW Terwilliger Boulevard. Parking Access 1 provides access to a staff parking structure (Building 108), and Lot 5, which can be accessed by traveling through Building 108. Parking Access 1 is located on a section of SW US Veterans Hospital Road that has significant vertical and horizontal curves. Traffic speeds along SW US Veterans Hospital Road are typically low, with a posted speed limit of 15 mph. There are no turning movement restrictions entering or exiting the access. No right or left turn lanes are provided on SW US Veterans Hospital Road.

Inbound traffic to Parking Access 1 is controlled by an electronic security gate located approximately 20 feet from the back of the sidewalk, allowing for one vehicle to queue without blocking sidewalk access. Outbound traffic is controlled by a security gate at the back of sidewalk. The inbound and outbound security gates are controlled by a card reader.

Parking Access 2 is located on SW US Veterans Hospital Road approximately 930 feet from SW Terwilliger Boulevard. Parking Access 2 provides access to Lot 5 and provides a secondary access to staff parking structure Building 108. Sight distance for exiting vehicles at Parking Access 2 is slightly restricted by a retaining wall structure that can block visibility of northbound vehicles unless the exiting vehicle encroaches into the crosswalk. There are no turning movement restrictions entering or exiting the access. A 40-foot left turn pocket provides storage for about 2 vehicles entering from the northbound direction on US Veterans Hospital Road.

Inbound traffic to Parking Access 2 is controlled by an electronic security gate located approximately 14 feet from the back of the sidewalk. Vehicles stopped at the electronic gate may block the crosswalk while waiting for the gate to open. Outbound traffic is controlled by a security access gate approximately three feet behind the back of sidewalk. The inbound and outbound security gates are controlled by a card reader.

Parking Access 3 is located on SW US Veterans Hospital Road approximately 100 feet south of Parking Access 2. Parking Access 3 provides access to Lot 4 and Building 16. The access has a single lane that serves inbound and outbound traffic. There are no turning movement restrictions entering or exiting the access. No right or left turn lanes are provided on SW US Veterans Hospital Road.

Parking Access 3 has a single gate that controls both inbound and outbound traffic. Electronic card readers are provided in the inbound and outbound directions. There is room for one vehicle between the security gate and US Veterans Hospital Road travel lane in the inbound direction. There is no sidewalk to the south on the east side of US Veterans Hospital Road and no crosswalk across Parking Access 3.

TRAFFIC VOLUMES

Existing Year 2018 Traffic Volumes

Tube counts were collected at each access. Tube counts were collected on Wednesday, November 7th, 2018 and Thursday, November 8th, 2018 at Parking Access 1, on Tuesday, November 13th, 2018 and Wednesday November 14th, 2018 at Parking Access 2, and on Thursday, April 4th, 2019 at Parking Access 3.

Tube counts determined that the peak hour for inbound trips is between 7 AM and 8 AM at Parking Access 1 with 96 vehicles, between 6 AM and 7 AM at Parking Access 2 with 95 vehicles, and between 6 AM and 7 AM at Parking Access 3 with 63 vehicles. Figure 3, Figure 4, and Figure 5 show inbound and outbound traffic volumes over time at each access. The complete traffic count data can be found in Appendix A.

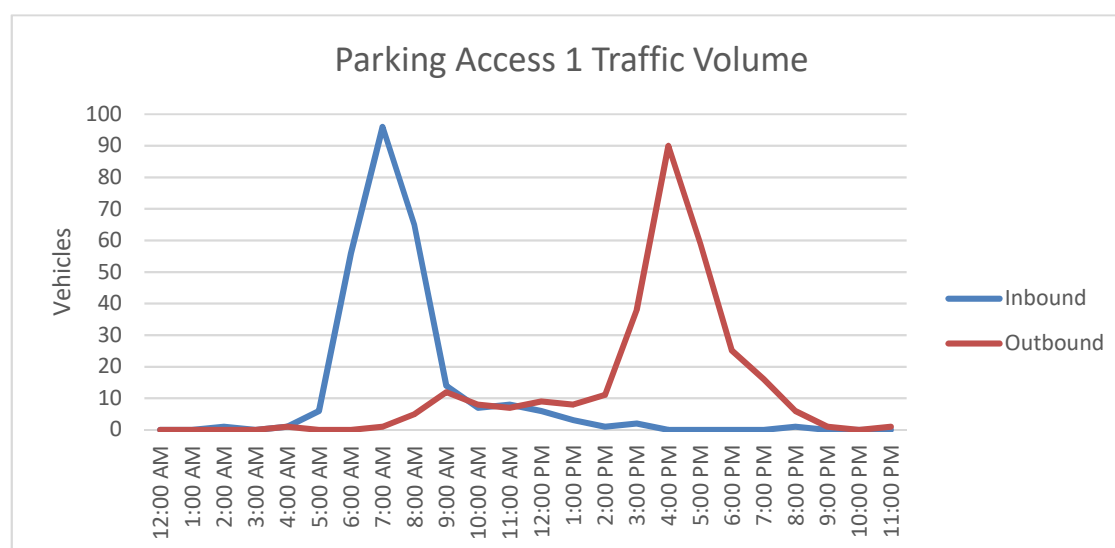


Figure 3: Parking Access 1 Traffic Volumes

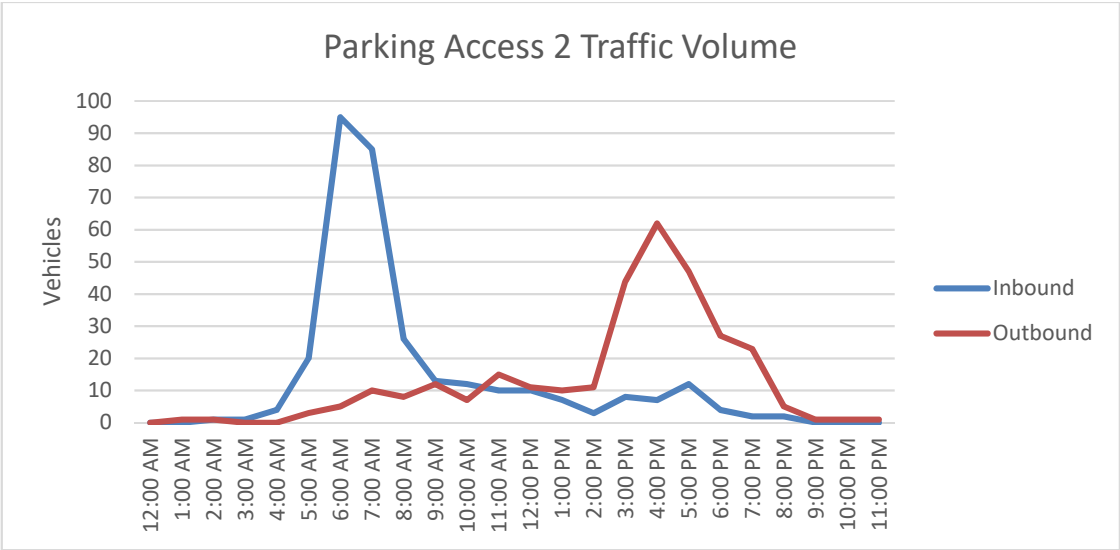


Figure 4: Parking Access 2 Traffic Volume

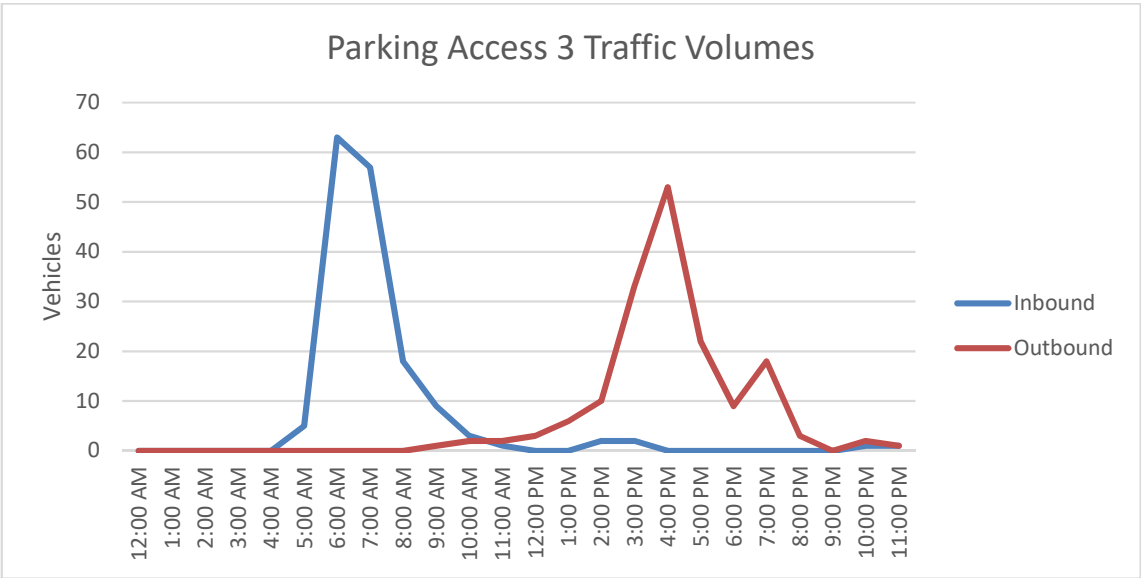


Figure 5: Parking Access 3 Traffic Volumes

Opening Day Traffic Volumes

The VAMC expansion will include 150 new parking spaces that will be accessed by Parking Access 1 and Parking Access 2 and 450 new parking spaces that will be accessed by Parking Access 3. The 600 new parking spaces are expected to generate 552 new trips per day assuming present-day parking utilization rates (92 percent). Based on existing traffic patterns, the additional daily trips were factored between the three entrances and by time of day to estimate the peak hour parking traffic volume when the VAMC expansion is complete and fully occupied.

Table 3: Parking Volumes

	2018 AM Peak Hour Volume (Inbound)	2018 PM Peak Hour Volume (Outbound)	Full Occupancy AM Peak Hour Volume (Inbound)	Full Occupancy PM Peak Hour Volume (Outbound)
Parking Access 1	96	90	186	172
Parking Access 2	95	62	184	119
Parking Access 3	63	53	224	186

QUEUING ANALYSIS

Full occupancy AM and PM peak hour traffic volumes were used to determine queue lengths at Parking Access 1, Parking Access 2, and Parking Access 3. The queueing analysis was conducted using the methodology outlined in the ITE Traffic Engineering Handbook, 6th Edition³. This analysis determines motor vehicle impacts due to potential inbound queuing at the secure accesses. The potential for queuing is dependent upon the gated access service rate, swing gate control equipment, and the physical characteristics of the driveway.

Both Parking Access 1 and Parking Access 2 have one travel lane in each direction separated by a concrete median. Parking Access 3 has a single travel lane that services both inbound and outbound traffic. All accesses are controlled by secure gates for entering and exiting the site that are activated with card readers. The secure gates have an opening time of five seconds⁴. Field observations indicate that the average total time for vehicles slowing for card activation to the vehicle passing through the gate is 6.5 seconds.

There are sidewalks crossing Parking Access 1 and Parking Access 2, and pedestrians are present in the study area. However, a pedestrian crossing one of the parking accesses at the same time a vehicle arrives is likely to be a rare occurrence, so no pedestrian conflict time was included in the analysis.

The following gate operations characteristics were assumed in the analysis:

- 6.5 seconds = gate activation and opening time.
- Gate location = approximately 20 feet from the back of sidewalk at Parking Access 1, and approximately 14 feet from the back of sidewalk at Parking Access 2.

A Poisson distribution was used to simulate random arrival rates of vehicles. Table 4 shows present day queuing analysis results and Table 5 shows the full buildout queuing analysis results. The probability of a queue forming at all entrances increases with the full buildout scenario.

Detailed queuing analysis results can be found in Appendix B.

³ Institute of Transportation Engineers, Traffic Engineering Handbook, January 2009.

⁴ Email from John Dodier, November 20, 2018

Table 4: Current Day Queuing Analysis

Queue Length	Probability of Queue					
	Parking Access 1		Parking Access 2		Parking Access 3	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
0	81%	82%	81%	88%	88%	90%
1	17%	16%	17%	11%	11%	10%
2	2%	2%	2%	1%	1%	1%

Table 5: Full Build Out Queuing Analysis

Queue Length	Probability of Queue					
	Parking Access 1		Parking Access 2		Parking Access 3	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
0	76%	78%	76%	85%	51%	60%
1	21%	19%	21%	14%	34%	30%
2	3%	2%	3%	1%	12%	8%
3	-	-	-	-	3%	1%

Inbound vehicles during the AM peak hour will arrive from both the northbound and southbound directions on SW US Veterans Hospital Road. Due to this directional split, the existing left turn lane at Parking Access 2 should be adequate to accommodate northbound traffic queues during the AM peak hour. Parking Access 1 has no existing turn lanes, and sight distance is restricted by vertical and horizontal curves on the northbound approach, which could create a safety issue if queued vehicles turning left into Parking Access 1 block the northbound lane. However, the speed limit on SW US Veterans Hospital Road is just 15 miles per hour. Stopping sight distance for a 15 mile per hour roadway is 80 feet, so approaching vehicles should be able to react and safely come to a stop before reaching the back of the queue.

Parking Access 3 has the greatest probability of a 2-vehicle or longer queue forming during the AM and PM peak hours. In the inbound direction, there is enough storage for one vehicle waiting for the secure gate to open. Based on the queuing analysis, vehicles will arrive when at least one vehicle is already present in the queue nearly half of the time during the AM peak hour. For this reason, additional mitigations such as turn lanes or adjusting the location of the security gate to allow for storage of two or three vehicles should be considered. Additionally, the Parking Access 3 has just one shared lane for inbound and outbound traffic. Traffic flow during the peak hours is highly directional with very few vehicles exiting during the AM peak and very few vehicles enter during the PM peak. However, with the additional traffic volumes expected with the new parking structure, the likelihood of opposing traffic during the peak hours will increase. For this reason, constructing an additional travel lane at the existing access or constructing a second access is recommended to provide separation between inbound and outbound traffic.

During the PM peak hour, there is enough existing storage at all accesses to accommodate outbound vehicle queues.

RESULTS AND RECOMMENDATIONS

The queuing analysis results indicate that there is an increased probability of an arriving vehicle encountering a queue at all accesses during the AM and PM peak hours under the full buildout scenario. While the probability of inbound vehicles encountering a queue at Parking Access 1 and Parking Access 2 will increase in the AM peak hour, the increase is small and the posted speed on SW US Veterans Hospital Road is low. Due to low speeds and the small increase in queuing probability, no changes to intersection geometry or left turn storage are recommended for Parking Access 1 and Parking Access 2 at this time.

























At Parking Access 3, inbound vehicles will encounter a waiting vehicle almost half of the time during the AM peak hour. Presently, there is enough storage for only one vehicle, so additional mitigations such as left or right turn lanes or moving the security gate to provide storage for two to three vehicles is recommended. There is currently only one travel lane at Parking Access 3 that serves both inbound and outbound traffic. Present day traffic counts indicate that there are very few outbound vehicles during the AM peak or inbound vehicles during the PM peak, but opposing traffic could increase with the expanded parking facilities. For this reason, an additional travel lane or an additional access is recommended to provide separation between inbound and outbound traffic.

Travel Demand Management












There are no future pedestrian, bicycle, and street improvements identified by the City's TSP in the study area. Continuation of VAMC travel demand management programs such as the federal employee transit program and the carpool parking card program is recommended to reduce future parking demand and traffic volumes at the study intersections.

Appendix A: Traffic Count Data

LOCATION: US Veterans Hospital Rd & Hospital South Dwy						QC JOB #: 14806002				
SPECIFIC LOCATION: US Veterans Hospital Rd & Hospital South Dwy						DIRECTION: SB				
CITY/STATE: Portland, OR						DATE: Nov 07 2018 - Nov 08 2018				
Start Time	Mon	Tue	Wed 07-Nov-18	Thu 08-Nov-18	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			0	0		0			0	
1:00 AM			0	0		0			0	
2:00 AM			0	1		1			1	
3:00 AM			0	0		0			0	
4:00 AM			0	1		1			1	
5:00 AM			6	5		6			6	
6:00 AM			57	54		56			56	
7:00 AM			103	88		96			96	
8:00 AM			75	55		65			65	
9:00 AM			13	15		14			14	
10:00 AM			10	4		7			7	
11:00 AM			8	7		8			8	
12:00 PM			4	8		6			6	
1:00 PM			3	2		3			3	
2:00 PM			0	2		1			1	
3:00 PM			2	1		2			2	
4:00 PM			0	0		0			0	
5:00 PM			0	0		0			0	
6:00 PM			0	0		0			0	
7:00 PM			0	0		0			0	
8:00 PM			1	0		1			1	
9:00 PM			0	0		0			0	
10:00 PM			0	0		0			0	
11:00 PM			0	0		0			0	
Day Total			282	243		267			267	
% Weekday Average			105.6%	91.0%						
% Week Average			105.6%	91.0%		100.0%				
AM Peak			7:00 AM	7:00 AM		7:00 AM			7:00 AM	
Volume			103	88		96			96	
PM Peak			12:00 PM	12:00 PM		12:00 PM			12:00 PM	
Volume			4	8		6			6	
Comments:										

LOCATION: US Veterans Hospital Rd & Hospital North Dwy							QC JOB #: 14806001			
SPECIFIC LOCATION: US Veterans Hospital Rd & Hospital North Dwy							DIRECTION: NB			
CITY/STATE: Portland, OR							DATE: Nov 13 2018 - Nov 14 2018			
Start Time	Mon 13-Nov-18	Tue 14-Nov-18	Wed 14-Nov-18	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		0	0			0			0	
1:00 AM		1	0			1			1	
2:00 AM		0	1			1			1	
3:00 AM		0	0			0			0	
4:00 AM		0	0			0			0	
5:00 AM		2	3			3			3	
6:00 AM		4	5			5			5	
7:00 AM		7	12			10			10	
8:00 AM		5	10			8			8	
9:00 AM		16	8			12			12	
10:00 AM		5	8			7			7	
11:00 AM		12	18			15			15	
12:00 PM		10	12			11			11	
1:00 PM		11	8			10			10	
2:00 PM		10	12			11			11	
3:00 PM		41	47			44			44	
4:00 PM		55	68			62			62	
5:00 PM		53	41			47			47	
6:00 PM		26	28			27			27	
7:00 PM		24	22			23			23	
8:00 PM		7	3			5			5	
9:00 PM		0	1			1			1	
10:00 PM		0	1			1			1	
11:00 PM		2	0			1			1	
Day Total		291	308			305			305	
% Weekday Average		95.4%	101.0%							
% Week Average		95.4%	101.0%			100.0%				
AM Peak		9:00 AM	11:00 AM			11:00 AM			11:00 AM	
Volume		16	18			15			15	
PM Peak		4:00 PM	4:00 PM			4:00 PM			4:00 PM	
Volume		55	68			62			62	
Comments:										

Type of report: Tube Count - Volume Data

LOCATION: Lot 4 Access						QC JOB #: 14944211				
SPECIFIC LOCATION:						DIRECTION: EB				
CITY/STATE: Multnomah, OR						DATE: Apr 4 2019 - Apr 4 2019				
Start Time	Mon	Tue	Wed	Thu 4 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				0		0			0	
01:00 AM				0		0			0	
02:00 AM				0		0			0	
03:00 AM				0		0			0	
04:00 AM				0		0			0	
05:00 AM				5		5			5	
06:00 AM				63		63			63	
07:00 AM				57		57			57	
08:00 AM				18		18			18	
09:00 AM				9		9			9	
10:00 AM				3		3			3	
11:00 AM				1		1			1	
12:00 PM				0		0			0	
01:00 PM				0		0			0	
02:00 PM				2		2			2	
03:00 PM				2		2			2	
04:00 PM				0		0			0	
05:00 PM				0		0			0	
06:00 PM				0		0			0	
07:00 PM				0		0			0	
08:00 PM				0		0			0	
09:00 PM				0		0			0	
10:00 PM				1		1			1	
11:00 PM				1		1			1	
Day Total				162		162			162	
% Weekday Average				100%						
% Week Average				100%		100%				
AM Peak Volume				6:00 AM 63		6:00 AM 63			6:00 AM 63	
PM Peak Volume				2:00 PM 2		2:00 PM 2			2:00 PM 2	
Comments:										

Report generated on 4/12/2019 10:37 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

LOCATION: Lot 4 Access SPECIFIC LOCATION: CITY/STATE: Multnomah, OR						QC JOB #: 14944211 DIRECTION: WB DATE: Apr 4 2019 - Apr 4 2019				
Start Time	Mon	Tue	Wed	Thu 4 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				0		0			0	
01:00 AM				0		0			0	
02:00 AM				0		0			0	
03:00 AM				0		0			0	
04:00 AM				0		0			0	
05:00 AM				0		0			0	
06:00 AM				0		0			0	
07:00 AM				0		0			0	
08:00 AM				0		0			0	
09:00 AM				1		1			1	
10:00 AM				2		2			2	
11:00 AM				2		2			2	
12:00 PM				3		3			3	
01:00 PM				6		6			6	
02:00 PM				10		10			10	
03:00 PM				33		33			33	
04:00 PM				53		53			53	
05:00 PM				22		22			22	
06:00 PM				9		9			9	
07:00 PM				18		18			18	
08:00 PM				3		3			3	
09:00 PM				0		0			0	
10:00 PM				2		2			2	
11:00 PM				1		1			1	
Day Total				165		165			165	
% Weekday Average				100%						
% Week Average				100%		100%				
AM Peak Volume				10:00 AM 2		10:00 AM 2			10:00 AM 2	
PM Peak Volume				4:00 PM 53		4:00 PM 53			4:00 PM 53	
Comments:										

Report generated on 4/12/2019 10:37 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Appendix B: On-Site Queuing Analysis

Peak Hour	AM
Entering Volume (vph)	96
Arrival Rate (Veh/Min)	1.60
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.17
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.036344
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.21
Average Waiting Time (Seconds)	1.36
Average Time in the System (Seconds, Includes Time Being Serve)	7.86

Queue	Probablity (Poisson Distribution)
0	81%
1	17%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	PM
Entering Volume (vph)	90
Arrival Rate (Veh/Min)	1.50
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.16
Length of Vehicle	25

Queue

Average Number of Vehicles Waiting for Service	0.03153
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.19
Average Waiting Time (Seconds)	1.26
Average Time in the System (Seconds, Includes Time Being Serve)	7.76

Queue	Probablity (Poisson Distribution)
0	82%
1	16%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:

Service Time: Gate Time

Peak Hour	AM
Entering Volume (vph)	118
Arrival Rate (Veh/Min)	1.97
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.21
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.05823
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.27
Average Waiting Time (Seconds)	1.77
Average Time in the System (Seconds, Includes Time Being Serve)	8.27

Queue	Probablity (Poisson Distribution)
0	76%
1	21%
2	3%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	PM
Entering Volume (vph)	111
Arrival Rate (Veh/Min)	1.84
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.20
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.049825
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.25
Average Waiting Time (Seconds)	1.62
Average Time in the System (Seconds, Includes Time Being Serve)	8.12

Queue	Probablity (Poisson Distribution)
0	78%
1	19%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	AM
Entering Volume (vph)	95
Arrival Rate (Veh/Min)	1.58
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.17
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.035513
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.21
Average Waiting Time (Seconds)	1.35
Average Time in the System (Seconds, Includes Time Being Serve)	7.85

Queue	Probablity (Poisson Distribution)
0	81%
1	17%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	PM
Entering Volume (vph)	62
Arrival Rate (Veh/Min)	1.03
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.11
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.014111
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.13
Average Waiting Time (Seconds)	0.82
Average Time in the System (Seconds, Includes Time Being Serve)	7.32

Queue	Probablity (Poisson Distribution)
0	88%
1	11%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	AM
Entering Volume (vph)	117
Arrival Rate (Veh/Min)	1.95
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.21
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.056862
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.27
Average Waiting Time (Seconds)	1.75
Average Time in the System (Seconds, Includes Time Being Serve)	8.25

Queue	Probablity (Poisson Distribution)
0	76%
1	21%
2	3%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Peak Hour	PM
Entering Volume (vph)	76
Arrival Rate (Veh/Min)	1.27
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.14
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.021942
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.16
Average Waiting Time (Seconds)	1.04
Average Time in the System (Seconds, Includes Time Being Serve)	7.54

Queue	Probablity (Poisson Distribution)
0	85%
1	14%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	AM
Entering Volume (vph)	63
Arrival Rate (Veh/Min)	1.05
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.11
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.0146
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.13
Average Waiting Time (Seconds)	0.83
Average Time in the System (Seconds, Includes Time Being Serve)	7.33

Queue	Probability (Poisson Distribution)
0	88%
1	11%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	PM
Entering Volume (vph)	53
Arrival Rate (Veh/Min)	0.88
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.10
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.010126
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.11
Average Waiting Time (Seconds)	0.69
Average Time in the System (Seconds, Includes Time Being Serve)	7.19

Queue	Probablity (Poisson Distribution)
0	90%
1	10%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
 Service Time: Gate Time

Peak Hour	AM
Entering Volume (vph)	224
Arrival Rate (Veh/Min)	3.73
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.40
Length of Vehicle	25

Queue

Average Number of Vehicles Waiting for Service	0.27466
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.68
Average Waiting Time (Seconds)	4.41
Average Time in the System (Seconds, Includes Time Being Serve)	10.91

Queue	Probablity (Poisson Distribution)
0	51%
1	34%
2	12%
3	3%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:

Service Time: Gate Time

Peak Hour	PM
Entering Volume (vph)	186
Arrival Rate (Veh/Min)	3.10
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.34
Length of Vehicle	25

Queue

Average Number of Vehicles Waiting for Service	0.169771
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.51
Average Waiting Time (Seconds)	3.29
Average Time in the System (Seconds, Includes Time Being Serve)	9.79

Queue	Probablity (Poisson Distribution)
0	60%
1	30%
2	8%
3	1%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

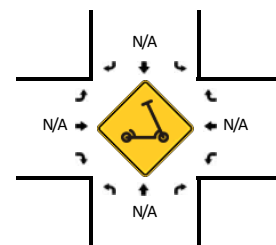
Notes:

Service Time: Gate Time

Appendix B

2020 Traffic Counts

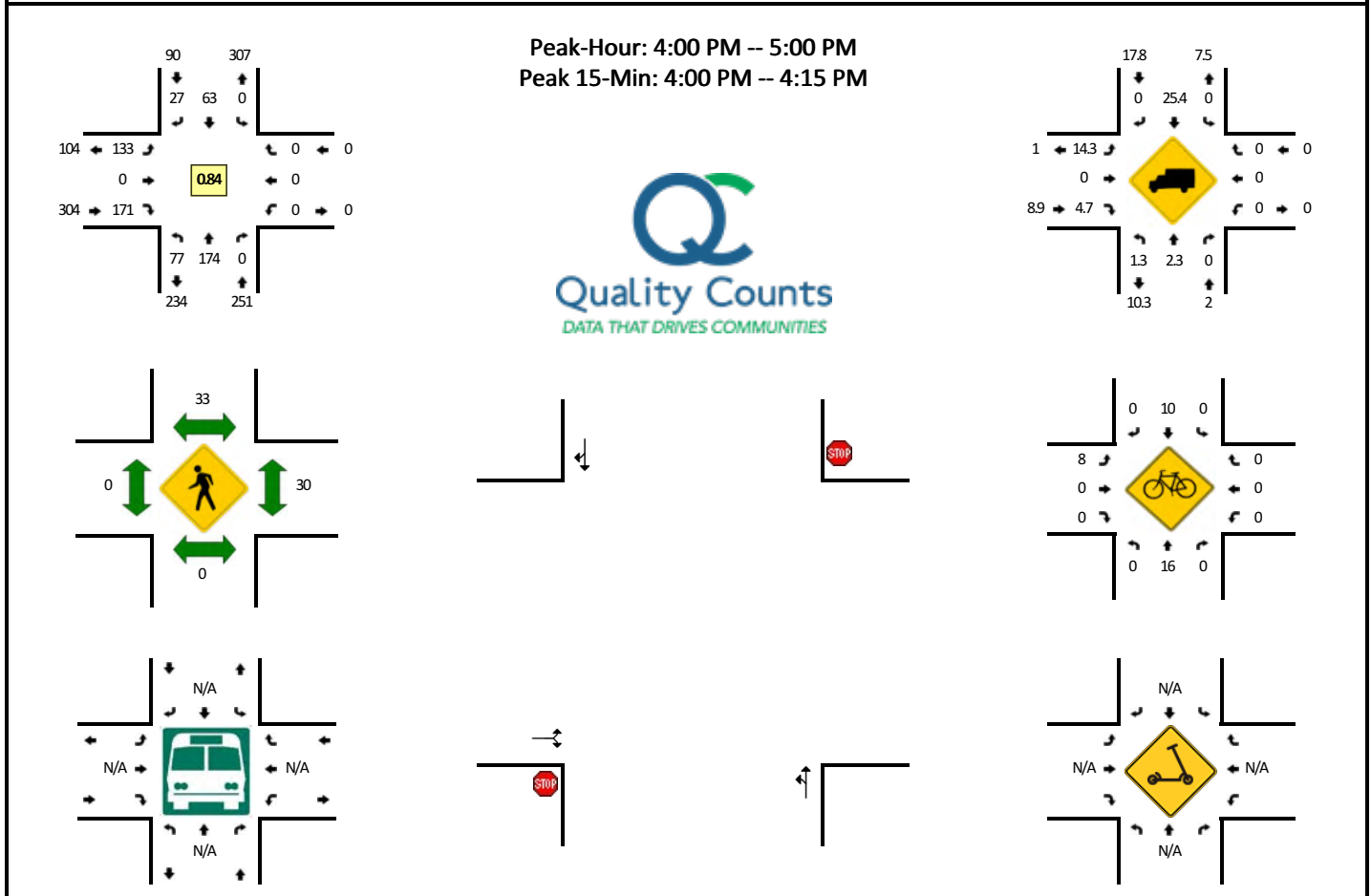
QC JOB #: 15308501
DATE: Thu, Dec 3 2020



Comments:

LOCATION: SW Terwilliger Blvd -- SW Campus Dr
CITY/STATE: Portland, OR

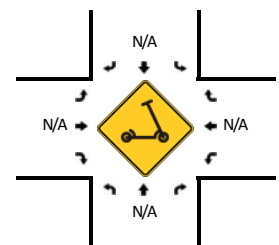
QC JOB #: 15308502
DATE: Thu, Dec 3 2020



5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	23	0	0	0	3	4	0	12	0	11	0	0	0	0	0	58	
4:05 PM	9	17	0	0	0	7	1	0	20	0	14	0	0	0	0	0	68	
4:10 PM	6	22	0	0	0	4	4	0	12	0	19	0	0	0	0	0	67	
4:15 PM	2	14	0	0	0	9	5	0	9	0	11	0	0	0	0	0	50	
4:20 PM	5	15	0	0	0	7	1	0	8	0	19	0	0	0	0	0	55	
4:25 PM	5	14	0	0	0	6	1	0	10	0	17	0	0	0	0	0	53	
4:30 PM	8	16	0	0	0	7	3	0	9	0	12	0	0	0	0	0	55	
4:35 PM	4	13	0	0	0	3	2	0	9	0	21	0	0	0	0	0	52	
4:40 PM	7	4	0	0	0	1	2	0	10	0	13	0	0	0	0	0	37	
4:45 PM	5	16	0	0	0	4	2	0	11	0	11	0	0	0	0	0	49	
4:50 PM	14	13	0	0	0	10	2	0	9	0	10	0	0	0	0	0	58	
4:55 PM	7	7	0	0	0	2	0	0	14	0	13	0	0	0	0	0	43	645
5:00 PM	4	11	0	0	0	4	3	0	8	0	16	0	0	0	0	0	46	633
5:05 PM	4	10	0	0	0	7	1	0	5	0	14	0	0	0	0	0	41	606
5:10 PM	5	15	0	0	0	6	2	0	13	0	19	0	0	0	0	0	60	599
5:15 PM	5	9	0	0	0	6	2	0	9	0	19	0	0	0	0	0	50	599
5:20 PM	4	9	0	0	0	3	2	0	11	0	17	0	0	0	0	0	46	590
5:25 PM	6	10	0	0	0	7	1	0	9	0	12	0	0	0	0	0	45	582
5:30 PM	7	7	0	0	0	9	1	0	11	0	16	0	0	0	0	0	51	578
5:35 PM	5	15	0	0	0	7	2	0	8	0	18	0	0	0	0	0	55	581
5:40 PM	3	17	0	0	0	5	5	0	6	0	10	0	0	0	0	0	46	590
5:45 PM	4	10	0	0	0	7	4	0	7	0	13	0	0	0	0	0	45	586
5:50 PM	6	14	0	0	0	3	3	0	8	0	14	0	0	0	0	0	48	576
5:55 PM	3	9	0	0	0	3	2	0	6	0	12	0	0	0	0	0	35	568
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	80	248	0	0	0	56	36	0	176	0	176	0	0	0	0	0	772	
Heavy Trucks	0	4	0	0	0	16	0	0	20	0	4	0	0	0	0	0	44	
Buses																		
Pedestrians		0				52				0				36			88	
Bicycles	0	16	0		0	16	0		4	0	0		0	0	0		36	
Scooters																		

Comments:

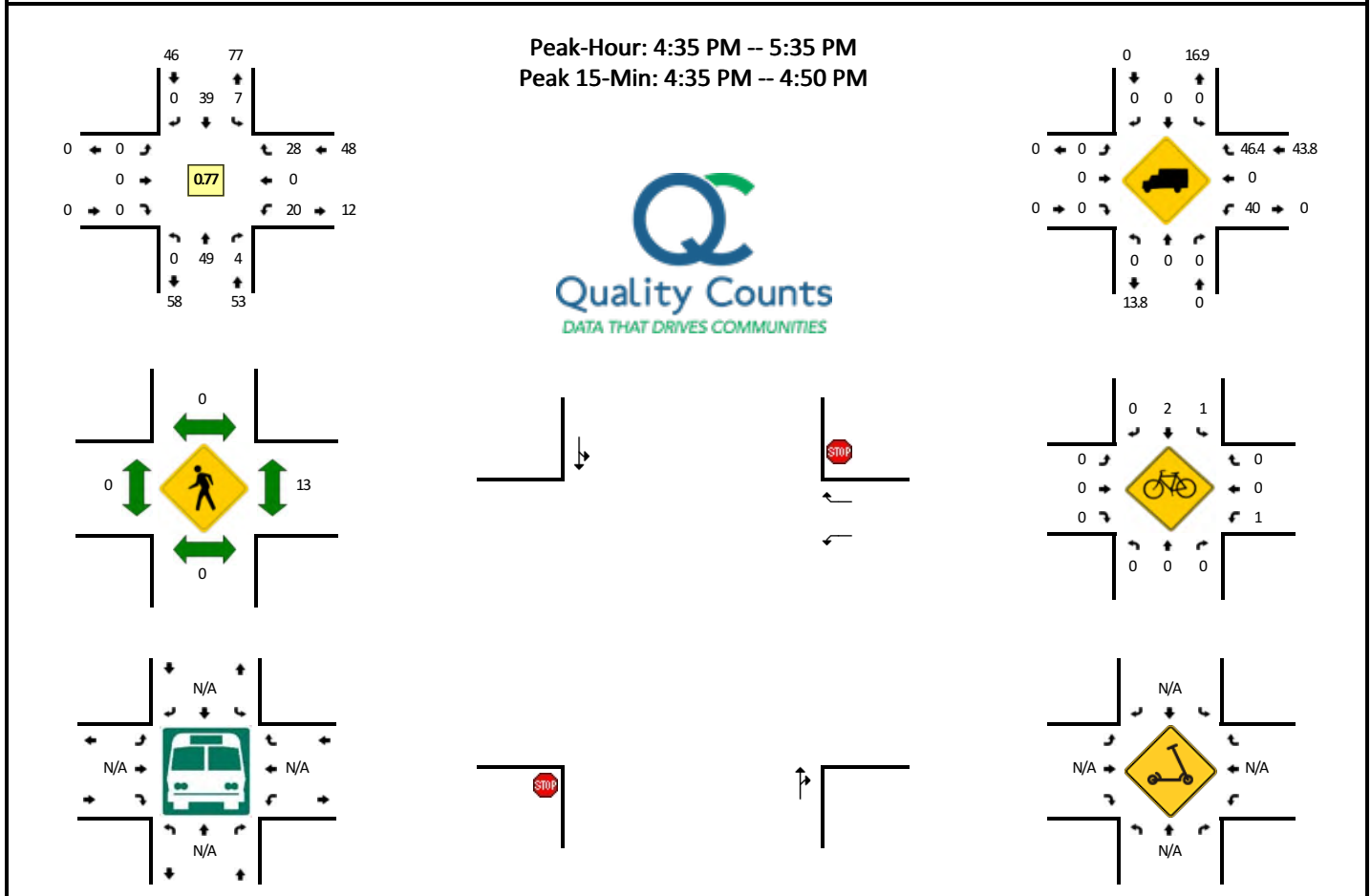
QC JOB #: 15308503
DATE: Thu, Dec 3 2020



Comments:

LOCATION: S Gaines St -- SW US Veterans Hospital Rd
CITY/STATE: Portland, OR

QC JOB #: 15308504
DATE: Thu, Dec 3 2020

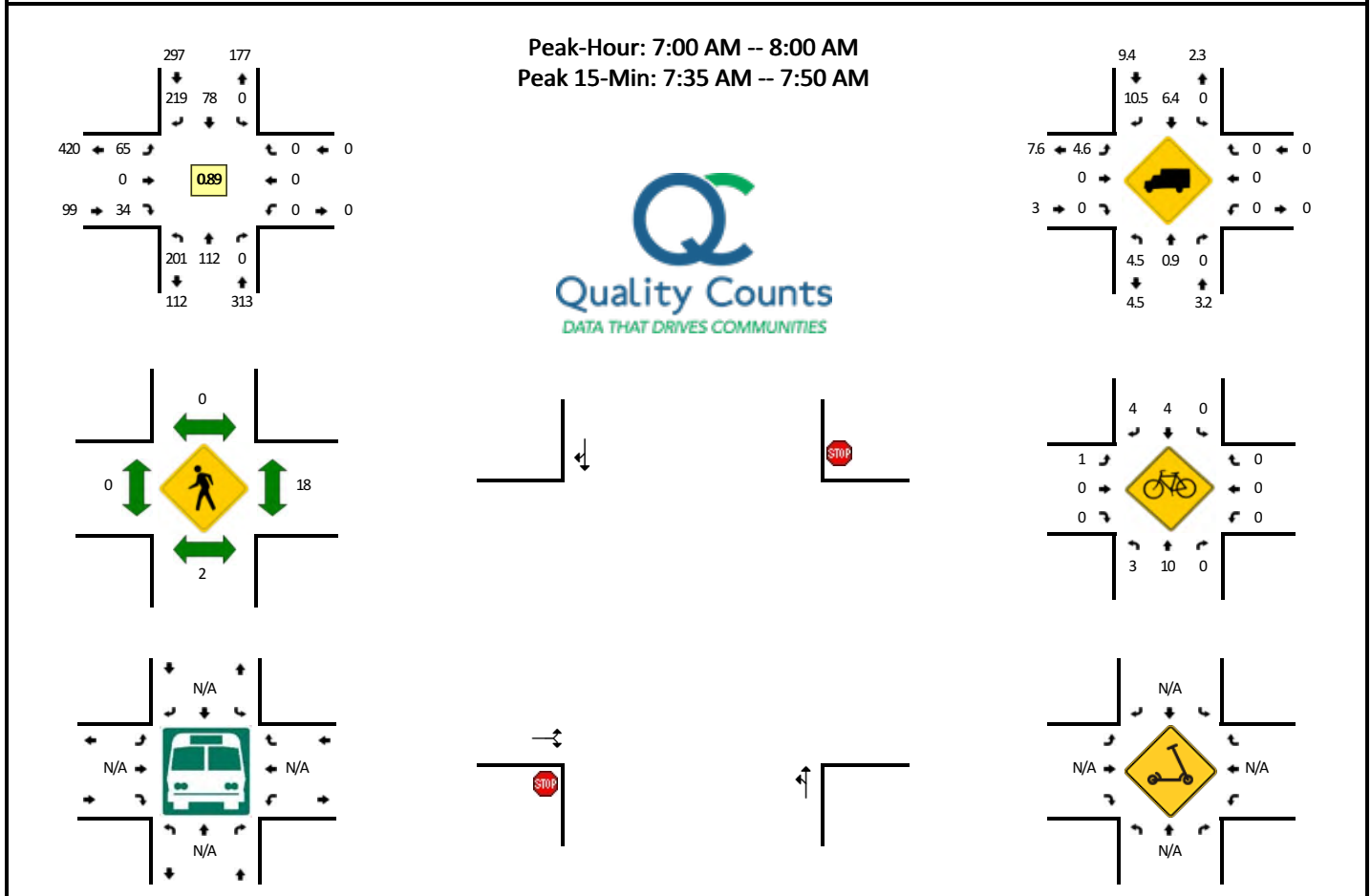


5-Min Count Period Beginning At	S Gaines St (Northbound)				S Gaines St (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	3	1	0	1	2	0	0	0	0	0	0	0	0	3	0	10	
4:05 PM	0	5	2	0	0	2	0	0	0	0	0	0	0	4	0	3	16	
4:10 PM	0	4	1	0	0	4	0	0	0	0	0	0	0	1	0	2	12	
4:15 PM	0	2	2	0	0	2	0	0	0	0	0	0	0	1	0	4	11	
4:20 PM	0	4	0	0	0	1	0	0	0	0	0	0	0	1	0	2	8	
4:25 PM	0	3	1	0	0	4	0	0	0	0	0	0	0	1	0	1	10	
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	3	7	
4:35 PM	0	7	0	0	1	5	0	0	0	0	0	0	0	2	0	3	18	
4:40 PM	0	6	0	0	2	2	0	0	0	0	0	0	0	2	0	4	16	
4:45 PM	0	4	1	0	0	5	0	0	0	0	0	0	0	2	0	2	14	
4:50 PM	0	0	0	0	0	4	0	0	0	0	0	0	0	3	0	1	8	145
4:55 PM	0	6	0	0	1	4	0	0	0	0	0	0	0	2	0	2	15	144
5:00 PM	0	1	1	0	0	3	0	0	0	0	0	0	0	2	0	2	9	144
5:05 PM	0	6	0	0	2	6	0	0	0	0	0	0	0	0	0	2	16	144
5:10 PM	0	4	0	0	1	2	0	0	0	0	0	0	0	2	0	3	12	144
5:15 PM	0	3	1	0	0	2	0	0	0	0	0	0	0	1	0	3	10	143
5:20 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	3	8	143
5:25 PM	0	5	0	0	0	0	0	0	0	0	0	0	0	2	0	2	9	142
5:30 PM	0	5	1	0	0	4	0	0	0	0	0	0	0	0	0	1	12	147
5:35 PM	0	2	1	0	1	2	0	0	0	0	0	0	0	1	0	4	11	140
5:40 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	1	6	130
5:45 PM	0	3	0	1	0	2	0	0	0	0	0	0	0	0	0	1	7	123
5:50 PM	0	1	0	0	0	4	0	0	0	0	0	0	0	2	0	1	8	123
5:55 PM	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3	111
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	68	4	0	12	48	0	0	0	0	0	0	24	0	36	0	192	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	8	0	16	0	24	
Buses																		
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	20	
Bicycles	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	8	
Scooters																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd
CITY/STATE: Portland, OR

QC JOB #: 15308505
DATE: Thu, Dec 3 2020

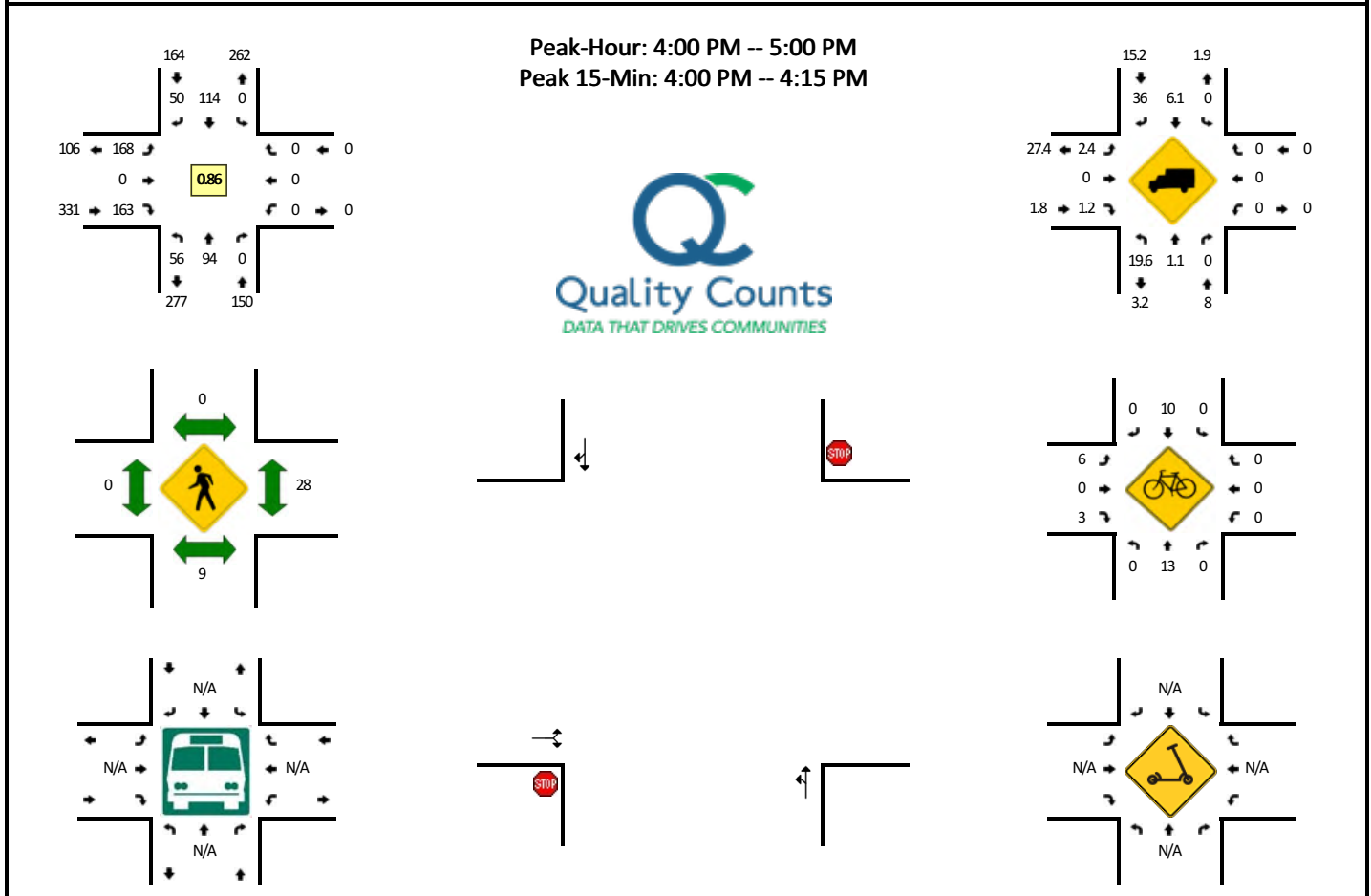


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	9	7	0	0	0	8	27	0	2	0	0	0	0	0	0	0	53	
7:05 AM	12	8	0	0	0	3	18	0	2	0	1	0	0	0	0	0	44	
7:10 AM	17	15	0	0	0	3	12	0	5	0	2	0	0	0	0	0	54	
7:15 AM	21	8	0	0	0	5	22	0	2	0	0	0	0	0	0	0	58	
7:20 AM	26	8	0	0	0	3	24	0	5	0	3	0	0	0	0	0	69	
7:25 AM	21	6	0	0	0	7	16	0	9	0	4	0	0	0	0	0	63	
7:30 AM	13	7	0	0	0	13	16	0	12	0	4	0	0	0	0	0	65	
7:35 AM	14	7	0	0	0	8	11	0	8	0	7	0	0	0	0	0	55	
7:40 AM	21	14	0	0	0	8	17	0	5	0	7	0	0	0	0	0	72	
7:45 AM	21	13	0	0	0	10	22	0	3	0	3	0	0	0	0	0	72	
7:50 AM	14	9	0	0	0	7	15	0	7	0	2	0	0	0	0	0	54	
7:55 AM	12	10	0	0	0	3	19	0	5	0	1	0	0	0	0	0	50	709
8:00 AM	12	9	0	0	0	9	7	0	9	0	2	0	0	0	0	0	48	704
8:05 AM	10	13	0	0	0	3	8	0	5	0	1	0	0	0	0	0	40	700
8:10 AM	5	6	0	0	0	8	11	0	3	0	1	0	0	0	0	0	34	680
8:15 AM	6	7	0	0	0	10	15	0	4	0	3	0	0	0	0	0	45	667
8:20 AM	5	10	0	0	0	5	12	0	2	0	0	0	0	0	0	0	34	632
8:25 AM	12	12	0	0	0	6	9	0	1	0	2	0	0	0	0	0	42	611
8:30 AM	7	15	0	0	0	8	11	0	1	0	2	0	0	0	0	0	44	590
8:35 AM	11	6	0	0	0	8	9	0	3	0	1	0	0	0	0	0	38	573
8:40 AM	10	11	0	0	0	6	11	0	9	0	4	0	0	0	0	0	51	552
8:45 AM	6	18	0	0	0	7	8	0	6	0	5	0	0	0	0	0	50	530
8:50 AM	10	9	0	0	0	8	5	0	1	0	4	0	0	0	0	0	37	513
8:55 AM	5	7	0	0	0	2	11	0	3	0	1	0	0	0	0	0	29	492
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	224	136	0	0	0	104	200	0	64	0	68	0	0	0	0	0	796	
Heavy Trucks	12	0	0	0	0	4	20	0	8	0	0	0	0	0	0	0	44	
Buses																		
Pedestrians		4				0				0				16			20	
Bicycles	4	4	0		0	4	12		0	0	0		0	0	0		24	
Scooters																		

Comments:

LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd
CITY/STATE: Portland, OR

QC JOB #: 15308506
DATE: Thu, Dec 3 2020

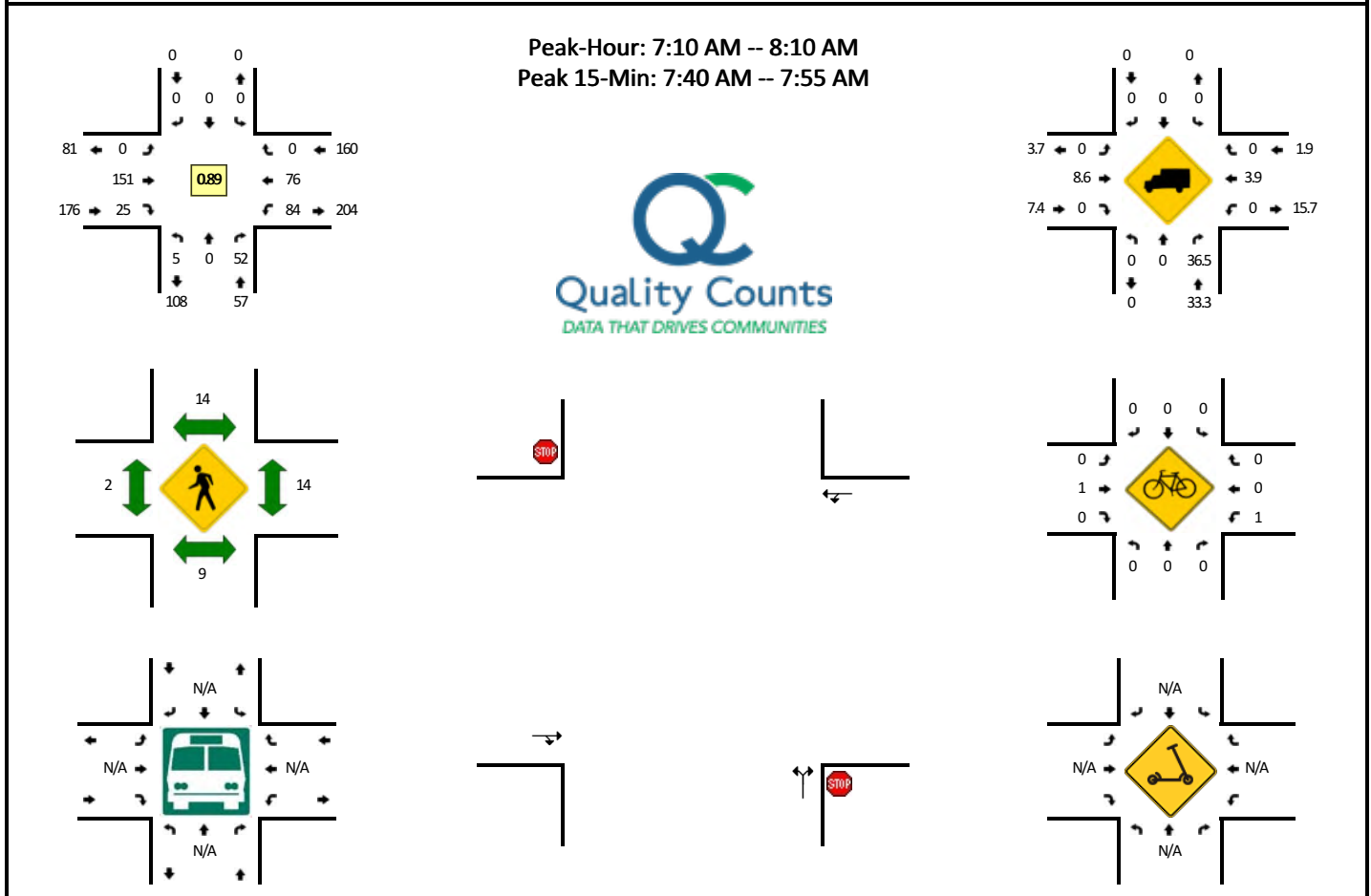


5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	4	0	0	0	9	1	0	21	0	26	0	0	0	0	0	65	
4:05 PM	5	10	0	0	0	7	3	0	28	0	18	0	0	0	0	0	71	
4:10 PM	5	10	0	0	0	10	4	0	15	0	8	0	0	0	0	0	52	
4:15 PM	2	9	0	0	0	15	5	0	13	0	15	0	0	0	0	0	59	
4:20 PM	1	6	0	0	0	12	4	0	13	0	16	0	0	0	0	0	52	
4:25 PM	2	10	0	0	0	14	5	0	10	0	10	0	0	0	0	0	51	
4:30 PM	1	8	0	0	0	11	5	0	10	0	16	0	0	0	0	0	51	
4:35 PM	7	4	0	0	0	10	5	0	13	0	11	0	0	0	0	0	50	
4:40 PM	8	7	0	0	0	7	4	0	11	0	8	0	0	0	0	0	45	
4:45 PM	8	10	0	0	0	7	2	0	12	0	13	0	0	0	0	0	52	
4:50 PM	9	11	0	0	0	5	10	0	9	0	14	0	0	0	0	0	58	
4:55 PM	4	5	0	0	0	7	2	0	13	0	8	0	0	0	0	0	39	645
5:00 PM	4	7	0	0	0	10	2	0	7	0	9	0	0	0	0	0	39	619
5:05 PM	3	4	0	0	0	12	1	0	13	0	11	0	0	0	0	0	44	592
5:10 PM	3	7	0	0	0	13	3	0	14	0	14	0	0	0	0	0	54	594
5:15 PM	1	7	0	0	0	17	2	0	11	0	11	0	0	0	0	0	49	584
5:20 PM	2	2	0	0	0	9	3	0	9	0	6	0	0	0	0	0	31	563
5:25 PM	3	6	0	0	0	9	5	0	10	0	10	0	0	0	0	0	43	555
5:30 PM	1	3	0	0	0	16	4	0	7	0	6	0	0	0	0	0	37	541
5:35 PM	2	14	0	0	0	16	5	0	13	0	9	0	0	0	0	0	59	550
5:40 PM	3	10	0	0	0	13	1	0	16	0	9	0	0	0	0	0	52	557
5:45 PM	3	5	0	0	0	15	2	0	8	0	5	0	0	0	0	0	38	543
5:50 PM	2	6	0	0	0	8	1	0	11	0	3	0	0	0	0	0	31	516
5:55 PM	2	5	0	0	0	5	1	0	6	0	4	0	0	0	0	0	23	500
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	56	96	0	0	0	104	32	0	256	0	208	0	0	0	0	0	752	
Heavy Trucks	8	0	0	0	0	4	16	0	4	0	0	0	0	0	0	0	32	
Buses																		
Pedestrians		16				0				0			44				60	
Bicycles	0	16	0		0	12	0		4	0	0		0	0	0		32	
Scooters																		

Comments:

LOCATION: SW US Veterans Hospital Rd -- SW Gibbs St
CITY/STATE: Portland, OR

QC JOB #: 15308507
DATE: Thu, Dec 3 2020

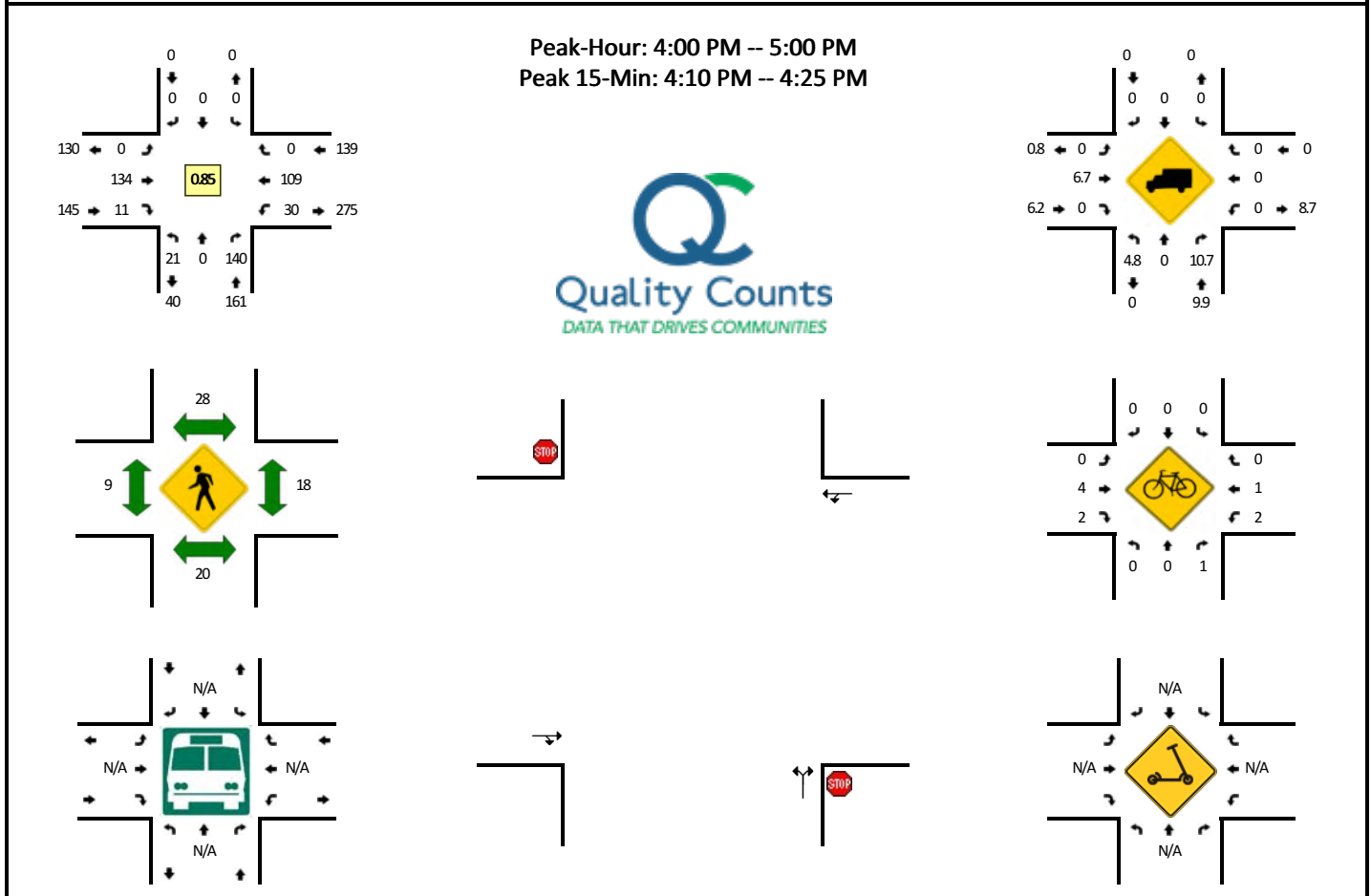


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				SW Gibbs St (Eastbound)				SW Gibbs St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	6	0	0	0	0	0	0	9	3	0	8	4	0	0	30	
7:05 AM	0	0	7	0	0	0	0	0	0	9	0	0	5	2	0	0	23	
7:10 AM	2	0	6	0	0	0	0	0	0	10	4	0	8	7	0	0	37	
7:15 AM	0	0	2	0	0	0	0	0	0	10	2	0	13	2	0	0	29	
7:20 AM	0	0	2	0	0	0	0	0	0	7	0	0	9	8	0	0	26	
7:25 AM	0	0	3	0	0	0	0	0	0	22	0	0	8	4	0	0	37	
7:30 AM	2	0	1	0	0	0	0	0	0	23	4	0	6	6	0	0	42	
7:35 AM	0	0	5	0	0	0	0	0	0	13	0	0	3	4	0	0	25	
7:40 AM	0	0	4	0	0	0	0	0	0	14	3	0	6	8	0	0	35	
7:45 AM	0	0	4	0	0	0	0	0	0	14	6	0	8	7	0	1	40	
7:50 AM	0	0	8	0	0	0	0	0	0	9	3	0	7	8	0	0	35	
7:55 AM	0	0	4	0	0	0	0	0	0	9	1	0	8	7	0	0	29	388
8:00 AM	0	0	6	0	0	0	0	0	0	8	1	0	6	4	0	0	25	383
8:05 AM	1	0	7	0	0	0	0	0	0	12	1	0	1	11	0	0	33	393
8:10 AM	2	0	3	0	0	0	0	0	0	10	2	0	9	9	0	0	35	391
8:15 AM	0	0	4	0	0	0	0	0	0	6	3	0	7	5	0	1	26	388
8:20 AM	0	0	4	0	0	0	0	0	0	11	3	0	6	4	0	0	28	390
8:25 AM	0	0	2	0	0	0	0	0	0	15	2	0	7	7	0	0	33	386
8:30 AM	0	0	5	0	0	0	0	0	0	3	2	0	5	2	0	0	17	361
8:35 AM	1	0	3	0	0	0	0	0	0	13	1	0	7	7	0	0	32	368
8:40 AM	0	0	2	0	0	0	0	0	0	6	3	0	5	6	0	0	22	355
8:45 AM	0	0	4	0	0	0	0	0	0	8	1	0	5	10	0	0	28	343
8:50 AM	0	0	4	0	0	0	0	0	0	10	0	0	3	5	0	0	22	330
8:55 AM	1	0	1	0	0	0	0	0	0	6	1	0	5	7	0	0	21	322
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	64	0	0	0	0	0	0	148	48	0	84	92	0	4	440	
Heavy Trucks	0	0	16		0	0	0		0	20	0		0	4	0		40	
Buses																		
Pedestrians		8				8				0				12			28	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scooters																		

Comments:

LOCATION: SW US Veterans Hospital Rd -- SW Gibbs St
CITY/STATE: Portland, OR

QC JOB #: 15308508
DATE: Thu, Dec 3 2020

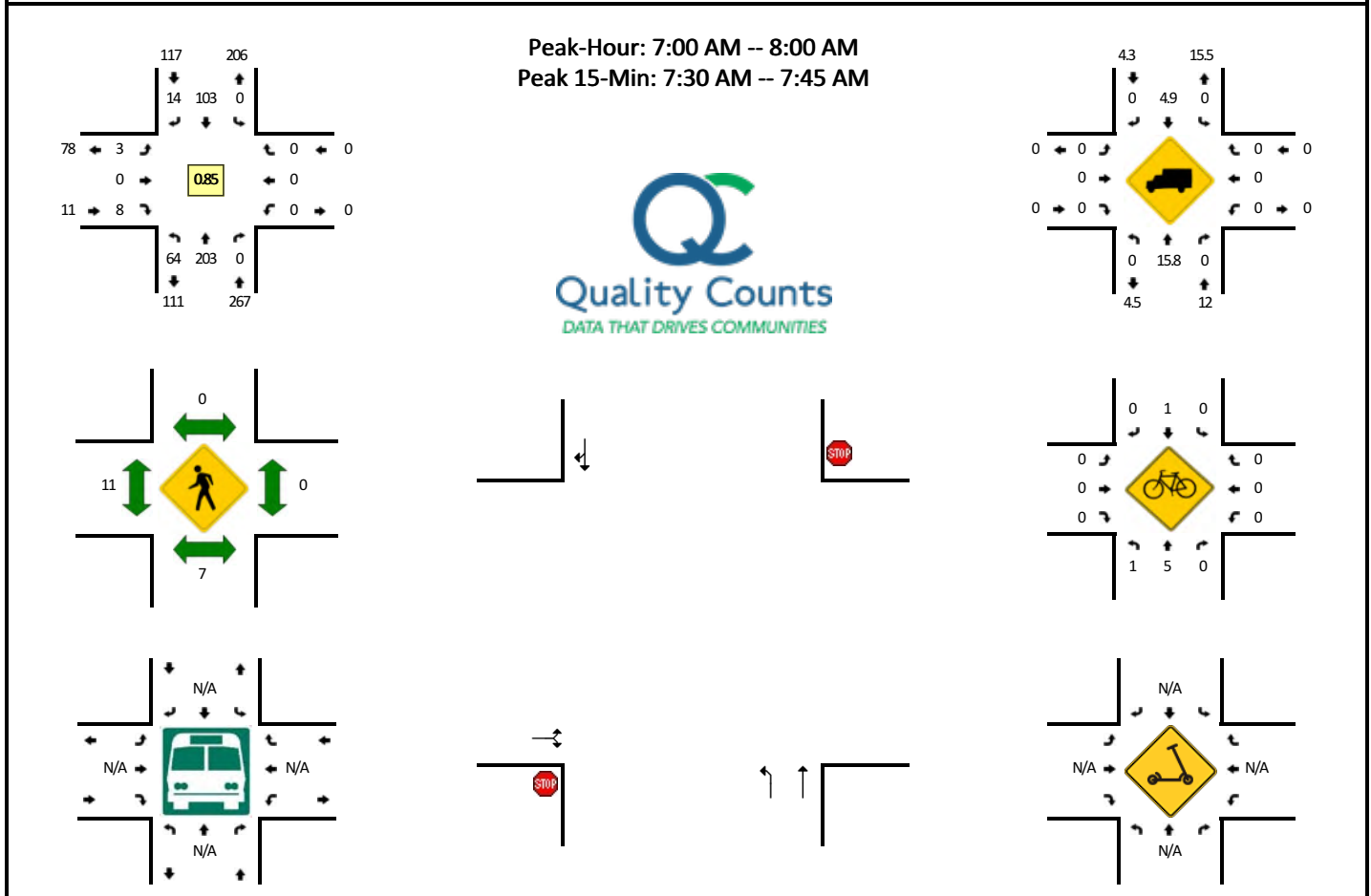


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				SW Gibbs St (Eastbound)				SW Gibbs St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	0	12	0	0	0	0	0	0	11	1	0	1	8	0	0	35	
4:05 PM	2	0	13	0	0	0	0	0	0	10	0	0	7	9	0	0	41	
4:10 PM	1	0	14	0	0	0	0	0	0	12	0	0	4	14	0	0	45	
4:15 PM	0	0	13	0	0	0	0	0	0	14	0	0	2	7	0	0	36	
4:20 PM	2	0	14	0	0	0	0	0	0	20	1	0	4	9	0	0	50	
4:25 PM	2	0	11	0	0	0	0	0	0	10	1	0	4	6	0	0	34	
4:30 PM	2	0	10	0	0	0	0	0	0	9	0	0	2	8	0	0	31	
4:35 PM	0	0	11	0	0	0	0	0	0	11	1	0	2	10	0	0	35	
4:40 PM	5	0	16	0	0	0	0	0	0	8	4	0	0	8	0	0	41	
4:45 PM	0	0	10	0	0	0	0	0	0	12	0	0	1	9	0	1	33	
4:50 PM	1	0	6	0	0	0	0	0	0	9	2	0	2	14	0	0	34	
4:55 PM	4	0	10	0	0	0	0	0	0	8	1	0	0	7	0	0	30	445
5:00 PM	2	0	6	0	0	0	0	0	0	9	0	0	3	14	0	0	34	444
5:05 PM	1	0	12	0	0	0	0	0	0	8	0	0	4	10	0	0	35	438
5:10 PM	3	0	6	0	0	0	0	0	0	6	0	0	0	18	0	0	33	426
5:15 PM	3	0	11	0	0	0	0	0	0	10	2	0	0	11	0	0	37	427
5:20 PM	2	0	11	0	0	0	0	0	0	12	3	0	1	5	0	0	34	411
5:25 PM	2	0	9	0	0	0	0	0	0	8	0	0	0	12	0	0	31	408
5:30 PM	0	0	5	0	0	0	0	0	0	14	0	0	1	13	0	0	33	410
5:35 PM	6	0	13	0	0	0	0	0	0	5	1	0	2	12	0	0	39	414
5:40 PM	4	0	6	0	0	0	0	0	0	11	0	0	3	13	0	0	37	410
5:45 PM	2	0	2	0	0	0	0	0	0	14	0	0	4	3	0	0	25	402
5:50 PM	3	0	6	0	0	0	0	0	0	9	0	0	2	10	0	0	30	398
5:55 PM	1	0	4	0	0	0	0	0	0	10	0	0	2	7	0	0	24	392
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	12	0	164	0	0	0	0	0	0	184	4	0	40	120	0	0	524	
Heavy Trucks Buses	4	0	16	0	0	0	0	0	0	12	0	0	0	0	0	0	32	
Pedestrians		24				32				28				16			100	
Bicycles Scooters	0	0	0		0	0	0		0	4	0		8	0	0		12	

Comments:

LOCATION: SW US Veterans Hospital Rd -- Building T-51 Access Rd
CITY/STATE: Portland, OR

QC JOB #: 15308509
DATE: Thu, Dec 3 2020

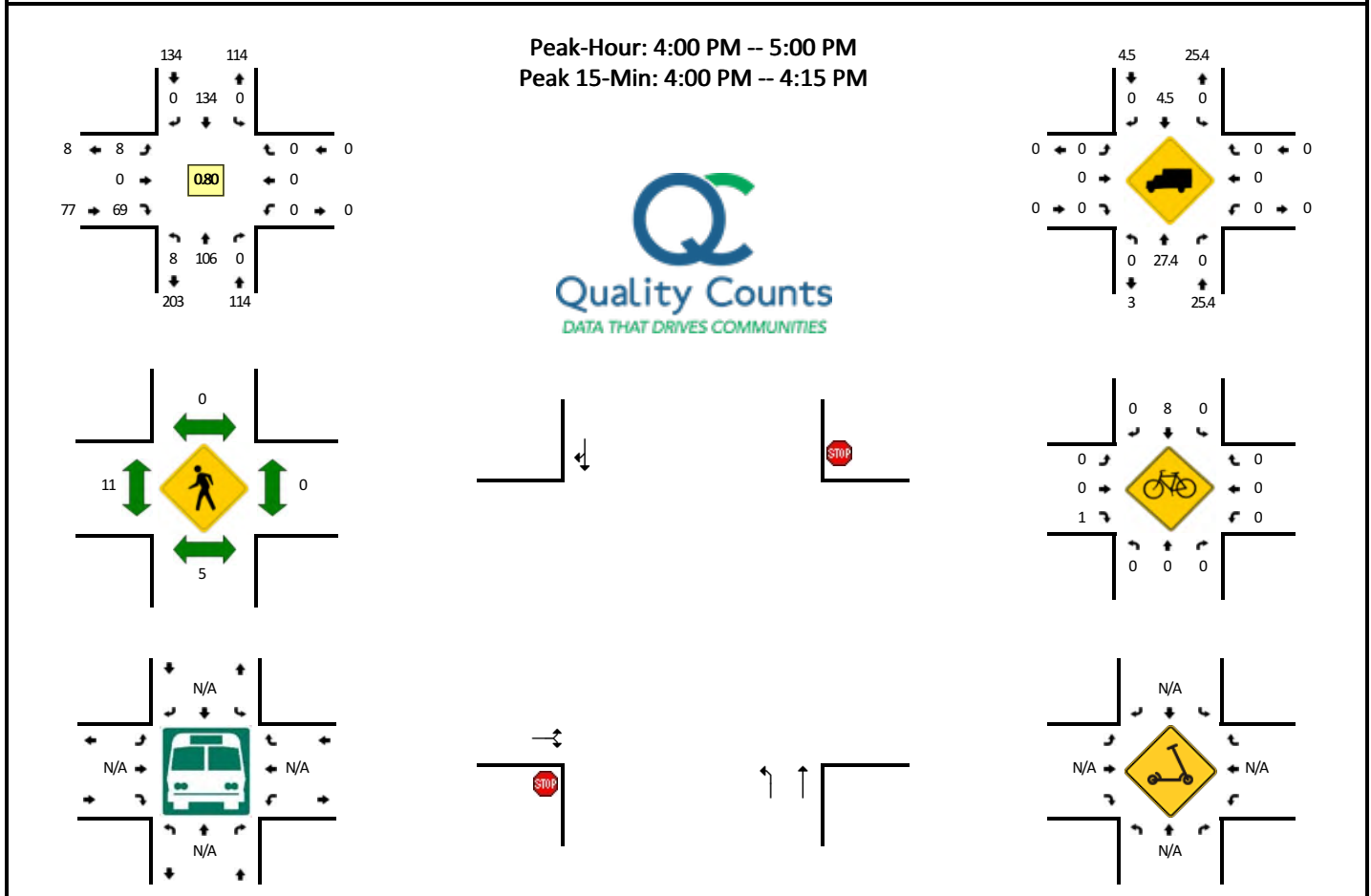


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Building T-51 Access Rd (Eastbound)				Building T-51 Access Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	12	16	0	0	0	2	1	0	0	0	0	0	0	0	0	0	31	
7:05 AM	6	18	0	0	0	3	0	0	0	0	0	1	0	0	0	0	28	
7:10 AM	4	17	0	0	0	6	1	0	0	0	0	0	0	0	0	0	28	
7:15 AM	7	15	0	0	0	2	1	0	0	0	0	0	0	0	0	0	25	
7:20 AM	7	17	0	0	0	14	1	0	0	0	0	1	0	0	0	0	40	
7:25 AM	3	15	0	0	0	11	0	0	0	0	0	1	0	0	0	0	30	
7:30 AM	6	17	0	0	0	16	0	0	0	0	0	0	0	0	0	0	39	
7:35 AM	5	11	0	0	0	14	3	0	1	0	0	1	0	0	0	0	35	
7:40 AM	3	22	0	0	0	13	1	0	2	0	0	1	0	0	0	0	42	
7:45 AM	7	19	0	0	0	6	3	0	0	0	0	0	0	0	0	0	35	
7:50 AM	2	17	0	0	0	8	1	0	0	0	0	2	0	0	0	0	30	
7:55 AM	2	19	0	0	0	8	2	0	0	0	0	1	0	0	0	0	32	395
8:00 AM	2	13	0	0	0	11	1	0	0	0	0	1	0	0	0	0	28	392
8:05 AM	1	13	0	0	0	4	1	0	0	0	0	0	0	0	0	0	19	383
8:10 AM	2	10	0	0	0	5	0	0	0	0	0	0	0	0	0	0	17	372
8:15 AM	0	17	0	0	0	4	0	0	0	0	0	1	0	0	0	0	22	369
8:20 AM	1	8	0	0	0	6	3	0	0	0	0	1	0	0	0	0	19	348
8:25 AM	1	20	0	0	0	1	1	0	1	0	0	0	0	0	0	0	24	342
8:30 AM	0	12	0	0	0	3	0	0	0	0	0	0	0	0	0	0	15	318
8:35 AM	1	15	0	0	0	6	1	0	0	0	0	1	0	0	0	0	24	307
8:40 AM	0	22	0	1	0	14	0	0	0	0	0	1	0	0	0	0	38	303
8:45 AM	0	14	0	0	0	8	2	0	0	0	0	0	0	0	0	0	24	292
8:50 AM	0	10	0	0	0	5	0	0	0	0	0	0	0	0	0	0	15	277
8:55 AM	3	11	0	1	0	6	1	0	0	0	0	1	0	0	0	0	23	268
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	56	200	0	0	0	172	16	0	12	0	8	0	0	0	0	0	464	
Heavy Trucks	0	36	0	0	0	12	0	0	0	0	0	0	0	0	0	0	48	
Buses																		
Pedestrians		8				0				4				0			12	
Bicycles	0	12	0		0	4	0		0	0	0		0	0	0		16	
Scooters																		

Comments:

LOCATION: SW US Veterans Hospital Rd -- Building T-51 Access Rd
CITY/STATE: Portland, OR

QC JOB #: 15308510
DATE: Thu, Dec 3 2020

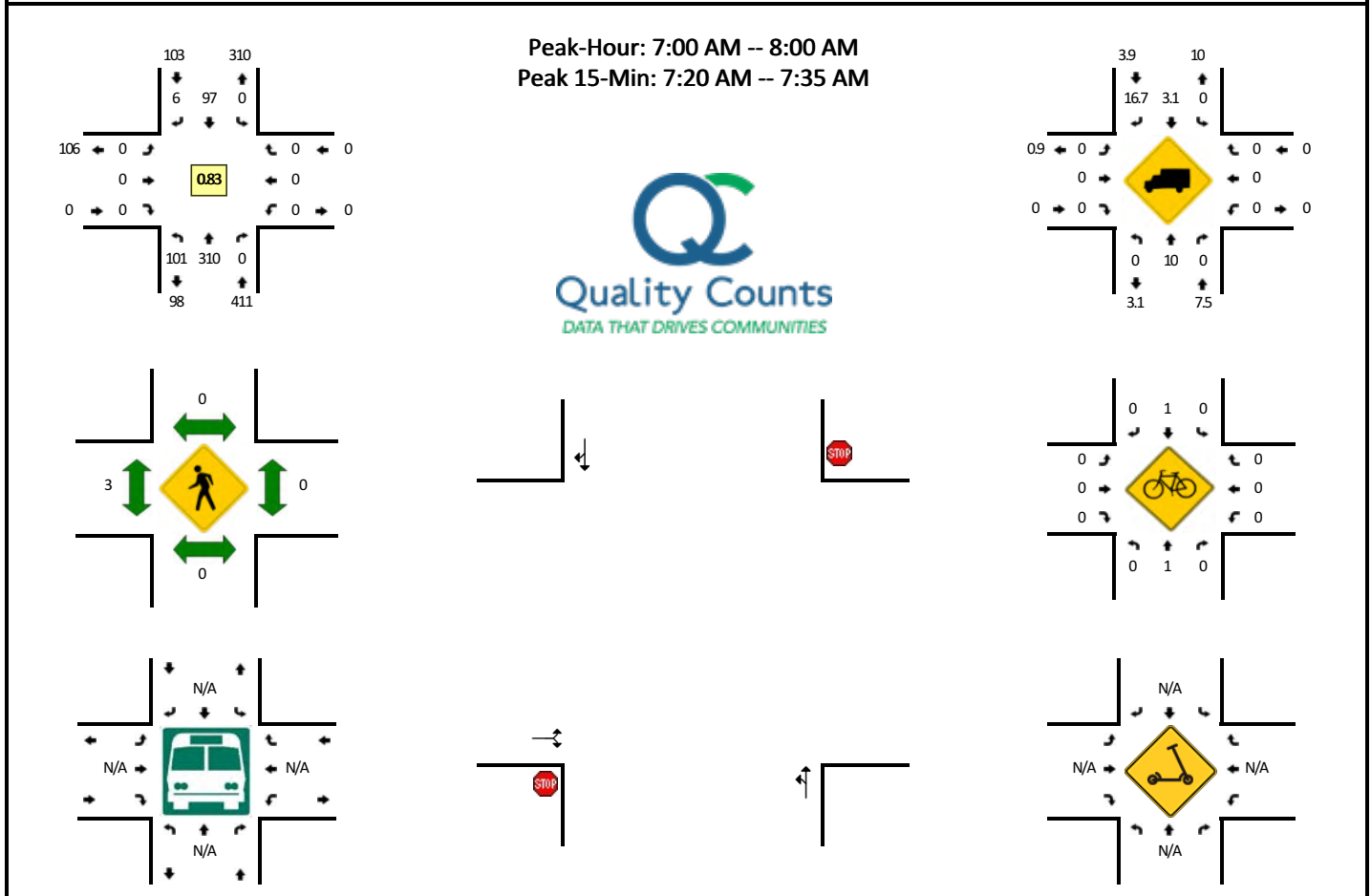


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Building T-51 Access Rd (Eastbound)				Building T-51 Access Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	7	0	0	0	22	0	0	0	0	12	0	0	0	0	0	41	
4:05 PM	0	6	0	0	0	17	0	0	0	0	8	0	0	0	0	0	31	
4:10 PM	0	12	0	0	0	9	0	0	0	0	8	0	0	0	0	0	29	
4:15 PM	0	5	0	0	0	12	0	0	1	0	4	0	0	0	0	0	22	
4:20 PM	0	6	0	0	0	14	0	0	0	0	6	0	0	0	0	0	26	
4:25 PM	0	7	0	0	0	10	0	0	2	0	4	0	0	0	0	0	23	
4:30 PM	0	8	0	0	0	7	0	0	0	0	7	0	0	0	0	0	22	
4:35 PM	0	11	0	0	0	8	0	0	2	0	4	0	0	0	0	0	25	
4:40 PM	0	9	0	0	0	8	0	0	2	0	2	0	0	0	0	0	21	
4:45 PM	2	12	0	0	0	9	0	0	0	0	5	0	0	0	0	0	28	
4:50 PM	1	18	0	0	0	10	0	0	0	0	3	0	0	0	0	0	32	
4:55 PM	5	5	0	0	0	8	0	0	1	0	6	0	0	0	0	0	25	325
5:00 PM	2	6	0	0	0	9	1	0	0	0	6	0	0	0	0	0	24	308
5:05 PM	1	4	0	0	0	11	0	0	0	0	4	0	0	0	0	0	20	297
5:10 PM	0	5	0	0	0	10	0	0	2	0	5	0	0	0	0	0	22	290
5:15 PM	0	4	0	0	0	10	0	0	0	0	1	0	0	0	0	0	15	283
5:20 PM	1	4	0	0	0	7	0	0	1	0	5	0	0	0	0	0	18	275
5:25 PM	1	6	0	0	0	8	0	0	0	0	8	0	0	0	0	0	23	275
5:30 PM	0	5	0	0	0	8	1	0	1	0	2	0	0	0	0	0	17	270
5:35 PM	0	7	0	0	0	11	0	0	1	0	5	0	0	0	0	0	24	269
5:40 PM	2	3	0	0	0	13	0	0	0	0	5	0	0	0	0	0	23	271
5:45 PM	0	5	0	0	0	5	1	0	1	0	3	0	0	0	0	0	15	258
5:50 PM	0	3	0	0	0	4	0	0	0	0	5	0	0	0	0	0	12	238
5:55 PM	0	3	0	0	0	3	0	0	0	0	3	0	0	0	0	0	9	222
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	100	0	0	0	192	0	0	0	0	112	0	0	0	0	0	404	
Heavy Trucks	0	32	0	0	0	4	0	0	0	0	0	0	0	0	0	0	36	
Buses																		
Pedestrians		12				0				16				0			28	
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4	
Scooters																		

Comments:

LOCATION: SW US Veterans Hospital Rd -- Building 108 Parking Access
CITY/STATE: Portland, OR

QC JOB #: 15308511
DATE: Thu, Dec 3 2020

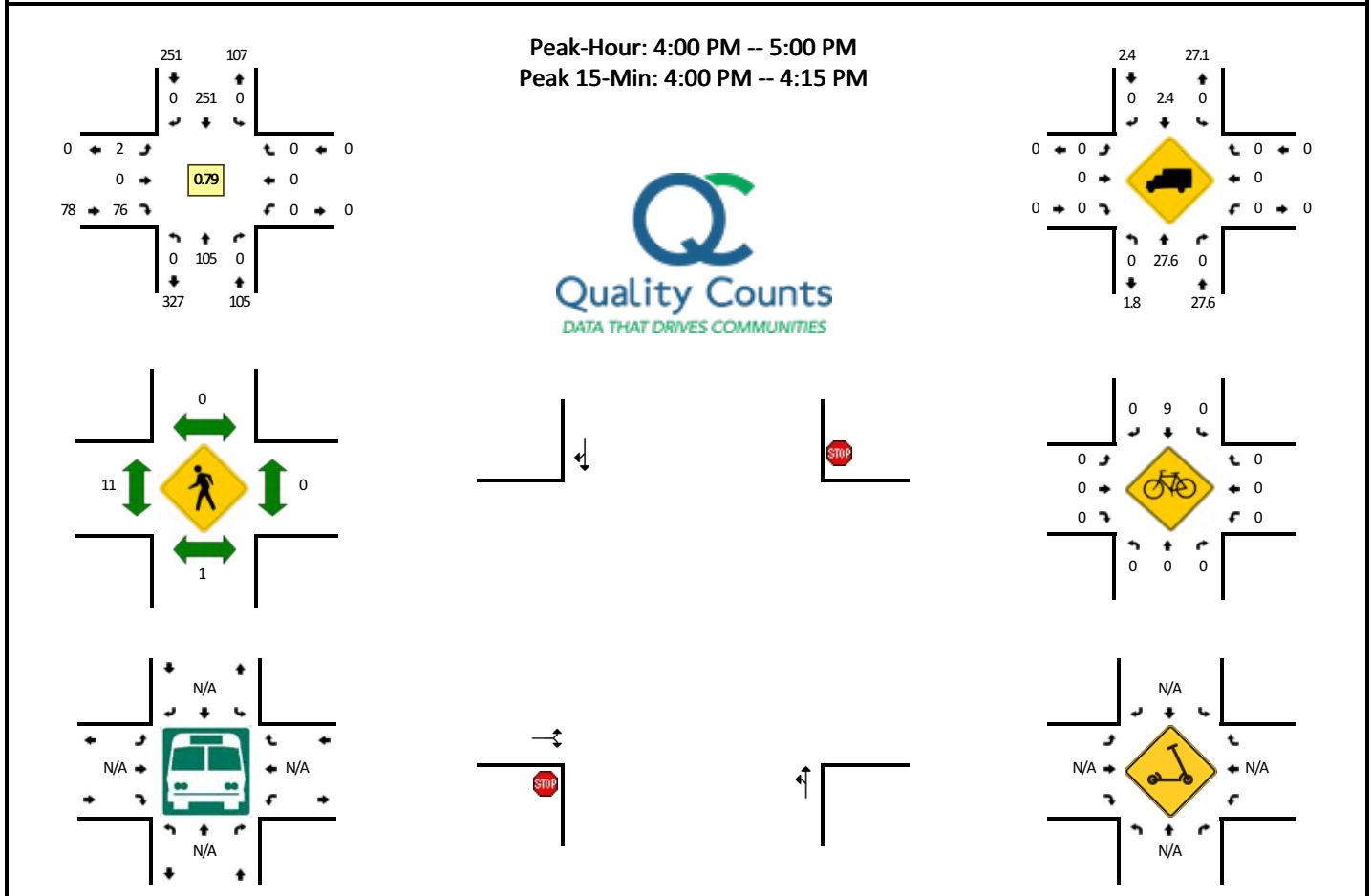


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Building 108 Parking Access (Eastbound)				Building 108 Parking Access (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	30	0	0	0	2	0	0	0	0	0	0	0	0	0	0	38	
7:05 AM	3	27	0	0	0	4	0	0	0	0	0	0	0	0	0	0	34	
7:10 AM	6	22	0	1	0	5	1	0	0	0	0	0	0	0	0	0	35	
7:15 AM	9	31	0	0	0	1	1	0	0	0	0	0	0	0	0	0	42	
7:20 AM	17	27	0	0	0	10	1	0	0	0	0	0	0	0	0	0	55	
7:25 AM	15	26	0	0	0	12	1	0	0	0	0	0	0	0	0	0	54	
7:30 AM	3	27	0	0	0	16	0	0	0	0	0	0	0	0	0	0	46	
7:35 AM	6	18	0	0	0	15	0	0	0	0	0	0	0	0	0	0	39	
7:40 AM	10	28	0	0	0	13	0	0	0	0	0	0	0	0	0	0	51	
7:45 AM	10	28	0	0	0	4	1	0	0	0	0	0	0	0	0	0	43	
7:50 AM	8	23	0	0	0	10	0	0	0	0	0	0	0	0	0	0	41	
7:55 AM	7	23	0	0	0	5	1	0	0	0	0	0	0	0	0	0	36	514
8:00 AM	5	15	0	0	0	13	0	0	0	0	0	0	0	0	0	0	33	509
8:05 AM	3	14	0	0	0	4	0	0	0	0	0	0	0	0	0	0	21	496
8:10 AM	2	14	0	0	0	5	0	0	0	0	0	0	0	0	0	0	21	482
8:15 AM	1	19	0	0	0	5	0	0	0	0	0	0	0	0	0	0	25	465
8:20 AM	5	11	0	0	0	3	2	0	0	0	0	0	0	0	0	0	21	431
8:25 AM	2	20	0	0	0	2	0	0	0	0	0	0	0	0	0	0	24	401
8:30 AM	4	13	0	0	0	3	0	0	0	0	0	0	0	0	0	0	20	375
8:35 AM	1	20	0	0	0	6	0	0	0	0	0	0	0	0	0	0	27	363
8:40 AM	0	21	0	0	0	15	1	0	0	0	0	0	0	0	0	0	37	349
8:45 AM	0	13	0	0	0	8	0	0	0	0	0	0	0	0	0	0	21	327
8:50 AM	2	13	0	0	0	5	0	0	0	0	0	0	0	0	0	0	20	306
8:55 AM	0	17	0	0	0	7	1	0	0	0	0	0	0	0	0	0	25	295
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	140	320	0	0	0	152	8	0	0	0	0	0	0	0	0	0	620	
Heavy Trucks	0	36	0	0	0	4	4	0	0	0	0	0	0	0	0	0	44	
Buses																		
Pedestrians		0				0			8				0				8	
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4	
Scooters																		

Comments:

LOCATION: SW US Veterans Hospital Rd -- Building 108 Parking Access
CITY/STATE: Portland, OR

QC JOB #: 15308512
DATE: Thu, Dec 3 2020

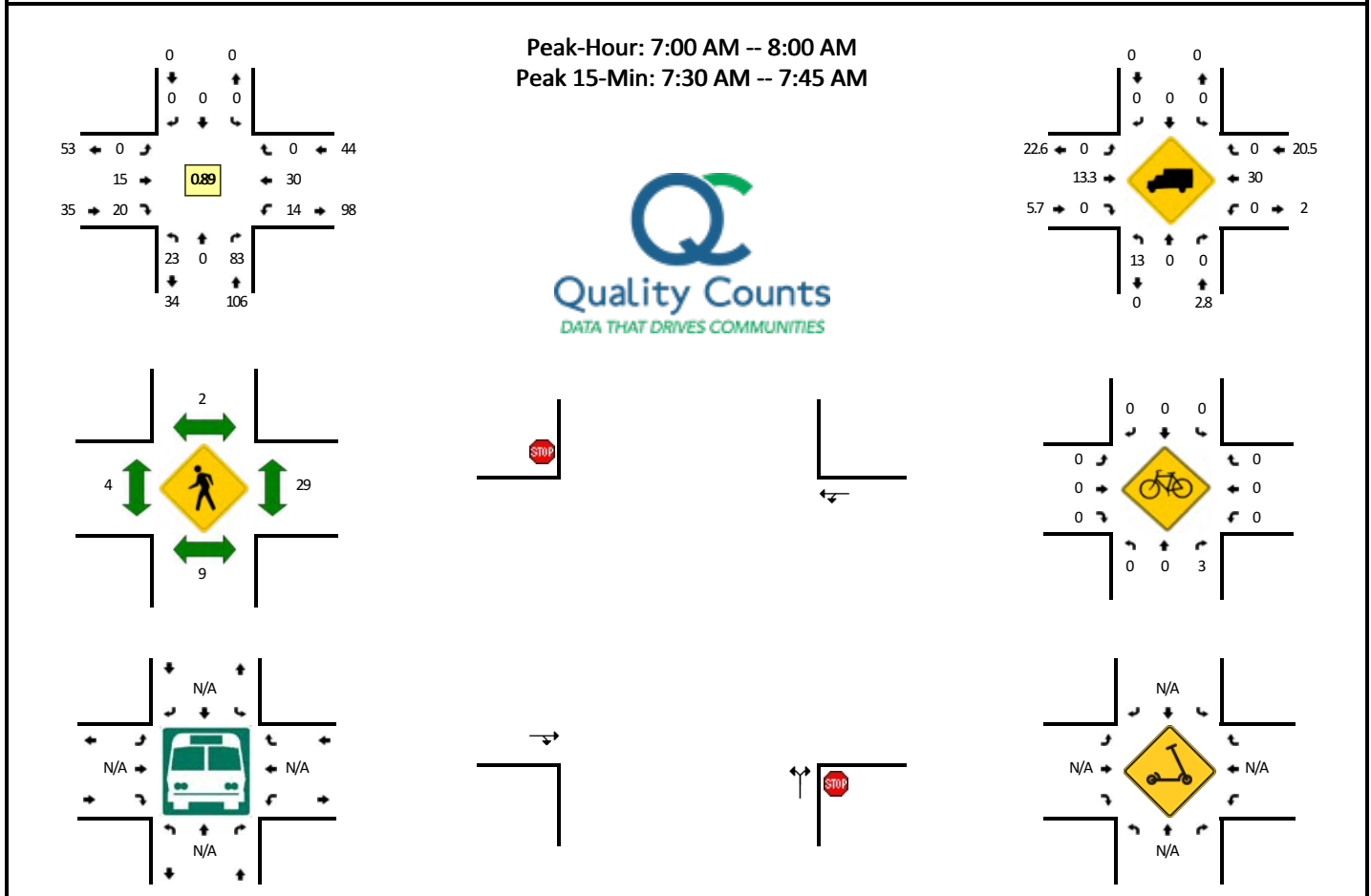


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Building 108 Parking Access (Eastbound)				Building 108 Parking Access (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	6	0	0	0	45	0	0	0	0	2	0	0	0	0	0	53	
4:05 PM	0	8	0	0	0	37	0	0	0	0	7	0	0	0	0	0	52	
4:10 PM	0	9	0	0	0	20	0	0	0	0	4	0	0	0	0	0	33	
4:15 PM	0	6	0	0	0	20	0	0	0	0	9	0	0	0	0	0	35	
4:20 PM	0	5	0	0	0	23	0	0	0	0	3	0	0	0	0	0	31	
4:25 PM	0	7	0	0	0	17	0	0	0	0	4	0	0	0	0	0	28	
4:30 PM	0	6	0	0	0	16	0	0	0	0	8	0	0	0	0	0	30	
4:35 PM	0	11	0	0	0	15	0	0	1	0	10	0	0	0	0	0	37	
4:40 PM	0	11	0	0	0	11	0	0	0	0	9	0	0	0	0	0	31	
4:45 PM	0	10	0	0	0	15	0	0	0	0	8	0	0	0	0	0	33	
4:50 PM	0	20	0	0	0	16	0	0	0	0	8	0	0	0	0	0	44	
4:55 PM	0	6	0	0	0	16	0	0	1	0	4	0	0	0	0	0	27	434
5:00 PM	0	6	0	0	0	16	0	0	0	0	3	0	0	0	0	0	25	406
5:05 PM	0	4	0	0	0	18	0	0	1	0	7	0	0	0	0	0	30	384
5:10 PM	0	6	0	0	0	16	0	0	0	0	10	0	0	0	0	0	32	383
5:15 PM	0	3	0	0	0	12	0	0	0	0	5	0	0	0	0	0	20	368
5:20 PM	0	5	0	0	0	12	0	0	0	0	4	0	0	0	0	0	21	358
5:25 PM	0	8	0	0	0	17	0	0	0	0	3	0	0	0	0	0	28	358
5:30 PM	0	5	0	0	0	11	0	0	0	0	2	0	0	0	0	0	18	346
5:35 PM	0	7	0	0	0	19	0	0	0	0	5	0	0	0	0	0	31	340
5:40 PM	0	4	0	0	0	18	0	0	0	0	5	0	0	0	0	0	27	336
5:45 PM	0	5	0	0	0	9	0	0	0	0	5	0	0	0	0	0	19	322
5:50 PM	0	3	0	0	0	10	0	0	0	0	3	0	0	0	0	0	16	294
5:55 PM	0	3	0	0	0	8	0	0	0	0	5	0	0	0	0	0	16	283
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	92	0	0	0	408	0	0	0	0	52	0	0	0	0	0	552	
Heavy Trucks	0	28	0	0	0	4	0	0	0	0	0	0	0	0	0	0	32	
Buses																		
Pedestrians	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	16	
Bicycles	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	
Scooters																		

Comments:

LOCATION: SW 6th Ave Dr -- S Gaines St
CITY/STATE: Portland, OR

QC JOB #: 15308513
DATE: Thu, Dec 3 2020

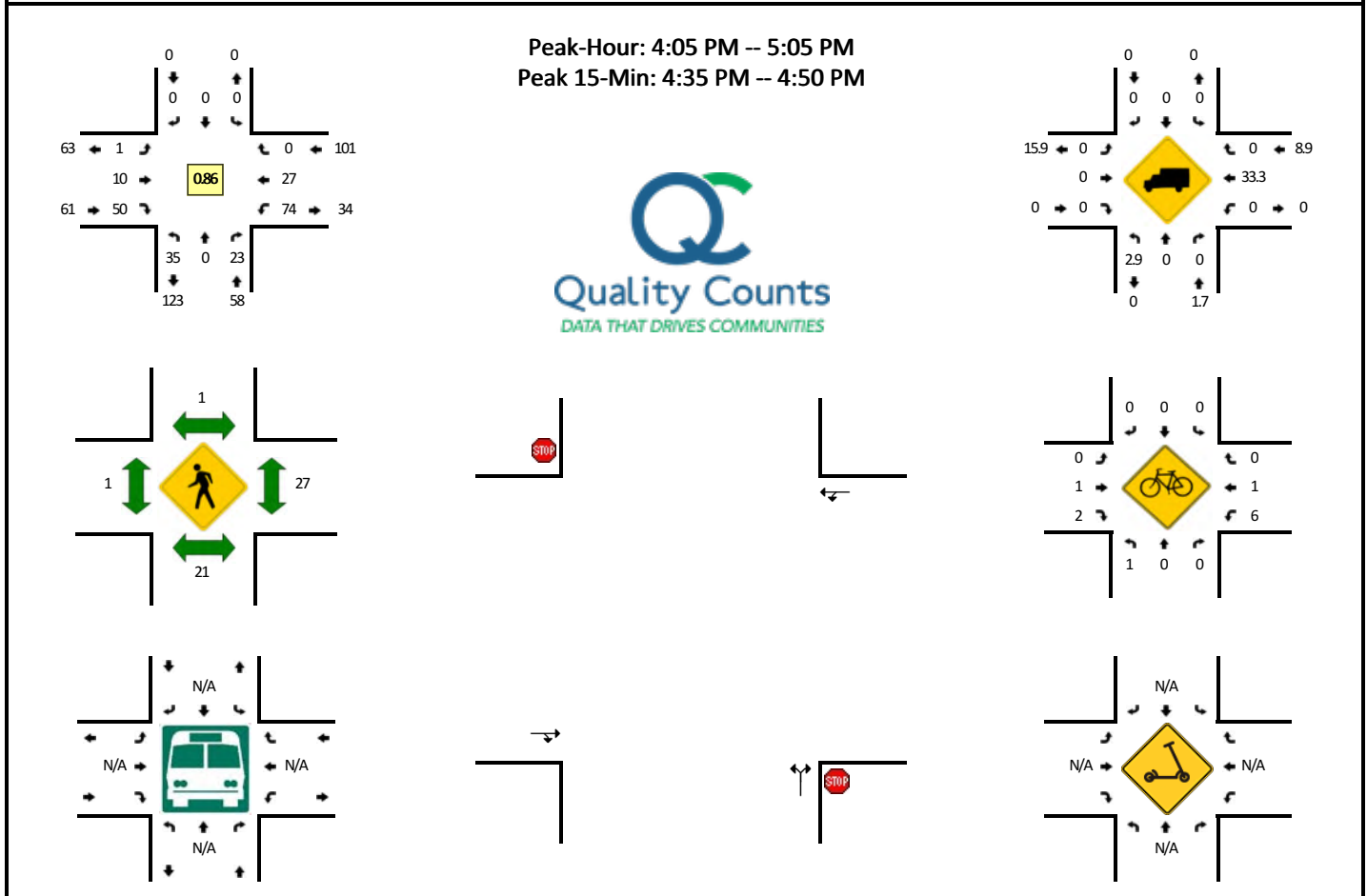


5-Min Count Period Beginning At	SW 6th Ave Dr (Northbound)				SW 6th Ave Dr (Southbound)				S Gaines St (Eastbound)				S Gaines St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	0	10	0	0	0	0	0	0	0	2	0	1	5	0	0	20	
7:05 AM	1	0	5	0	0	0	0	0	0	0	2	0	2	1	0	0	11	
7:10 AM	1	0	5	0	0	0	0	0	0	1	1	0	0	4	0	0	12	
7:15 AM	0	0	8	0	0	0	0	0	0	1	1	0	2	5	0	0	17	
7:20 AM	3	0	2	0	0	0	0	0	0	5	3	0	0	1	0	0	14	
7:25 AM	1	0	10	0	0	0	0	0	0	0	1	0	1	0	0	0	13	
7:30 AM	2	0	11	0	0	0	0	0	0	2	3	0	0	3	0	0	21	
7:35 AM	4	0	5	0	0	0	0	0	0	0	2	0	1	1	0	0	13	
7:40 AM	4	0	6	0	0	0	0	0	0	1	2	0	0	5	0	0	18	
7:45 AM	1	0	5	0	0	0	0	0	0	2	1	0	3	0	0	0	12	
7:50 AM	3	0	11	0	0	0	0	0	0	2	1	0	2	3	0	0	22	
7:55 AM	1	0	5	0	0	0	0	0	0	1	1	0	2	2	0	0	12	185
8:00 AM	1	0	8	0	0	0	0	0	0	1	0	0	1	2	0	0	13	178
8:05 AM	2	0	2	0	0	0	0	0	0	0	2	0	1	1	0	0	8	175
8:10 AM	4	0	4	0	0	0	0	0	0	0	4	0	0	3	0	0	15	178
8:15 AM	2	0	4	0	0	0	0	0	0	0	1	0	2	5	0	0	14	175
8:20 AM	1	0	5	0	0	0	0	0	0	3	2	0	3	1	0	0	15	176
8:25 AM	3	0	6	0	0	0	0	0	0	1	0	0	1	2	0	0	13	176
8:30 AM	1	0	3	0	0	0	0	0	0	1	0	0	1	2	0	0	8	163
8:35 AM	2	0	2	0	0	0	0	0	0	1	2	0	1	0	0	0	8	158
8:40 AM	2	0	2	0	0	0	0	0	0	1	0	0	1	4	0	0	10	150
8:45 AM	5	0	1	0	0	0	0	0	0	0	2	0	0	3	0	1	12	150
8:50 AM	3	0	2	0	0	0	0	0	0	1	0	0	0	1	0	0	7	135
8:55 AM	7	0	4	0	0	0	0	0	0	1	2	0	0	0	0	0	14	137
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	40	0	88	0	0	0	0	0	0	12	28	0	4	36	0	0	208	
Heavy Trucks	8	0	0		0	0	0		0	0	0		0	12	0		20	
Buses																		
Pedestrians		16				0				8				32			56	
Bicycles	0	0	8		0	0	0		0	0	0		0	0	0		8	
Scooters																		

Comments:

LOCATION: SW 6th Ave Dr -- S Gaines St
CITY/STATE: Portland, OR

QC JOB #: 15308514
DATE: Thu, Dec 3 2020

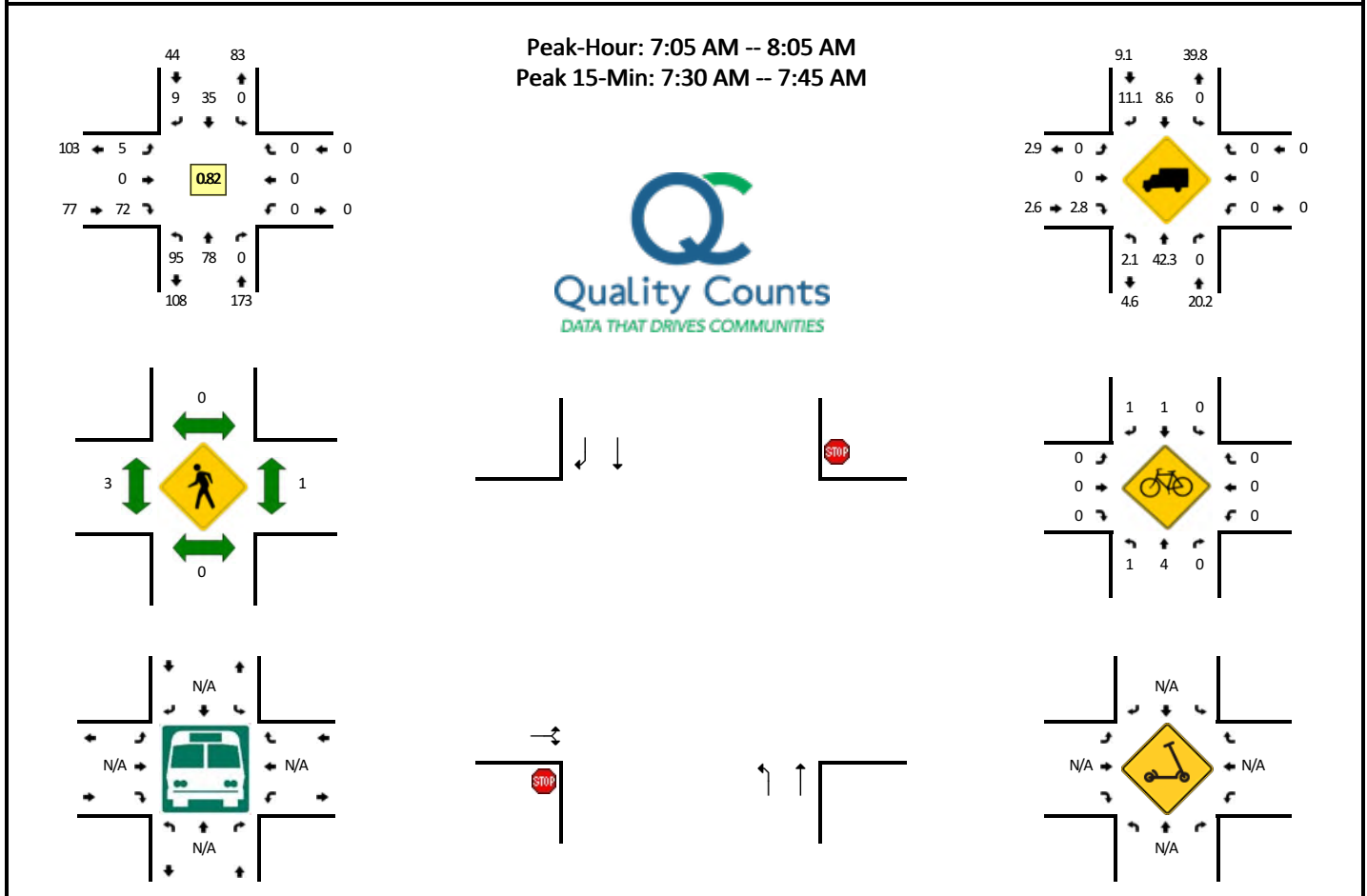


5-Min Count Period Beginning At	SW 6th Ave Dr (Northbound)				SW 6th Ave Dr (Southbound)				S Gaines St (Eastbound)				S Gaines St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	0	7	
4:05 PM	1	0	3	0	0	0	0	0	0	2	4	0	7	2	0	0	19	
4:10 PM	7	0	1	0	0	0	0	0	0	1	2	0	8	6	0	0	25	
4:15 PM	0	0	2	0	0	0	0	0	0	2	5	0	4	1	0	1	15	
4:20 PM	3	0	3	0	0	0	0	0	0	0	3	0	2	2	0	0	13	
4:25 PM	5	0	4	0	0	0	0	0	0	0	1	0	2	3	0	0	15	
4:30 PM	1	0	0	0	0	0	0	0	0	0	7	0	4	2	0	0	14	
4:35 PM	2	0	2	0	0	0	0	0	0	0	3	1	13	1	0	0	22	
4:40 PM	3	0	3	0	0	0	0	0	0	2	8	0	7	1	0	0	24	
4:45 PM	2	0	0	0	0	0	0	0	0	2	2	0	8	4	0	0	18	
4:50 PM	2	0	2	0	0	0	0	0	0	0	3	0	7	2	0	0	16	
4:55 PM	8	0	2	0	0	0	0	0	0	1	7	0	7	2	0	0	27	215
5:00 PM	1	0	1	0	0	0	0	0	0	0	5	0	4	1	0	0	12	220
5:05 PM	1	0	1	0	0	0	0	0	0	2	5	0	10	0	0	0	19	220
5:10 PM	1	0	2	0	0	0	0	0	0	0	2	0	7	2	0	0	14	209
5:15 PM	4	0	1	0	0	0	0	0	0	1	5	0	2	2	0	0	15	209
5:20 PM	5	0	1	0	0	0	0	0	0	0	2	0	4	1	0	0	13	209
5:25 PM	8	0	4	0	0	0	0	0	0	1	3	0	3	2	0	0	21	215
5:30 PM	4	0	3	0	0	0	0	0	0	2	4	0	4	0	0	0	17	218
5:35 PM	7	0	0	0	0	0	0	0	0	0	5	1	2	1	0	0	16	212
5:40 PM	0	0	1	0	0	0	0	0	0	1	3	0	4	1	0	0	10	198
5:45 PM	6	0	2	0	0	0	0	0	0	1	0	0	4	0	0	0	13	193
5:50 PM	2	0	0	0	0	0	0	0	0	0	3	0	5	2	0	0	12	189
5:55 PM	2	0	1	0	0	0	0	0	0	1	1	0	2	1	0	0	8	170
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	28	0	20	0	0	0	0	0	0	16	52	4	112	24	0	0	256	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	12	
Buses																		
Pedestrians		28				4				4				16			52	
Bicycles	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	8	
Scoters																		

Comments:

LOCATION: SW US Veterans Hospital Rd -- Shipping/Receiving Access Road
CITY/STATE: Portland, OR

QC JOB #: 15308515
DATE: Thu, Dec 3 2020

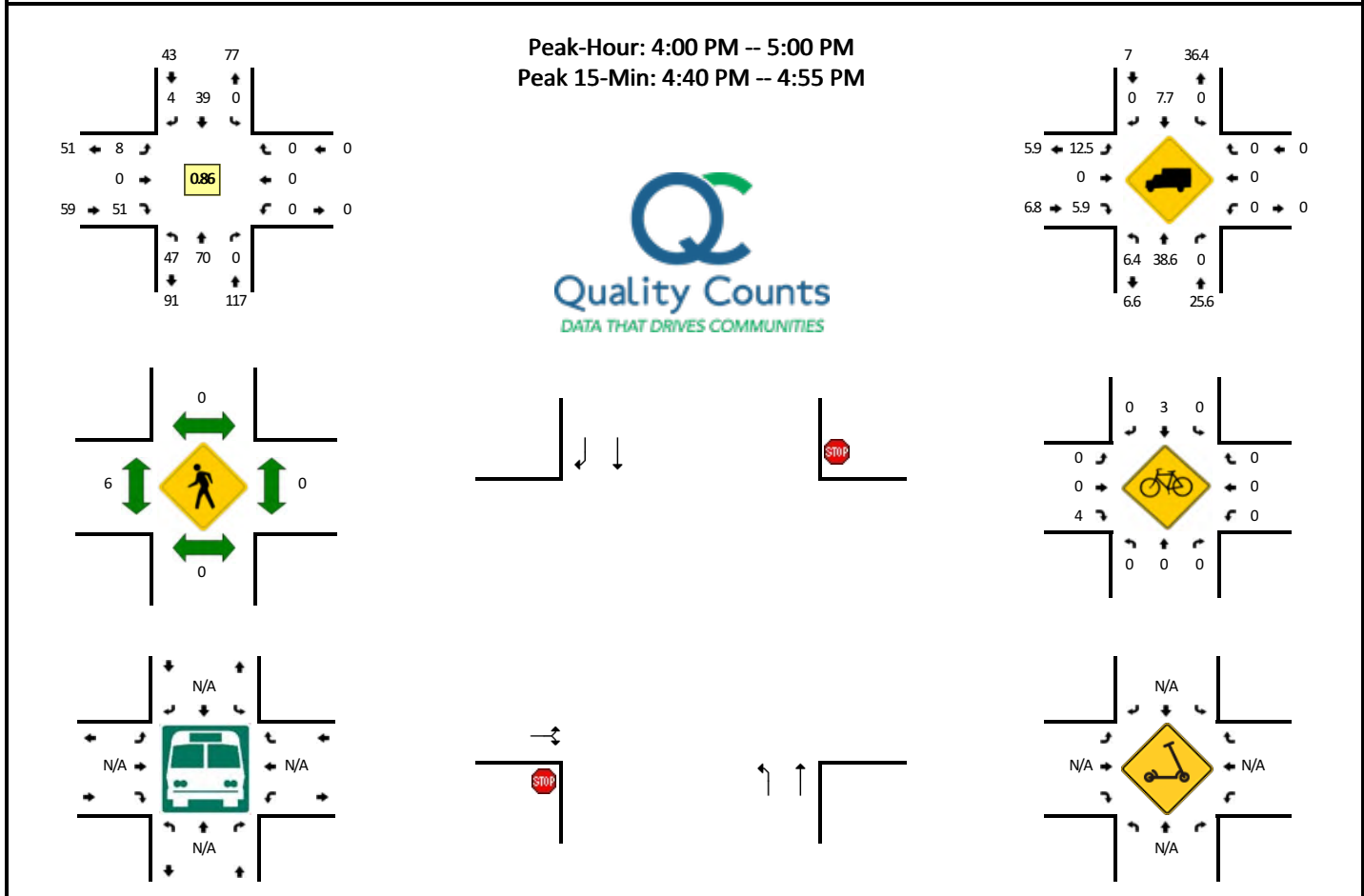


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Shipping/Receiving Access Road (Eastbound)				Shipping/Receiving Access Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	14	
7:05 AM	7	6	0	0	0	2	0	0	0	0	1	0	0	0	0	0	16	
7:10 AM	7	10	0	0	0	3	1	0	0	0	4	0	0	0	0	0	25	
7:15 AM	5	4	0	0	0	1	0	0	1	0	1	0	0	0	0	0	12	
7:20 AM	9	5	0	0	0	0	2	0	0	0	12	0	0	0	0	0	28	
7:25 AM	11	6	0	0	0	4	0	0	0	0	7	0	0	0	0	0	28	
7:30 AM	5	8	0	0	0	3	0	0	2	0	12	0	0	0	0	0	30	
7:35 AM	6	5	0	0	0	5	2	0	0	0	10	0	0	0	0	0	28	
7:40 AM	9	8	0	1	0	3	1	0	1	0	9	0	0	0	0	0	32	
7:45 AM	9	7	0	0	0	3	1	0	1	0	2	0	0	0	0	0	23	
7:50 AM	7	5	0	0	0	5	1	0	0	0	2	0	0	0	0	0	20	
7:55 AM	13	6	0	0	0	3	0	0	0	0	5	0	0	0	0	0	27	283
8:00 AM	6	8	0	0	0	3	1	0	0	0	7	0	0	0	0	0	25	294
8:05 AM	5	3	0	0	0	3	0	0	0	0	2	0	0	0	0	0	13	291
8:10 AM	5	6	0	0	0	3	0	0	0	0	2	0	0	0	0	0	16	282
8:15 AM	10	4	0	1	0	3	0	0	0	0	1	0	0	0	0	0	19	289
8:20 AM	6	3	0	0	0	1	0	0	0	0	4	0	0	0	0	0	14	275
8:25 AM	12	6	0	0	0	1	0	0	0	0	1	0	0	0	0	0	20	267
8:30 AM	4	6	0	0	0	0	0	0	0	0	3	0	0	0	0	0	13	250
8:35 AM	10	6	0	0	0	4	2	0	0	0	3	0	0	0	0	0	25	247
8:40 AM	13	6	0	1	0	4	0	0	0	0	8	0	0	0	0	0	32	247
8:45 AM	12	4	0	0	0	3	2	0	0	0	7	0	0	0	0	0	28	252
8:50 AM	7	2	0	0	0	1	1	0	1	0	4	0	0	0	0	0	16	248
8:55 AM	7	4	0	0	0	3	1	0	0	0	4	0	0	0	0	0	19	240
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	80	84	0	4	0	44	12	0	12	0	124	0	0	0	0	0	360	
Heavy Trucks	0	36	0		0	8	0		0	0	4		0	0	0		48	
Buses																		
Pedestrians	0				0				4				0				4	
Bicycles	0	12	0		0	4	4		0	0	0		0	0	0		20	
Scooters																		

Comments:

LOCATION: SW US Veterans Hospital Rd -- Shipping/Receiving Access Road
CITY/STATE: Portland, OR

QC JOB #: 15308516
DATE: Thu, Dec 3 2020



5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Shipping/Receiving Access Road (Eastbound)				Shipping/Receiving Access Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	5	0	1	0	3	0	0	1	0	12	0	0	0	0	0	23	
4:05 PM	0	9	0	0	0	8	0	0	1	0	4	0	0	0	0	0	22	
4:10 PM	6	2	0	0	0	4	1	0	0	0	2	0	0	0	0	0	15	
4:15 PM	2	6	0	0	0	5	0	0	0	0	7	0	0	0	0	0	20	
4:20 PM	3	4	0	0	0	5	0	0	0	0	6	1	0	0	0	0	19	
4:25 PM	3	4	0	0	0	3	0	0	1	0	2	0	0	0	0	0	13	
4:30 PM	4	5	0	0	0	2	0	0	1	0	2	0	0	0	0	0	14	
4:35 PM	2	9	0	0	0	1	0	0	0	0	2	0	0	0	0	0	14	
4:40 PM	7	7	0	0	0	3	1	0	0	0	2	0	0	0	0	0	20	
4:45 PM	6	6	0	0	0	2	1	0	1	0	2	0	0	0	0	0	18	
4:50 PM	10	8	0	0	0	1	0	0	1	0	6	0	0	0	0	0	26	
4:55 PM	2	5	0	0	0	2	1	0	1	0	4	0	0	0	0	0	15	219
5:00 PM	2	5	0	0	0	2	0	0	0	0	1	0	0	0	0	0	10	206
5:05 PM	1	3	0	0	0	3	0	0	0	0	5	0	0	0	0	0	12	196
5:10 PM	0	7	0	0	0	3	0	0	0	0	3	0	0	0	0	0	13	194
5:15 PM	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	180
5:20 PM	3	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	167
5:25 PM	1	5	0	0	0	1	0	0	0	0	2	0	0	0	0	0	9	163
5:30 PM	4	2	0	0	0	1	0	0	0	0	5	0	0	0	0	0	12	161
5:35 PM	0	7	0	0	0	3	0	0	0	0	4	0	0	0	0	0	14	161
5:40 PM	2	1	0	0	0	3	0	0	0	0	2	0	0	0	0	0	8	149
5:45 PM	3	3	0	0	0	2	0	0	0	0	2	0	0	0	0	0	10	141
5:50 PM	5	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	8	123
5:55 PM	0	3	0	0	0	1	0	0	0	0	2	0	0	0	0	0	6	114
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	92	84	0	0	0	24	8	0	8	0	40	0	0	0	0	0	256	
Heavy Trucks	0	32	0	0	0	4	0	0	0	0	8	0	0	0	0	0	44	
Buses																		
Pedestrians		0				0				4				0			4	
Bicycles	0	0	0		0	8	0		0	0	8		0	0	0		16	
Scoters																		

Comments:

Appendix C

Traffic Observations

Date: 12/2/2020

Weather: Clear. Low 40 degrees in the morning. Upper 40 degrees in the afternoon.

Observer: Stuart Campbell

General Overall Observations:

- Overall, there were no traffic observations overserved. Traffic volumes were light most of the day. Peak periods saw higher volumes, but even during heavy periods, traffic moved well.
- Limited congestion – occurs at intersection, usually for only short period of time
- Freight volumes were low during observation periods
- ADA compliance needs to be addressed along sidewalks/paths and at crossings due to pavement striping and curb ramps/tactile warning devices throughout VA campus
- Parking level 2 and 1 of Lot 3 was closed off due to drive thru COVID-19 testing
- Bike parking exists in some locations, but in several locations, bikes are locked to staircase railings or other non-bike rack locations

Location: SW Capitol Hwy & SW Terwilliger Blvd
Time: 6:05 AM – 10-minute observation period
Observations: <ul style="list-style-type: none">• Light traffic volume – cars and bus• 7 TriMet buses serve this intersection• Bus stop pad turns has small path that turns into an unimproved “goat path” across grass/soil onto Terwilliger Blvd south of SW Capitol.• No freight• Adequate pedestrian crossing, with striping and crosswalk signal, but need new ADA curb ramps.• Crossing time is approximately 20 seconds which could create a challenge for people using wheelchairs and other mobility devices. There is a slight incline in topography from Terwilliger Blvd to SW Capital Highway.• Intersection includes a bike sensor on traffic light, allowing for signal change for bikes crossing SW Capitol Highway, on Terwilliger Blvd. Bikes: 1 Peds: 2
Time: 4:47 PM – 10-minute observation period
Observations: <ul style="list-style-type: none">• Busy intersection at this time of day – moderate to heavy traffic volumes consistently, mostly on SW Capitol Highway.• 7 car queue at light Terwilliger Blvd, south of SW Capitol Highway<ul style="list-style-type: none">◦ Queue appears due to single-lane signalized left turn. Bikes: 1 Peds: 2

Location: SW Terwilliger Blvd & SW Sam Jackson Rd
Time: 6:30 AM – 10-minute observation period
<p>Observations:</p> <ul style="list-style-type: none"> • Heavy traffic volumes at this time of day – cars and bus • Heavy left turning movements south onto Terwilliger Blvd from eastbound Sam Jackson Park Rd • Pedestrian crossings need improvement – approximately 20 second crossing time <ul style="list-style-type: none"> ○ Worn striping ○ Missing ADA treatments at ramps/curbs ○ Pedestrian island at pork chop could use treatment to improve curbs and surface • 2 TriMet buses service this intersection • 1 small freight delivery truck <p>Bikes: 1 Peds: 1</p>
Time: 4:11 PM – 6-minute observation period
<p>Observations:</p> <ul style="list-style-type: none"> • Heavy and steady traffic – some backups but queues are relatively short and clear quickly <ul style="list-style-type: none"> ○ Note from Shell gas attendant – when I-405 on ramp backs up, traffic at this intersection backs up as well. <p>Bikes: 2 Peds: 6</p>

Location: SW US Veterans Hospital Road & SW Gibbs St
Time: 6:47 AM – 10-minute observation period
<p>Observations:</p> <ul style="list-style-type: none"> • Lots of activity at this time of day near OHSU hospital, research, and Shriners Hospital– peds, cars, and bus (TriMet and C-Tran) • Location is across from a parking garage and near entrance of large building • T-intersection – no turning issues observed <p>Bikes: 0 Peds: 10+</p>
Time: 4:30 PM – 5-minute observation period
<p>Observations:</p> <ul style="list-style-type: none"> • Steady traffic volumes through intersection – not heavy but just steady • No issues <p>Bikes: 0 Peds: 4</p>

Location: SW Terwilliger Blvd & SW Campus Dr
Time: 7:07 AM – 10-minute observation period
<p>Observations:</p> <ul style="list-style-type: none"> • Traffic volumes are steady here at this time of day • Lots of TriMet bus activity – buses driving through and a stop that serves 4 buses <ul style="list-style-type: none"> ◦ Bus stop is accessed by a crosswalk. Cross walk paint is deteriorating and the landing ADA landing pad at end of crosswalk is in need of improvement • Buses turning left onto Terwilliger Blvd, off Campus Dr is a little tight <ul style="list-style-type: none"> ◦ Pavement issues here – one bus scraped undercarriage due to dip in road • Slight queue of 5 cars waiting to turn left onto Campus Dr • 3 freight vehicles – two semis and one box truck – turning/passing through intersection going to and from campus • Drivers yielded for pedestrians, as several crossed Terwilliger Blvd to get to Campus Dr <ul style="list-style-type: none"> ◦ There are PVC pipe holders zip-tied on the crossing signs – they look like they may have held crossing flags but none were present during observation <p>Bikes: 4 Peds: 5</p>
Time: 4:00 PM – 7-minute observation period
<p>Observations:</p> <ul style="list-style-type: none"> • Moderate and steady traffic flow • 3 car queues at Campus Dr to turn onto Terwilliger Blvd • 2 freight trucks observed – one box truck and one semi <p>Bikes: 7 Peds: 9</p>

Location: SW US Veterans Hospital Road & SW Terwilliger Blvd
Time: 7:25 AM – 10-minute observation period
<p>Observations:</p> <ul style="list-style-type: none"> • Steady traffic on Terwilliger Blvd • Lots of turning onto SW US Veterans Hospital Rd, off of Terwilliger Blvd • Slight queue for left turns (7 seconds) causes approximately 6 car back up waiting for left turn onto SW US Veterans Hospital Rd <ul style="list-style-type: none"> ◦ This causes a small queue of cars on SW US Veterans Hospital Rd waiting to turn left onto Terwilliger Blvd • TriMet Buses 8, 61, and 68 turn here to enter into VA Hospital campus • Terwilliger Blvd pedestrian crossing appears to lack ADA compliant curb cuts and landing pad <p>Bikes: 3 Peds: 3</p>
Time: 5:00 PM – 10-minute observation period

Observations:

- Steady traffic but not heavy or congested – consistent stream of cars
- A few cyclists in bike lane
- Pedestrians on paved multiuse path adjacent to the road

Bikes: 3

Peds: 7

Location: **SW US Veterans Hospital Road & S Gaines St**

Time: 7:55 AM – 7-minute observation period

Observations:

- Traffic is light with no issues – turn at T-intersection seems sharp, but no observed issue
- Pedestrian crossing doesn't have paint/striping or ADA treatment, aside from old curb cuts
- Pathway on one side of S Gaines St connects the crosswalk is behind guard rail – pathway is narrow and not well maintained, likely not suitable for all pedestrians. Not suitable for mobility devices.
- TriMet Buses 8 and 64 flow through intersection

Bikes: 1

Peds: 4

Time: 4:40 PM – 5-minute observation period

Observations:

- Not much activity here – quiet
- Just a few cars observed driving through
- 2 buses observed

Bikes: 0

Peds: 2

Location: **S Gaines St & SW 6th Ave Dr**

Time: 8:09 AM – 5-minute observation period

Observations:

- Quiet here – little traffic
- Location is surrounded by parking lots that are mostly full
- Bus 8 has covered stop next to intersection
- Pedestrian crosswalks look good – only one tactile warning device wearing out

Bikes: 1

Peds: 7

Time: 4:46 PM – 5-minute observation period

Observations:

- Very quiet
- Just a few cars observed here and 1 bus
- Only a few pedestrians observed

Bikes: 0

Peds: 3

Location: SW US Veterans Hospital Rd & Shipping/Receiving Access Road
Time: 8:24 AM – 5-minute observation period
Observations: <ul style="list-style-type: none"> • Light traffic – most activity are cars moving to/from patient and visitor parking garage • 1 freight vehicle observed • Pedestrian crosswalk is small/narrow with some deteriorating paint Bikes: 0 Peds: 0
Time: 5:30 PM – 5-minute observation period
Observations: <ul style="list-style-type: none"> • Very quiet • Just a few cars observed here and 1 bus Bikes: 0 Peds: 0

Location: SW US Veterans Hospital Rd & Building T-51 Access Rd
Time: 8:32 AM – 5-minute observation period
Observations: <ul style="list-style-type: none"> • Traffic is light but steady • Pedestrian crosswalk is narrow, and landings don't seem ADA compliant due to small size and sloping pavement Bikes: 0 Peds: 0
Time: 5:22 PM – 5-minute observation period
Observations: <ul style="list-style-type: none"> • Light traffic – most cars leaving garage, others driving past the garage through small intersection • Cars yielded for pedestrians • A few buses passing by with bus stop and shelter at this location Bikes: 0 Peds: 11

Location: SW US Veterans Hospital Rd & Building 108 Parking Access
Time: 8:40 AM – 5-minute observation period

Observations:

- Light and steady traffic – no issues
- No freight observed except for 1 dumpster truck picking up a large dumpster
- Pedestrian crosswalk is small, curb ramps look older and do not seem ADA compliant

Bikes: 0

Peds: 1

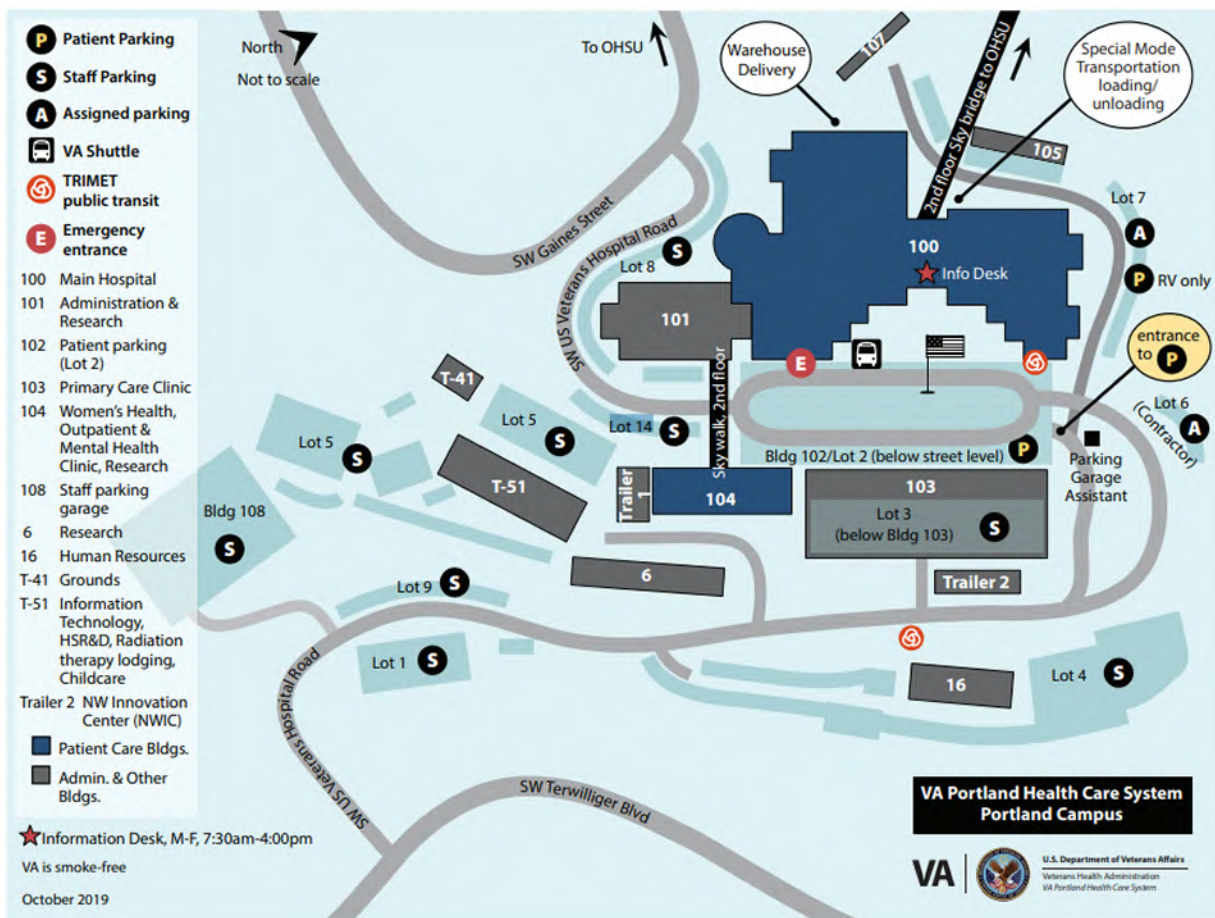
Time: 5:15 PM – 5-minute observation period

Observations:

- Steady and moderate traffic with several cars leaving Lot 108 parking garage
- Traffic flowing along US Veterans Hospital Rd
- Several buses passing during this time period

Bikes: 1

Peds: 1



Date: 12/3/20

Time: All counts were completed between the hours 9:30 AM and 2:00 PM

Location	Parking Supply (Total Spaces Available)	Parking Spaces Occupied	Bike Parking Supply	Bike Parking Occupied
Lot 1	33	6	-	-
Lot 2	228	125	-	-
Lot 3*	349	317	-	-
Lot 4	182	123	-	-
Lot 5	183	139	-	-
Lot 6	25	22	-	-
Lot 7	11	8	-	-
Lot 8	28	18	6	1
Lot 9	13	4	-	-
Lot 14	19	9	6	2
Building 108 Parking Garage	299	240	-	-
Parking Notes: <ul style="list-style-type: none"> *Lot 3 parking levels 1 and 2 were closed off due to drive thru COVID-19 testing – unable to count parking. Some parking spots that were striped for parking were unusable due to VA equipment storage or other barriers. Bikes were observed throughout the campus. The bike parking counts listed above were based on permanent bike parking (actual bike racks), but bikes were observed locked to railings within some parking garages. Bike parking boxes are also provided in various garages, but it was unclear whether they were in use. 				

SW Capitol and SW Terwilliger Blvd



SW Terwilliger Blvd & SW Sam Jackson Rd





SW US Veterans Hospital Road & SW Gibbs St





SW Terwilliger Blvd & SW Campus Dr





This is where the pavement dips causing one bus to scrape



SW US Veterans Hospital Road & SW Terwilliger Blvd



SW US Veterans Hospital Road & S Gaines St



S Gaines St & SW 6th Ave Dr



SW US Veterans Hospital Rd & Shipping/Receiving Access Road



SW US Veterans Hospital Rd & Building T-51 Access Rd



SW US Veterans Hospital Rd & Building 108 Parking Access



Bike parking at edge of Lot 14



Bike parking at edge of Lot 8



Appendix D
2020 Adjusted Synchro Reports

Intersection

Int Delay, s/veh 3.5

Movement EBT EBR WBL WBT NEL NERLane Configurations 

Traffic Vol, veh/h 214 37 128 96 6 75

Future Vol, veh/h 214 37 128 96 6 75

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Free Free Free Free Stop Stop

RT Channelized - None - None - None

Storage Length - - - - 0 -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 89 89 89 89 89 89

Heavy Vehicles, % 8 0 0 4 0 34

Mvmt Flow 240 42 144 108 7 84

Major/Minor Major1 Major2 Minor1

Conflicting Flow All 0 0 282 0 657 261

Stage 1 - - - - 261 -

Stage 2 - - - - 396 -

Critical Hdwy - - 4.1 - 6.4 6.54

Critical Hdwy Stg 1 - - - - 5.4 -

Critical Hdwy Stg 2 - - - - 5.4 -

Follow-up Hdwy - - 2.2 - 3.5 3.606

Pot Cap-1 Maneuver - - 1292 - 433 706

Stage 1 - - - - 787 -

Stage 2 - - - - 684 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver - - 1292 - 381 706

Mov Cap-2 Maneuver - - - - 381 -

Stage 1 - - - - 787 -

Stage 2 - - - - 603 -

Approach EB WB NE

HCM Control Delay, s 0 4.6 11.3

HCM LOS B

Minor Lane/Major Mvmt NELn1 EBT EBR WBL WBT

Capacity (veh/h) 664 - - 1292 -

HCM Lane V/C Ratio 0.137 - - 0.111 -

HCM Control Delay (s) 11.3 - - 8.1 0

HCM Lane LOS B - - A A




HCM 95th %tile Q(veh) 0.5 - - 0.4 -

HCM 6th TWSC
2: S Gaines St & SW US Veterans Hospital Rd

01/27/2022

Intersection

Int Delay, s/veh 4.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	13	57	23	43	46	6
Future Vol, veh/h	13	57	23	43	46	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	56	60	6	0
Mvmt Flow	16	70	28	52	56	7




Major/Minor	Major1	Minor2
Conflicting Flow All	0	0 51 86
Stage 1	-	- 0 0
Stage 2	-	- 51 86
Critical Hdwy	-	- 6.96 7.1
Critical Hdwy Stg 1	-	- - -
Critical Hdwy Stg 2	-	- 5.96 6.1
Follow-up Hdwy	-	- 4.004 4.54
Pot Cap-1 Maneuver	-	- 838 706
Stage 1	-	- - -
Stage 2	-	- 850 723
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 838 0
Mov Cap-2 Maneuver	-	- 838 0
Stage 1	-	- - 0
Stage 2	-	- 850 0




Approach	EB	WB
HCM Control Delay, s	0	9.8
HCM LOS		A





Minor Lane/Major Mvmt	EBT	EBRWBLn1
Capacity (veh/h)	-	- 838
HCM Lane V/C Ratio	-	- 0.096
HCM Control Delay (s)	-	- 9.8
HCM Lane LOS	-	- A
HCM 95th %tile Q(veh)	-	- 0.3

HCM 6th TWSC
3: SW 6th Ave Dr & S Gaines St

01/27/2022

Intersection						
Int Delay, s/veh	6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	22	29	20	43	33	119
Future Vol, veh/h	22	29	20	43	33	119
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	25	33	22	48	37	134
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	58	0	134	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	92	-
Critical Hdwy	-	-	4.1	-	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	-	-	2.2	-	3.617	3.3
Pot Cap-1 Maneuver	-	-	1559	-	834	1034
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	905	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1559	-	821	1034
Mov Cap-2 Maneuver	-	-	-	-	821	-
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	891	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.3		9.5	
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	979	-	-	1559	-	
HCM Lane V/C Ratio	0.174	-	-	0.014	-	
HCM Control Delay (s)	9.5	-	-	7.3	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.6	-	-	0	-	

Intersection						
Int Delay, s/veh	35					
Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	102	107	266	147	336	108
Future Vol, veh/h	102	107	266	147	336	108
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	91	91	91	91	91	91
Heavy Vehicles, %	24	3	14	3	0	5
Mvmt Flow	112	118	292	162	369	119
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1230	373	0	0	454	0
Stage 1	373	-	-	-	-	-
Stage 2	857	-	-	-	-	-
Critical Hdwy	6.64	6.23	-	-	4.1	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	-	-	2.2	-
Pot Cap-1 Maneuver	177	671	-	-	1117	-
Stage 1	651	-	-	-	-	-
Stage 2	381	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	114	671	-	-	1117	-
Mov Cap-2 Maneuver	114	-	-	-	-	-
Stage 1	651	-	-	-	-	-
Stage 2	246	-	-	-	-	-
Approach	EB	SE	NW			
HCM Control Delay, s	163	0	7.4			
HCM LOS	F					
Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER	
Capacity (veh/h)	1117	-	198	-	-	
HCM Lane V/C Ratio	0.331	-	1.16	-	-	
HCM Control Delay (s)	9.8	0	163	-	-	
HCM Lane LOS	A	A	F	-	-	
HCM 95th %tile Q(veh)	1.5	-	11.5	-	-	






Intersection						
Int Delay, s/veh	4.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	93	135	109	49	11
Future Vol, veh/h	7	93	135	109	49	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	3	3	38	9	0
Mvmt Flow	8	104	152	122	55	12
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	487	61	55	0	-	0
Stage 1	61	-	-	-	-	-
Stage 2	426	-	-	-	-	-
Critical Hdwy	6.4	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	543	1001	1544	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	490	1001	1544	-	-	-
Mov Cap-2 Maneuver	490	-	-	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.4	4.2		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1544	-	933	-	-	
HCM Lane V/C Ratio	0.098	-	0.12	-	-	
HCM Control Delay (s)	7.6	-	9.4	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0.3	-	0.4	-	-	

HCM 6th TWSC
6: SW US Veterans Hospital Rd & Building T-51

01/27/2022

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	11	92	291	148	20
Future Vol, veh/h	4	11	92	291	148	20
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	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	16	5	0
Mvmt Flow	5	13	108	342	174	24

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	744	186	198
Stage 1	186	-	-
Stage 2	558	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	385	861	1387
Stage 1	851	-	-
Stage 2	577	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	355	861	1387
Mov Cap-2 Maneuver	355	-	-
Stage 1	785	-	-
Stage 2	577	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	1.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1387	-	624	-	-
HCM Lane V/C Ratio	0.078	-	0.028	-	-
HCM Control Delay (s)	7.8	-	10.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.1	-	-

Intersection

Int Delay, s/veh 1.5

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 0 0 145 445 139 9

Future Vol, veh/h 0 0 145 445 139 9

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 83 83 83 83 83 83

Heavy Vehicles, % 0 0 0 10 3 17

Mvmt Flow 0 0 175 536 167 11

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1059 173 178 0 - 0

Stage 1 173 - - - - -

Stage 2 886 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 251 876 1410 - - -

Stage 1 862 - - - - -

Stage 2 406 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 207 876 1410 - - -

Mov Cap-2 Maneuver 207 - - - - -

Stage 1 709 - - - - -

Stage 2 406 - - - - -

Approach EB NB SB

HCM Control Delay, s 0 1.9 0

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1410 - - - -

HCM Lane V/C Ratio 0.124 - - - -

HCM Control Delay (s) 7.9 0 0 - -

HCM Lane LOS A A A - -

HCM 95th %tile Q(veh) 0.4 - - - -

Intersection

Int Delay, s/veh 12.3

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 94 49 289 161 112 315

Future Vol, veh/h 94 49 289 161 112 315

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 89 89 89 89 89 89

Heavy Vehicles, % 5 0 4 1 6 11

Mvmt Flow 106 55 325 181 126 354

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1134 303 480 0 - 0

Stage 1 303 - - - - -

Stage 2 831 - - - - -

Critical Hdwy 6.45 6.2 4.14 - - -

Critical Hdwy Stg 1 5.45 - - - - -

Critical Hdwy Stg 2 5.45 - - - - -

Follow-up Hdwy 3.545 3.3 2.236 - - -

Pot Cap-1 Maneuver 221 741 1072 - - -

Stage 1 742 - - - - -

Stage 2 423 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 147 741 1072 - - -

Mov Cap-2 Maneuver 147 - - - - -

Stage 1 492 - - - - -

Stage 2 423 - - - - -

Approach EB NB SB

HCM Control Delay, s 68.1 6.3 0

HCM LOS F

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR




Capacity (veh/h) 1072 - 203 - -

HCM Lane V/C Ratio 0.303 - 0.791 - -

HCM Control Delay (s) 9.8 0 68.1 - -

HCM Lane LOS A A F - -

HCM 95th %tile Q(veh) 1.3 - 5.6 - -




Intersection						
Int Delay, s/veh	5.2					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	192	16	43	156	30	201
Future Vol, veh/h	192	16	43	156	30	201
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	226	19	51	184	35	236
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	245	0	522	236
Stage 1	-	-	-	-	236	-
Stage 2	-	-	-	-	286	-
Critical Hdwy	-	-	4.1	-	6.45	6.31
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.399
Pot Cap-1 Maneuver	-	-	1333	-	510	781
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	756	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1333	-	488	781
Mov Cap-2 Maneuver	-	-	-	-	488	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	723	-
Approach	EB		WB		NE	
HCM Control Delay, s	0		1.7		12.9	
HCM LOS					B	
Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	725	-	-	1333	-	
HCM Lane V/C Ratio	0.375	-	-	0.038	-	
HCM Control Delay (s)	12.9	-	-	7.8	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	1.7	-	-	0.1	-	

HCM 6th TWSC
2: S Gaines St & SW US Veterans Hospital Rd

01/27/2022

Intersection




Int Delay, s/veh 5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	7	52	30	43	65	12
Future Vol, veh/h	7	52	30	43	65	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	38	53	6	0
Mvmt Flow	9	63	37	52	79	15

Major/Minor	Major1	Minor2
Conflicting Flow All	0	0 41 72
Stage 1	-	- 0 0
Stage 2	-	- 41 72
Critical Hdwy	-	- 6.78 7.03
Critical Hdwy Stg 1	-	- - -
Critical Hdwy Stg 2	-	- 5.78 6.03
Follow-up Hdwy	-	- 3.842 4.477
Pot Cap-1 Maneuver	-	- 886 730
Stage 1	-	- - -
Stage 2	-	- 897 745
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 886 0
Mov Cap-2 Maneuver	-	- 886 0
Stage 1	-	- - 0
Stage 2	-	- 897 0

Approach	EB	WB
HCM Control Delay, s	0	9.5
HCM LOS		A

Minor Lane/Major Mvmt	EBT	EBRWBLn1
Capacity (veh/h)	-	- 886
HCM Lane V/C Ratio	-	- 0.1
HCM Control Delay (s)	-	- 9.5
HCM Lane LOS	-	- A
HCM 95th %tile Q(veh)	-	- 0.3

Intersection						
Int Delay, s/veh	5.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	17	66	103	37	49	33
Future Vol, veh/h	17	66	103	37	49	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	20	77	120	43	57	38
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	97	0	342	59
Stage 1	-	-	-	-	59	-
Stage 2	-	-	-	-	283	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1509	-	658	1012
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	770	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1509	-	605	1012
Mov Cap-2 Maneuver	-	-	-	-	605	-
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	708	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		5.6		10.7	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	722	-	-	1509	-	
HCM Lane V/C Ratio	0.132	-	-	0.079	-	
HCM Control Delay (s)	10.7	-	-	7.6	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.5	-	-	0.3	-	

Intersection

Int Delay, s/veh 16

Movement EBL EBR SET SER NWL NWTLane Configurations 

Traffic Vol, veh/h 192 246 91 39 111 251

Future Vol, veh/h 192 246 91 39 111 251

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - 0 - - 0

Grade, % 0 - 0 - - 0

Peak Hour Factor 94 94 94 94 94 94

Heavy Vehicles, % 14 5 25 0 1 2

Mvmt Flow 204 262 97 41 118 267

Major/Minor Minor1 Major1 Major2

Conflicting Flow All 621 118 0 0 138 0

Stage 1 118 - - - - -

Stage 2 503 - - - - -

Critical Hdwy 6.54 6.25 - - 4.11 -

Critical Hdwy Stg 1 5.54 - - - - -

Critical Hdwy Stg 2 5.54 - - - - -

Follow-up Hdwy 3.626 3.345 - - 2.209 -

Pot Cap-1 Maneuver 432 926 - - 1452 -

Stage 1 878 - - - - -

Stage 2 584 - - - - -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 391 926 - - 1452 -

Mov Cap-2 Maneuver 391 - - - - -

Stage 1 878 - - - - -

Stage 2 529 - - - - -

Approach EB SE NW

HCM Control Delay, s 32 0 2.4

HCM LOS D

Minor Lane/Major Mvmt NWL NWT EBLn1 SET SER

Capacity (veh/h) 1452 - 579 - -

HCM Lane V/C Ratio 0.081 - 0.805 - -

HCM Control Delay (s) 7.7 0 32 - -

HCM Lane LOS A A D - -

HCM 95th %tile Q(veh) 0.3 - 7.9 - -

Intersection

Int Delay, s/veh 4.1

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 11 73 67 100 56 6

Future Vol, veh/h 11 73 67 100 56 6

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - Stop

Storage Length 0 - 0 - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 86 86 86 86 86 86

Heavy Vehicles, % 13 6 6 39 8 0

Mvmt Flow 13 85 78 116 65 7

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 341 69 65 0 - 0

Stage 1 69 - - - - -

Stage 2 272 - - - - -

Critical Hdwy 6.53 6.26 4.16 - - -

Critical Hdwy Stg 1 5.53 - - - - -

Critical Hdwy Stg 2 5.53 - - - - -

Follow-up Hdwy 3.617 3.354 2.254 - - -

Pot Cap-1 Maneuver 633 983 1512 - - -

Stage 1 927 - - - - -

Stage 2 749 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 600 983 1512 - - -

Mov Cap-2 Maneuver 600 - - - - -

Stage 1 879 - - - - -

Stage 2 749 - - - - -

Approach EB NB SB

HCM Control Delay, s 9.4 3 0

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1512 - 907 - -

HCM Lane V/C Ratio 0.052 - 0.108 - -

HCM Control Delay (s) 7.5 - 9.4 - -

HCM Lane LOS A - A - -






HCM 95th %tile Q(veh) 0.2 - 0.4 - -

HCM 6th TWSC
6: SW US Veterans Hospital Rd & Building T-51

01/27/2022

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	99	11	152	192	0
Future Vol, veh/h	11	99	11	152	192	0
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	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	14	124	14	190	240	0




Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	458	240	240
Stage 1	240	-	-
Stage 2	218	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	565	804	1339
Stage 1	805	-	-
Stage 2	823	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	559	804	1339
Mov Cap-2 Maneuver	559	-	-
Stage 1	797	-	-
Stage 2	823	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1339	-	770	-	-
HCM Lane V/C Ratio	0.01	-	0.179	-	-
HCM Control Delay (s)	7.7	-	10.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	109	0	151	360	0
Future Vol, veh/h	3	109	0	151	360	0
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	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	28	2	0
Mvmt Flow	4	138	0	191	456	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	647	456	456
Stage 1	456	-	-
Stage 2	191	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	439	609	1115
Stage 1	643	-	-
Stage 2	846	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	439	609	1115
Mov Cap-2 Maneuver	439	-	-
Stage 1	643	-	-
Stage 2	846	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1115	-	603	-	-
HCM Lane V/C Ratio	-	-	0.235	-	-
HCM Control Delay (s)	0	-	12.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection

Int Delay, s/veh 25.2

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 241 234 80 135 164 72

Future Vol, veh/h 241 234 80 135 164 72

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 89 89 89 89 89 89

Heavy Vehicles, % 5 0 4 1 6 11

Mvmt Flow 271 263 90 152 184 81

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 557 225 265 0 - 0

Stage 1 225 - - - - -

Stage 2 332 - - - - -

Critical Hdwy 6.45 6.2 4.14 - - -

Critical Hdwy Stg 1 5.45 - - - - -

Critical Hdwy Stg 2 5.45 - - - - -

Follow-up Hdwy 3.545 3.3 2.236 - - -

Pot Cap-1 Maneuver 486 819 1287 - - -

Stage 1 805 - - - - -

Stage 2 720 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 449 819 1287 - - -

Mov Cap-2 Maneuver 449 - - - - -

Stage 1 744 - - - - -

Stage 2 720 - - - - -

Approach EB NB SB

HCM Control Delay, s 47.7 3 0

HCM LOS E

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1287 - 578 - -

HCM Lane V/C Ratio 0.07 - 0.923 - -

HCM Control Delay (s) 8 0 47.7 - -

HCM Lane LOS A A E - -

HCM 95th %tile Q(veh) 0.2 - 11.6 - -

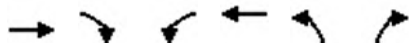
HCM 6th Edition methodology does not support Non-NEMA phasing.

HCM 6th Edition methodology does not support Non-NEMA phasing.

HCM 6th Signalized Intersection Summary

29:

01/27/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↱	↱	↱	↱
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (veh/h)	0	0	0	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	748	0	160	748	713	634
Arrive On Green	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1870	0	1781	1870	1781	1585
Grp Volume(v), veh/h	0	0	0	0	0	0
Grp Sat Flow(s),veh/h/ln	1870	0	1781	1870	1781	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane		0.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	748	0	160	748	713	634
V/C Ratio(X)	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c_a), veh/h	748	0	160	748	713	634
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A
Approach Vol, veh/h	0			0	0	
Approach Delay, s/veh	0.0			0.0	0.0	
Approach LOS						
Timer - Assigned Phs	2		4		8	
Phs Duration (G+Y+Rc), s	22.5		22.5		22.5	
Change Period (Y+Rc), s	4.5		4.5		4.5	
Max Green Setting (Gmax), s	18.0		18.0		18.0	
Max Q Clear Time (g_c+l1), s	0.0		0.0		0.0	
Green Ext Time (p_c), s	0.0		0.0		0.0	
Intersection Summary						
HCM 6th Ctrl Delay			0.0			
HCM 6th LOS			A			

Appendix E
2030 No-build Synchro Reports

Intersection

Int Delay, s/veh 3.6

Movement EBT EBR WBL WBT NEL NERLane Configurations 

Traffic Vol, veh/h 237 41 141 106 7 83

Future Vol, veh/h 237 41 141 106 7 83

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Free Free Free Free Stop Stop

RT Channelized - None - None - None

Storage Length - - - - 0 -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 89 89 89 89 89 89

Heavy Vehicles, % 8 0 0 4 0 34

Mvmt Flow 266 46 158 119 8 93

Major/Minor Major1 Major2 Minor1

Conflicting Flow All 0 0 312 0 724 289

Stage 1 - - - - 289 -

Stage 2 - - - - 435 -

Critical Hdwy - - 4.1 - 6.4 6.54

Critical Hdwy Stg 1 - - - - 5.4 -

Critical Hdwy Stg 2 - - - - 5.4 -

Follow-up Hdwy - - 2.2 - 3.5 3.606

Pot Cap-1 Maneuver - - 1260 - 396 680

Stage 1 - - - - 765 -

Stage 2 - - - - 657 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver - - 1260 - 343 680

Mov Cap-2 Maneuver - - - - 343 -

Stage 1 - - - - 765 -

Stage 2 - - - - 569 -

Approach EB WB NE

HCM Control Delay, s 0 4.7 11.8

HCM LOS B

Minor Lane/Major Mvmt NELn1 EBT EBR WBL WBT

Capacity (veh/h) 632 - - 1260 -

HCM Lane V/C Ratio 0.16 - - 0.126 -





HCM Control Delay (s) 11.8 - - 8.3 0

HCM Lane LOS B - - A A

HCM 95th %tile Q(veh) 0.6 - - 0.4 -

Intersection

Int Delay, s/veh 3.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	47	51	7	14	64
Future Vol, veh/h	25	47	51	7	14	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	56	60	6	0	0	0
Mvmt Flow	30	57	62	9	17	78

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	179	67	0	0	71
Stage 1	67	-	-	-	-
Stage 2	112	-	-	-	-
Critical Hdwy	6.96	6.8	-	-	4.1
Critical Hdwy Stg 1	5.96	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-
Follow-up Hdwy	4.004	3.84	-	-	2.2
Pot Cap-1 Maneuver	702	856	-	-	1542
Stage 1	835	-	-	-	-
Stage 2	794	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	694	856	-	-	1542
Mov Cap-2 Maneuver	694	-	-	-	-
Stage 1	835	-	-	-	-
Stage 2	784	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.3
HCM LOS	A		




Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 694 856 1542	-	-
HCM Lane V/C Ratio	-	- 0.044 0.067 0.011	-	-
HCM Control Delay (s)	-	- 10.4 9.5 7.4	0	
HCM Lane LOS	-	- B A A	A	A
HCM 95th %tile Q(veh)	-	- 0.1 0.2 0	-	-

HCM 6th TWSC
3: SW 6th Ave Dr & S Gaines St

01/21/2022

Intersection

Int Delay, s/veh 6.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	24	32	22	47	36	133
Future Vol, veh/h	24	32	22	47	36	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	27	36	25	53	40	149




Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	63
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1553
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1553
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	973	-	-	1553	-
HCM Lane V/C Ratio	0.195	-	-	0.016	-
HCM Control Delay (s)	9.6	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0	-

HCM 6th TWSC
4: SW Terwilliger Blvd & SW Campus Dr

01/21/2022

Intersection						
Int Delay, s/veh	74.2					
Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	113	118	294	162	371	119
Future Vol, veh/h	113	118	294	162	371	119
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	91	91	91	91	91	91
Heavy Vehicles, %	24	3	14	3	0	5
Mvmt Flow	124	130	323	178	408	131
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1359	412	0	0	501	0
Stage 1	412	-	-	-	-	-
Stage 2	947	-	-	-	-	-
Critical Hdwy	6.64	6.23	-	-	4.1	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	-	-	2.2	-
Pot Cap-1 Maneuver	147	638	-	-	1074	-
Stage 1	624	-	-	-	-	-
Stage 2	344	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 87	638	-	-	1074	-
Mov Cap-2 Maneuver	~ 87	-	-	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	203	-	-	-	-	-
Approach	EB	SE	NW			
HCM Control Delay, s	361.1	0	7.9			
HCM LOS	F					
Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER	
Capacity (veh/h)	1074	-	156	-	-	
HCM Lane V/C Ratio	0.38	-	1.627	-	-	
HCM Control Delay (s)	10.4	0	361.1	-	-	
HCM Lane LOS	B	A	F	-	-	
HCM 95th %tile Q(veh)	1.8	-	17.6	-	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Intersection

Int Delay, s/veh 4.9

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 8 104 149 120 54 13

Future Vol, veh/h 8 104 149 120 54 13

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - Stop

Storage Length 0 - 0 - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 89 89 89 89 89 89

Heavy Vehicles, % 0 3 3 38 9 0

Mvmt Flow 9 117 167 135 61 15

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 538 69 61 0 - 0

Stage 1 69 - - - - -

Stage 2 469 - - - - -

Critical Hdwy 6.4 6.23 4.13 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.327 2.227 - - -

Pot Cap-1 Maneuver 508 991 1536 - - -

Stage 1 959 - - - - -

Stage 2 634 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 453 991 1536 - - -

Mov Cap-2 Maneuver 453 - - - - -

Stage 1 854 - - - - -

Stage 2 634 - - - - -

Approach EB NB SB

HCM Control Delay, s 9.6 4.2 0

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1536 - 914 - -

HCM Lane V/C Ratio 0.109 - 0.138 - -






HCM Control Delay (s) 7.6 - 9.6 - -

HCM Lane LOS A - A - -

HCM 95th %tile Q(veh) 0.4 - 0.5 - -

HCM 6th TWSC
6: Building T-51 & SW US Veterans Hospital Rd

01/21/2022

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	13	102	323	163	22
Future Vol, veh/h	4	13	102	323	163	22
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	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	16	5	0
Mvmt Flow	5	15	120	380	192	26

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	825	205	218	0	-	0
Stage 1	205	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	345	841	1364	-	-	-
Stage 1	834	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	315	841	1364	-	-	-
Mov Cap-2 Maneuver	315	-	-	-	-	-
Stage 1	761	-	-	-	-	-
Stage 2	540	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	1.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1364	-	604	-	-
HCM Lane V/C Ratio	0.088	-	0.033	-	-
HCM Control Delay (s)	7.9	-	11.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.1	-	-

Intersection

Int Delay, s/veh 1.6

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 0 0 160 493 155 10

Future Vol, veh/h 0 0 160 493 155 10

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 83 83 83 83 83 83

Heavy Vehicles, % 0 0 0 10 3 17

Mvmt Flow 0 0 193 594 187 12

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1173 193 199 0 - 0

Stage 1 193 - - - - -

Stage 2 980 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 214 854 1385 - - -

Stage 1 845 - - - - -

Stage 2 367 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 169 854 1385 - - -

Mov Cap-2 Maneuver 169 - - - - -

Stage 1 669 - - - - -

Stage 2 367 - - - - -

Approach EB NB SB

HCM Control Delay, s 0 2 0

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1385 - - - -

HCM Lane V/C Ratio 0.139 - - - -




HCM Control Delay (s) 8 0 0 - -

HCM Lane LOS A A A - -

HCM 95th %tile Q(veh) 0.5 - - - -

HCM 6th TWSC
8: SW Terwilliger Blvd & SW US Veterans Hospital Rd




01/21/2022

Intersection						
Int Delay, s/veh	25.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	54	319	178	124	348
Future Vol, veh/h	104	54	319	178	124	348
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	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	117	61	358	200	139	391
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1251	335	530	0	-	0
Stage 1	335	-	-	-	-	-
Stage 2	916	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	188	712	1027	-	-	-
Stage 1	718	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 114	712	1027	-	-	-
Mov Cap-2 Maneuver	~ 114	-	-	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	161	6.7		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1027	-	160	-	-	
HCM Lane V/C Ratio	0.349	-	1.11	-	-	
HCM Control Delay (s)	10.4	0	161	-	-	
HCM Lane LOS	B	A	F	-	-	
HCM 95th %tile Q(veh)	1.6	-	9.3	-	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 6th TWSC




1: SW US Veterans Hospital Rd & SW Gibbs St/SW Sam Jackson Park Rd

01/21/2022

Intersection						
Int Delay, s/veh	5.6					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	212	18	47	172	33	222
Future Vol, veh/h	212	18	47	172	33	222
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	249	21	55	202	39	261
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	270	0	572	260
Stage 1	-	-	-	-	260	-
Stage 2	-	-	-	-	312	-
Critical Hdwy	-	-	4.1	-	6.45	6.31
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.399
Pot Cap-1 Maneuver	-	-	1305	-	477	757
Stage 1	-	-	-	-	777	-
Stage 2	-	-	-	-	735	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1305	-	455	757
Mov Cap-2 Maneuver	-	-	-	-	455	-
Stage 1	-	-	-	-	777	-
Stage 2	-	-	-	-	700	-
Approach	EB		WB		NE	
HCM Control Delay, s	0		1.7		14	
HCM LOS	B					
Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	697	-	-	1305	-	
HCM Lane V/C Ratio	0.43	-	-	0.042	-	
HCM Control Delay (s)	14	-	-	7.9	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	2.2	-	-	0.1	-	

HCM 6th TWSC
2: S Gaines St & SW US Veterans Hospital Rd

01/21/2022




Intersection						
Int Delay, s/veh	3.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	47	72	12	8	57
Future Vol, veh/h	33	47	72	12	8	57
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	82	82	82	82	82	82
Heavy Vehicles, %	38	53	6	0	0	0
Mvmt Flow	40	57	88	15	10	70
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	186	96	0	0	103	0
Stage 1	96	-	-	-	-	-
Stage 2	90	-	-	-	-	-
Critical Hdwy	6.78	6.73	-	-	4.1	-
Critical Hdwy Stg 1	5.78	-	-	-	-	-
Critical Hdwy Stg 2	5.78	-	-	-	-	-
Follow-up Hdwy	3.842	3.777	-	-	2.2	-
Pot Cap-1 Maneuver	728	837	-	-	1502	-
Stage 1	845	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	723	837	-	-	1502	-
Mov Cap-2 Maneuver	723	-	-	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	845	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	9.6	0		0.9		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	837		1502	-	
HCM Lane V/C Ratio	-	0.068		0.006	-	
HCM Control Delay (s)	-	9.6		7.4	0	
HCM Lane LOS	-	A		A	A	
HCM 95th %tile Q(veh)	-	0.2		0	-	

HCM 6th TWSC
3: SW 6th Ave Dr & S Gaines St

01/21/2022

Intersection

Int Delay, s/veh 5.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	15	80	118	43	55	36
Future Vol, veh/h	15	80	118	43	55	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	17	93	137	50	64	42

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	110
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1493
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1493
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	11.3
HCM LOS			B




Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	680	-	-	1493	-
HCM Lane V/C Ratio	0.156	-	-	0.092	-
HCM Control Delay (s)	11.3	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.3	-

HCM 6th TWSC
4: SW Terwilliger Blvd & SW Campus Dr

01/21/2022

Intersection






Int Delay, s/veh 27.8

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	212	272	101	43	123	277
Future Vol, veh/h	212	272	101	43	123	277
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	14	5	25	0	1	2
Mvmt Flow	226	289	107	46	131	295

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	687	130	0
Stage 1	130	-	-
Stage 2	557	-	-
Critical Hdwy	6.54	6.25	-
Critical Hdwy Stg 1	5.54	-	-
Critical Hdwy Stg 2	5.54	-	-
Follow-up Hdwy	3.626	3.345	-
Pot Cap-1 Maneuver	395	912	-
Stage 1	867	-	-
Stage 2	551	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	352	912	-
Mov Cap-2 Maneuver	352	-	-
Stage 1	867	-	-
Stage 2	491	-	-

Approach	EB	SE	NW
HCM Control Delay, s	57	0	2.4
HCM LOS	F		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1434	-	537	-	-
HCM Lane V/C Ratio	0.091	-	0.959	-	-
HCM Control Delay (s)	7.8	0	57	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	12.6	-	-






Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	81	75	112	62	7
Future Vol, veh/h	13	81	75	112	62	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	13	6	6	39	8	0
Mvmt Flow	15	94	87	130	72	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	380	76	72	0	-	0
Stage 1	76	-	-	-	-	-
Stage 2	304	-	-	-	-	-
Critical Hdwy	6.53	6.26	4.16	-	-	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.354	2.254	-	-	-
Pot Cap-1 Maneuver	601	974	1503	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	724	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	566	974	1503	-	-	-
Mov Cap-2 Maneuver	566	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	724	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.6	3		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1503	-	886	-	-	
HCM Lane V/C Ratio	0.058	-	0.123	-	-	
HCM Control Delay (s)	7.5	-	9.6	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-	

HCM 6th TWSC
6: Building T-51 & SW US Veterans Hospital Rd

01/21/2022

Intersection

Int Delay, s/veh 2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	109	13	169	213	0
Future Vol, veh/h	13	109	13	169	213	0
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	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	16	136	16	211	266	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	509	266	266
Stage 1	266	-	-
Stage 2	243	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	528	778	1310
Stage 1	783	-	-
Stage 2	802	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	522	778	1310
Mov Cap-2 Maneuver	522	-	-
Stage 1	774	-	-
Stage 2	802	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1310	-	739	-	-
HCM Lane V/C Ratio	0.012	-	0.206	-	-
HCM Control Delay (s)	7.8	-	11.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection

Int Delay, s/veh 2.5

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 3 120 0 167 399 0

Future Vol, veh/h 3 120 0 167 399 0

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 79 79 79 79 79 79

Heavy Vehicles, % 0 0 0 28 2 0

Mvmt Flow 4 152 0 211 505 0

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 716 505 505 0 - 0

Stage 1 505 - - - - -

Stage 2 211 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 400 571 1070 - - -

Stage 1 610 - - - - -

Stage 2 829 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 400 571 1070 - - -

Mov Cap-2 Maneuver 400 - - - - -

Stage 1 610 - - - - -

Stage 2 829 - - - - -

Approach EB NB SB

HCM Control Delay, s 13.8 0 0

HCM LOS B

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1070 - 565 - -

HCM Lane V/C Ratio - - 0.276 - -

HCM Control Delay (s) 0 - 13.8 - -

HCM Lane LOS A - B - -

HCM 95th %tile Q(veh) 0 - 1.1 - -

Intersection

Int Delay, s/veh 49.7

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 267 260 89 149 181 80

Future Vol, veh/h 267 260 89 149 181 80

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 89 89 89 89 89 89

Heavy Vehicles, % 5 0 4 1 6 11

Mvmt Flow 300 292 100 167 203 90

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 615 248 293 0 - 0

Stage 1 248 - - - - -

Stage 2 367 - - - - -

Critical Hdwy 6.45 6.2 4.14 - - -

Critical Hdwy Stg 1 5.45 - - - - -

Critical Hdwy Stg 2 5.45 - - - - -

Follow-up Hdwy 3.545 3.3 2.236 - - -

Pot Cap-1 Maneuver 450 796 1257 - - -

Stage 1 786 - - - - -

Stage 2 694 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 410 796 1257 - - -

Mov Cap-2 Maneuver 410 - - - - -

Stage 1 717 - - - - -

Stage 2 694 - - - - -

Approach EB NB SB

HCM Control Delay, s 95.5 3 0

HCM LOS F

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1257 - 539 - -

HCM Lane V/C Ratio 0.08 - 1.099 - -

HCM Control Delay (s) 8.1 0 95.5 - -

HCM Lane LOS A A F - -

HCM 95th %tile Q(veh) 0.3 - 18.6 - -

Appendix F
2030 Build Synchro Reports




HCM 6th TWSC

1: SW US Veterans Hospital Rd & SW Gibbs St/SW Sam Jackson Park Rd

01/21/2022

Intersection

Int Delay, s/veh 4.1

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	237	62	184	106	8	92
Future Vol, veh/h	237	62	184	106	8	92
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	8	0	0	4	0	34
Mvmt Flow	266	70	207	119	9	103





Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	336
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1235
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1235
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NE
HCM Control Delay, s	0	5.4	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	602	-	-	1235	-
HCM Lane V/C Ratio	0.187	-	-	0.167	-
HCM Control Delay (s)	12.3	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.6	-

Intersection




Int Delay, s/veh 4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	57	51	38	78	64
Future Vol, veh/h	26	57	51	38	78	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	56	60	6	0	0	0
Mvmt Flow	32	70	62	46	95	78

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	353	85	0
Stage 1	85	-	-
Stage 2	268	-	-
Critical Hdwy	6.96	6.8	-
Critical Hdwy Stg 1	5.96	-	-
Critical Hdwy Stg 2	5.96	-	-
Follow-up Hdwy	4.004	3.84	-
Pot Cap-1 Maneuver	549	835	-
Stage 1	819	-	-
Stage 2	667	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	513	835	-
Mov Cap-2 Maneuver	513	-	-
Stage 1	819	-	-
Stage 2	623	-	-




Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	4.2
HCM LOS	B		





Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 513 835 1495	-	-
HCM Lane V/C Ratio	-	- 0.062 0.083 0.064	-	-
HCM Control Delay (s)	-	- 12.5 9.7 7.6	0	0
HCM Lane LOS	-	- B A A	A	A
HCM 95th %tile Q(veh)	-	- 0.2 0.3 0.2	-	-

Intersection						
Int Delay, s/veh	6.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	30	32	22	47	36	158
Future Vol, veh/h	30	32	22	47	36	158
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	34	36	25	53	40	178
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	70	0	155	52
Stage 1	-	-	-	-	52	-
Stage 2	-	-	-	-	103	-
Critical Hdwy	-	-	4.1	-	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	-	-	2.2	-	3.617	3.3
Pot Cap-1 Maneuver	-	-	1544	-	811	1021
Stage 1	-	-	-	-	943	-
Stage 2	-	-	-	-	894	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1544	-	797	1021
Mov Cap-2 Maneuver	-	-	-	-	797	-
Stage 1	-	-	-	-	943	-
Stage 2	-	-	-	-	879	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.3		9.8	
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	970	-	-	1544	-	
HCM Lane V/C Ratio	0.225	-	-	0.016	-	
HCM Control Delay (s)	9.8	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.9	-	-	0	-	

HCM 6th TWSC
4: SW Terwilliger Blvd & SW Campus Dr

01/21/2022

Intersection						
Int Delay, s/veh	85.6					
Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	113	118	326	162	371	130
Future Vol, veh/h	113	118	326	162	371	130
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	91	91	91	91	91	91
Heavy Vehicles, %	24	3	14	3	0	5
Mvmt Flow	124	130	358	178	408	143
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1406	447	0	0	536	0
Stage 1	447	-	-	-	-	-
Stage 2	959	-	-	-	-	-
Critical Hdwy	6.64	6.23	-	-	4.1	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	-	-	2.2	-
Pot Cap-1 Maneuver	137	609	-	-	1042	-
Stage 1	600	-	-	-	-	-
Stage 2	340	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 79	609	-	-	1042	-
Mov Cap-2 Maneuver	~ 79	-	-	-	-	-
Stage 1	600	-	-	-	-	-
Stage 2	195	-	-	-	-	-
Approach	EB	SE	NW			
HCM Control Delay, s	435.2	0	7.9			
HCM LOS	F					
Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER	
Capacity (veh/h)	1042	-	142	-	-	
HCM Lane V/C Ratio	0.391	-	1.788	-	-	
HCM Control Delay (s)	10.7	0	435.2	-	-	
HCM Lane LOS	B	A	F	-	-	
HCM 95th %tile Q(veh)	1.9	-	19	-	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	104	149	184	68	13
Future Vol, veh/h	8	104	149	184	68	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	3	3	38	9	0
Mvmt Flow	9	117	167	207	76	15
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	625	84	76	0	-	0
Stage 1	84	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hdwy	6.4	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	452	972	1517	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	402	972	1517	-	-	-
Mov Cap-2 Maneuver	402	-	-	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.8	3.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1517	-	883	-	-	
HCM Lane V/C Ratio	0.11	-	0.143	-	-	
HCM Control Delay (s)	7.7	-	9.8	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-	

HCM 6th TWSC
6: Building T-51 & SW US Veterans Hospital Rd

01/21/2022

Intersection

Int Delay, s/veh 1.5

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations 

Traffic Vol, veh/h 4 13 102 387 177 22

Future Vol, veh/h 4 13 102 387 177 22

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 - 30 - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 85 85 85 85 85 85

Heavy Vehicles, % 0 0 0 16 5 0

Mvmt Flow 5 15 120 455 208 26

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 916 221 234 0 - 0

Stage 1 221 - - - - -

Stage 2 695 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 305 824 1345 - - -

Stage 1 821 - - - - -

Stage 2 499 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 278 824 1345 - - -

Mov Cap-2 Maneuver 278 - - - - -

Stage 1 748 - - - - -

Stage 2 499 - - - - -

Approach EB NB SB

HCM Control Delay, s 11.6 1.7 0

HCM LOS B

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1345 - 564 - -

HCM Lane V/C Ratio 0.089 - 0.035 - -

HCM Control Delay (s) 7.9 - 11.6 - -

HCM Lane LOS A - B - -

HCM 95th %tile Q(veh) 0.3 - 0.1 - -

Intersection

Int Delay, s/veh 1.9

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 0 6 213 557 169 10

Future Vol, veh/h 0 6 213 557 169 10

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 83 83 83 83 83 83

Heavy Vehicles, % 0 0 0 10 3 17

Mvmt Flow 0 7 257 671 204 12

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1395 210 216 0 - 0

Stage 1 210 - - - - -

Stage 2 1185 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 157 835 1366 - - -

Stage 1 830 - - - - -

Stage 2 293 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 110 835 1366 - - -

Mov Cap-2 Maneuver 110 - - - - -

Stage 1 581 - - - - -

Stage 2 293 - - - - -

Approach EB NB SB

HCM Control Delay, s 9.3 2.3 0

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR




Capacity (veh/h) 1366 - 835 - -

HCM Lane V/C Ratio 0.188 - 0.009 - -

HCM Control Delay (s) 8.2 0 9.3 - -

HCM Lane LOS A A A - -




HCM 95th %tile Q(veh) 0.7 - 0 - -

Intersection						
Int Delay, s/veh	82.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	115	62	404	178	124	380
Future Vol, veh/h	115	62	404	178	124	380
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	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	129	70	454	200	139	427
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1461	353	566	0	-	0
Stage 1	353	-	-	-	-	-
Stage 2	1108	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	140	695	996	-	-	-
Stage 1	705	-	-	-	-	-
Stage 2	312	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 68	695	996	-	-	-
Mov Cap-2 Maneuver	~ 68	-	-	-	-	-
Stage 1	343	-	-	-	-	-
Stage 2	312	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s\$	558.9		8.1		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL		NBT	EBLn1	SBT	SBR
Capacity (veh/h)	996		-	99	-	-
HCM Lane V/C Ratio	0.456		-	2.009	-	-
HCM Control Delay (s)	11.6		0\$ 558.9		-	-
HCM Lane LOS	B		A	F	-	-
HCM 95th %tile Q(veh)	2.4		-	16.9	-	-
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 6th TWSC





1: SW US Veterans Hospital Rd & SW Gibbs St/SW Sam Jackson Park Rd

01/21/2022

Intersection						
Int Delay, s/veh	7					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	213	19	50	173	42	268
Future Vol, veh/h	213	19	50	173	42	268
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	251	22	59	204	49	315
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	273	0	584	262
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	322	-
Critical Hdwy	-	-	4.1	-	6.45	6.31
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.399
Pot Cap-1 Maneuver	-	-	1302	-	469	755
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	728	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1302	-	445	755
Mov Cap-2 Maneuver	-	-	-	-	445	-
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	691	-
Approach	EB	WB		NE		
HCM Control Delay, s	0	1.8		15.9		
HCM LOS	C					
Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	690	-	-	1302	-	
HCM Lane V/C Ratio	0.529	-	-	0.045	-	
HCM Control Delay (s)	15.9	-	-	7.9	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	3.1	-	-	0.1	-	

Intersection

Int Delay, s/veh 5.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	60	101	72	17	12	57
Future Vol, veh/h	60	101	72	17	12	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	38	53	6	0	0	0
Mvmt Flow	73	123	88	21	15	70

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	199	99	0	0	109
Stage 1	99	-	-	-	-
Stage 2	100	-	-	-	-
Critical Hdwy	6.78	6.73	-	-	4.1
Critical Hdwy Stg 1	5.78	-	-	-	-
Critical Hdwy Stg 2	5.78	-	-	-	-
Follow-up Hdwy	3.842	3.777	-	-	2.2
Pot Cap-1 Maneuver	715	834	-	-	1494
Stage 1	842	-	-	-	-
Stage 2	841	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	708	834	-	-	1494
Mov Cap-2 Maneuver	708	-	-	-	-
Stage 1	842	-	-	-	-
Stage 2	833	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	1.3
HCM LOS	B		




Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 708 834 1494	-	-
HCM Lane V/C Ratio	-	- 0.103 0.148	0.01	-
HCM Control Delay (s)	-	- 10.7 10.1	7.4	0
HCM Lane LOS	-	- B B	A	A
HCM 95th %tile Q(veh)	-	- 0.3 0.5	0	-

HCM 6th TWSC
3: SW 6th Ave Dr & S Gaines St

01/21/2022

Intersection

Int Delay, s/veh 5.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	16	80	140	48	55	39
Future Vol, veh/h	16	80	140	48	55	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	19	93	163	56	64	45

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	112
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1490
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1490
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.7	11.8
HCM LOS			B




Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	638	-	-	1490	-
HCM Lane V/C Ratio	0.171	-	-	0.109	-
HCM Control Delay (s)	11.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.4	-

HCM 6th TWSC
4: SW Campus Dr & SW Terwilliger Blvd

01/21/2022

Intersection






Int Delay, s/veh 32.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	101	43	123	322	212	272
Future Vol, veh/h	101	43	123	322	212	272
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	25	0	1	2	14	5
Mvmt Flow	107	46	131	343	226	289

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	153
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.11
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.209
Pot Cap-1 Maneuver	-	-	1434
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1434
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	69.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	512	-	-	1434	-
HCM Lane V/C Ratio	1.006	-	-	0.091	-
HCM Control Delay (s)	69.7	-	-	7.8	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	14.1	-	-	0.3	-






Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	81	75	114	116	7
Future Vol, veh/h	13	81	75	114	116	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	13	6	6	39	8	0
Mvmt Flow	15	94	87	133	135	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	446	139	135	0	-	0
Stage 1	139	-	-	-	-	-
Stage 2	307	-	-	-	-	-
Critical Hdwy	6.53	6.26	4.16	-	-	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.354	2.254	-	-	-
Pot Cap-1 Maneuver	550	899	1425	-	-	-
Stage 1	861	-	-	-	-	-
Stage 2	722	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	516	899	1425	-	-	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	808	-	-	-	-	-
Stage 2	722	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.1	3.1		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1425	-	815	-	-	
HCM Lane V/C Ratio	0.061	-	0.134	-	-	
HCM Control Delay (s)	7.7	-	10.1	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-	

HCM 6th TWSC
6: Building T-51 & SW US Veterans Hospital Rd

01/21/2022

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	109	13	171	267	0
Future Vol, veh/h	13	109	13	171	267	0
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	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	16	136	16	214	334	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	580	334	334
Stage 1	334	-	-
Stage 2	246	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	480	712	1237
Stage 1	730	-	-
Stage 2	800	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	474	712	1237
Mov Cap-2 Maneuver	474	-	-
Stage 1	721	-	-
Stage 2	800	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.9	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1237	-	676	-	-
HCM Lane V/C Ratio	0.013	-	0.226	-	-
HCM Control Delay (s)	7.9	-	11.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection

Int Delay, s/veh 3.6

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 3 165 3 169 453 0

Future Vol, veh/h 3 165 3 169 453 0

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 79 79 79 79 79 79

Heavy Vehicles, % 0 0 0 28 2 0

Mvmt Flow 4 209 4 214 573 0

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 795 573 573 0 - 0

Stage 1 573 - - - - -

Stage 2 222 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 359 523 1010 - - -

Stage 1 568 - - - - -

Stage 2 820 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 358 523 1010 - - -

Mov Cap-2 Maneuver 358 - - - - -

Stage 1 566 - - - - -

Stage 2 820 - - - - -

Approach EB NB SB

HCM Control Delay, s 16.7 0.1 0

HCM LOS C

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1010 - 519 - -

HCM Lane V/C Ratio 0.004 - 0.41 - -




HCM Control Delay (s) 8.6 0 16.7 - -

HCM Lane LOS A A C - -

HCM 95th %tile Q(veh) 0 - 2 - -

Intersection

Int Delay, s/veh 97.9

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	181	80	93	149	312	314
Future Vol, veh/h	181	80	93	149	312	314
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	6	11	4	1	5	0
Mvmt Flow	203	90	104	167	351	353

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	293
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.14
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.236
Pot Cap-1 Maneuver	-	-	1257
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1257
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-




Approach	EB	WB	NE
HCM Control Delay, s	0	3.1	175.3
HCM LOS			F

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	537	-	-	1257	-
HCM Lane V/C Ratio	1.31	-	-	0.083	-
HCM Control Delay (s)	175.3	-	-	8.1	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	29.7	-	-	0.3	-

Appendix G
2030 Build Mitigated Synchro Reports

Intersection

Int Delay, s/veh 4.1

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	237	62	184	106	8	92
Future Vol, veh/h	237	62	184	106	8	92
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	8	0	0	4	0	34
Mvmt Flow	266	70	207	119	9	103





Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	336
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1235
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1235
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NE
HCM Control Delay, s	0	5.4	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	602	-	-	1235	-
HCM Lane V/C Ratio	0.187	-	-	0.167	-
HCM Control Delay (s)	12.3	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.6	-

Intersection

Int Delay, s/veh 4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	57	51	38	78	64
Future Vol, veh/h	26	57	51	38	78	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	56	60	6	0	0	0
Mvmt Flow	32	70	62	46	95	78

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	353	85	0	0	108
Stage 1	85	-	-	-	-
Stage 2	268	-	-	-	-
Critical Hdwy	6.96	6.8	-	-	4.1
Critical Hdwy Stg 1	5.96	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-
Follow-up Hdwy	4.004	3.84	-	-	2.2
Pot Cap-1 Maneuver	549	835	-	-	1495
Stage 1	819	-	-	-	-
Stage 2	667	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	513	835	-	-	1495
Mov Cap-2 Maneuver	513	-	-	-	-
Stage 1	819	-	-	-	-
Stage 2	623	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	4.2
HCM LOS	B		




Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 513 835 1495	-	-
HCM Lane V/C Ratio	-	- 0.062 0.083 0.064	-	-
HCM Control Delay (s)	-	- 12.5 9.7 7.6	0	
HCM Lane LOS	-	- B A A	A	
HCM 95th %tile Q(veh)	-	- 0.2 0.3 0.2	-	-

HCM 6th TWSC
3: SW 6th Ave Dr & S Gaines St

01/21/2022

Intersection

Int Delay, s/veh 6.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	30	32	22	47	36	158
Future Vol, veh/h	30	32	22	47	36	158
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	34	36	25	53	40	178

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	70
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1544
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1544
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.8
HCM LOS			A





Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	970	-	-	1544	-
HCM Lane V/C Ratio	0.225	-	-	0.016	-
HCM Control Delay (s)	9.8	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0	-

HCM 6th Signalized Intersection Summary

4: SW Terwilliger Blvd & SW Campus Dr





01/21/2022



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (veh/h)	113	118	326	162	371	130
Future Volume (veh/h)	113	118	326	162	371	130
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1544	1856	1693	1856	1900	1826
Adj Flow Rate, veh/h	124	130	358	178	408	143
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	24	3	14	3	0	5
Cap, veh/h	144	151	424	211	501	1164
Arrive On Green	0.21	0.21	0.40	0.40	0.17	0.64
Sat Flow, veh/h	673	705	1067	530	1810	1826
Grp Volume(v), veh/h	255	0	0	536	408	143
Grp Sat Flow(s),veh/h/ln	1384	0	0	1597	1810	1826
Q Serve(g_s), s	10.8	0.0	0.0	18.5	7.1	1.9
Cycle Q Clear(g_c), s	10.8	0.0	0.0	18.5	7.1	1.9
Prop In Lane	0.49	0.51		0.33	1.00	
Lane Grp Cap(c), veh/h	296	0	0	634	501	1164
V/C Ratio(X)	0.86	0.00	0.00	0.84	0.81	0.12
Avail Cap(c_a), veh/h	413	0	0	1046	759	1895
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	0.0	0.0	16.6	11.4	4.3
Incr Delay (d2), s/veh	12.5	0.0	0.0	3.5	4.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	0.0	6.5	2.6	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.5	0.0	0.0	20.0	15.6	4.4
LnGrp LOS	D	A	A	C	B	A
Approach Vol, veh/h	255		536			551
Approach Delay, s/veh	35.5		20.0			12.6
Approach LOS	D		C			B
Timer - Assigned Phs	2		4		5	6
Phs Duration (G+Y+Rc), s	43.1		17.5		14.6	28.6
Change Period (Y+Rc), s	4.5		4.5		4.5	4.5
Max Green Setting (Gmax), s	62.9		18.1		18.7	39.7
Max Q Clear Time (g_c+l1), s	3.9		12.8		9.1	20.5
Green Ext Time (p_c), s	0.9		0.4		0.9	3.6
Intersection Summary						
HCM 6th Ctrl Delay			19.9			
HCM 6th LOS			B			

Intersection

Int Delay, s/veh 4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	104	149	184	68	13
Future Vol, veh/h	8	104	149	184	68	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	3	3	38	9	0
Mvmt Flow	9	117	167	207	76	15

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	625	84	76
Stage 1	84	-	-
Stage 2	541	-	-
Critical Hdwy	6.4	6.23	4.13
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.327	2.227
Pot Cap-1 Maneuver	452	972	1517
Stage 1	944	-	-
Stage 2	588	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	402	972	1517
Mov Cap-2 Maneuver	402	-	-
Stage 1	840	-	-
Stage 2	588	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	3.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1517	-	883	-	-
HCM Lane V/C Ratio	0.11	-	0.143	-	-
HCM Control Delay (s)	7.7	-	9.8	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

HCM 6th TWSC
6: Building T-51 & SW US Veterans Hospital Rd

01/21/2022

Intersection

Int Delay, s/veh 1.5

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations 

Traffic Vol, veh/h 4 13 102 387 177 22

Future Vol, veh/h 4 13 102 387 177 22

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 - 30 - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 85 85 85 85 85 85

Heavy Vehicles, % 0 0 0 16 5 0

Mvmt Flow 5 15 120 455 208 26

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 916 221 234 0 - 0

Stage 1 221 - - - - -

Stage 2 695 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 305 824 1345 - - -

Stage 1 821 - - - - -

Stage 2 499 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 278 824 1345 - - -

Mov Cap-2 Maneuver 278 - - - - -

Stage 1 748 - - - - -

Stage 2 499 - - - - -

Approach EB NB SB

HCM Control Delay, s 11.6 1.7 0

HCM LOS B

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1345 - 564 - -

HCM Lane V/C Ratio 0.089 - 0.035 - -

HCM Control Delay (s) 7.9 - 11.6 - -

HCM Lane LOS A - B - -

HCM 95th %tile Q(veh) 0.3 - 0.1 - -

Intersection

Int Delay, s/veh 1.9

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 0 6 213 557 169 10

Future Vol, veh/h 0 6 213 557 169 10

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 83 83 83 83 83 83

Heavy Vehicles, % 0 0 0 10 3 17

Mvmt Flow 0 7 257 671 204 12

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1395 210 216 0 - 0

Stage 1 210 - - - - -

Stage 2 1185 - - - - -

Critical Hdwy 6.4 6.2 4.1 - - -

Critical Hdwy Stg 1 5.4 - - - - -

Critical Hdwy Stg 2 5.4 - - - - -

Follow-up Hdwy 3.5 3.3 2.2 - - -

Pot Cap-1 Maneuver 157 835 1366 - - -

Stage 1 830 - - - - -

Stage 2 293 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 110 835 1366 - - -

Mov Cap-2 Maneuver 110 - - - - -

Stage 1 581 - - - - -

Stage 2 293 - - - - -

Approach EB NB SB

HCM Control Delay, s 9.3 2.3 0

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1366 - 835 - -

HCM Lane V/C Ratio 0.188 - 0.009 - -

HCM Control Delay (s) 8.2 0 9.3 - -

HCM Lane LOS A A A - -

HCM 95th %tile Q(veh) 0.7 - 0 - -

HCM 6th Signalized Intersection Summary

8: SW Terwilliger Blvd & SW US Veterans Hospital Rd




01/21/2022



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	↑	↑	W
Traffic Volume (veh/h)	115	62	404	178	124	380
Future Volume (veh/h)	115	62	404	178	124	380
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1900	1841	1885	1811	1737
Adj Flow Rate, veh/h	129	70	454	200	139	427
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	5	0	4	1	6	11
Cap, veh/h	163	88	538	1294	165	506
Arrive On Green	0.15	0.15	0.18	0.69	0.42	0.42
Sat Flow, veh/h	1075	583	1753	1885	392	1203
Grp Volume(v), veh/h	200	0	454	200	0	566
Grp Sat Flow(s),veh/h/ln	1667	0	1753	1885	0	1595
Q Serve(g_s), s	6.4	0.0	7.0	2.1	0.0	17.7
Cycle Q Clear(g_c), s	6.4	0.0	7.0	2.1	0.0	17.7
Prop In Lane	0.64	0.35	1.00			0.75
Lane Grp Cap(c), veh/h	253	0	538	1294	0	671
V/C Ratio(X)	0.79	0.00	0.84	0.15	0.00	0.84
Avail Cap(c_a), veh/h	544	0	957	2137	0	1003
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	10.1	3.1	0.0	14.4
Incr Delay (d2), s/veh	5.5	0.0	3.7	0.1	0.0	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	2.4	0.5	0.0	6.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.2	0.0	13.8	3.1	0.0	18.8
LnGrp LOS	C	A	B	A	A	B
Approach Vol, veh/h	200			654	566	
Approach Delay, s/veh	28.2			10.5	18.8	
Approach LOS	C			B	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		42.6		12.9	14.7	27.8
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		62.9		18.1	23.5	34.9
Max Q Clear Time (g_c+l1), s		4.1		8.4	9.0	19.7
Green Ext Time (p_c), s		1.3		0.4	1.3	3.6
Intersection Summary						
HCM 6th Ctrl Delay			16.3			
HCM 6th LOS			B			

Intersection

Int Delay, s/veh 7

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	213	19	50	173	42	268
Future Vol, veh/h	213	19	50	173	42	268
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	251	22	59	204	49	315





Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	273
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1302
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1302
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NE
HCM Control Delay, s	0	1.8	15.9
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	690	-	-	1302	-
HCM Lane V/C Ratio	0.529	-	-	0.045	-
HCM Control Delay (s)	15.9	-	-	7.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	3.1	-	-	0.1	-

Intersection

Int Delay, s/veh 5.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	60	101	72	17	12	57
Future Vol, veh/h	60	101	72	17	12	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	38	53	6	0	0	0
Mvmt Flow	73	123	88	21	15	70

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	199	99	0	0	109
Stage 1	99	-	-	-	-
Stage 2	100	-	-	-	-
Critical Hdwy	6.78	6.73	-	-	4.1
Critical Hdwy Stg 1	5.78	-	-	-	-
Critical Hdwy Stg 2	5.78	-	-	-	-
Follow-up Hdwy	3.842	3.777	-	-	2.2
Pot Cap-1 Maneuver	715	834	-	-	1494
Stage 1	842	-	-	-	-
Stage 2	841	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	708	834	-	-	1494
Mov Cap-2 Maneuver	708	-	-	-	-
Stage 1	842	-	-	-	-
Stage 2	833	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	1.3
HCM LOS	B		




Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 708 834 1494	-	-
HCM Lane V/C Ratio	-	- 0.103 0.148	0.01	-
HCM Control Delay (s)	-	- 10.7 10.1	7.4	0
HCM Lane LOS	-	- B B	A	A
HCM 95th %tile Q(veh)	-	- 0.3 0.5	0	-

HCM 6th TWSC
3: SW 6th Ave Dr & S Gaines St

01/21/2022

Intersection

Int Delay, s/veh 5.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	16	80	140	48	55	39
Future Vol, veh/h	16	80	140	48	55	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	19	93	163	56	64	45

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	112
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1490
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1490
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.7	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	638	-	-	1490	-
HCM Lane V/C Ratio	0.171	-	-	0.109	-
HCM Control Delay (s)	11.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.4	-

HCM 6th Signalized Intersection Summary

4: SW Terwilliger Blvd & SW Campus Dr

01/21/2022



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (veh/h)	212	272	101	43	123	322
Future Volume (veh/h)	212	272	101	43	123	322
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No	
Adj Sat Flow, veh/h/ln	1693	1826	1530	1900	1885	1870
Adj Flow Rate, veh/h	226	289	107	46	131	343
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	14	5	25	0	1	2
Cap, veh/h	268	342	169	73	433	697
Arrive On Green	0.41	0.41	0.17	0.17	0.10	0.37
Sat Flow, veh/h	660	844	1015	436	1795	1870
Grp Volume(v), veh/h	516	0	0	153	131	343
Grp Sat Flow(s),veh/h/ln	1508	0	0	1451	1795	1870
Q Serve(g_s), s	12.6	0.0	0.0	4.0	2.2	5.7
Cycle Q Clear(g_c), s	12.6	0.0	0.0	4.0	2.2	5.7
Prop In Lane	0.44	0.56		0.30	1.00	
Lane Grp Cap(c), veh/h	611	0	0	242	433	697
V/C Ratio(X)	0.84	0.00	0.00	0.63	0.30	0.49
Avail Cap(c_a), veh/h	1616	0	0	905	603	1729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.9	0.0	0.0	15.7	10.9	9.8
Incr Delay (d2), s/veh	3.3	0.0	0.0	2.7	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	0.0	0.0	1.3	0.7	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.2	0.0	0.0	18.5	11.3	10.3
LnGrp LOS	B	A	A	B	B	B
Approach Vol, veh/h	516		153			474
Approach Delay, s/veh	14.2		18.5			10.6
Approach LOS	B		B			B
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		19.6		21.0	8.4	11.3
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		37.5		43.5	7.7	25.3
Max Q Clear Time (g_c+I1), s		7.7		14.6	4.2	6.0
Green Ext Time (p_c), s		2.2		1.9	0.1	0.8
Intersection Summary						
HCM 6th Ctrl Delay			13.3			
HCM 6th LOS			B			

Intersection

Int Delay, s/veh 3.8

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 13 81 75 114 116 7

Future Vol, veh/h 13 81 75 114 116 7

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - Stop

Storage Length 0 - 0 - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 86 86 86 86 86 86

Heavy Vehicles, % 13 6 6 39 8 0

Mvmt Flow 15 94 87 133 135 8

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 446 139 135 0 - 0

Stage 1 139 - - - - -

Stage 2 307 - - - - -

Critical Hdwy 6.53 6.26 4.16 - - -

Critical Hdwy Stg 1 5.53 - - - - -

Critical Hdwy Stg 2 5.53 - - - - -

Follow-up Hdwy 3.617 3.354 2.254 - - -

Pot Cap-1 Maneuver 550 899 1425 - - -

Stage 1 861 - - - - -

Stage 2 722 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 516 899 1425 - - -

Mov Cap-2 Maneuver 516 - - - - -

Stage 1 808 - - - - -

Stage 2 722 - - - - -

Approach EB NB SB

HCM Control Delay, s 10.1 3.1 0

HCM LOS B

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 1425 - 815 - -

HCM Lane V/C Ratio 0.061 - 0.134 - -






HCM Control Delay (s) 7.7 - 10.1 - -

HCM Lane LOS A - B - -

HCM 95th %tile Q(veh) 0.2 - 0.5 - -

HCM 6th TWSC
6: Building T-51 & SW US Veterans Hospital Rd




01/21/2022

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	109	13	171	267	0
Future Vol, veh/h	13	109	13	171	267	0
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	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	16	136	16	214	334	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	580	334	334	0	-	0
Stage 1	334	-	-	-	-	-
Stage 2	246	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	480	712	1237	-	-	-
Stage 1	730	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	474	712	1237	-	-	-
Mov Cap-2 Maneuver	474	-	-	-	-	-
Stage 1	721	-	-	-	-	-
Stage 2	800	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.9	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1237	-	676	-	-
HCM Lane V/C Ratio	0.013	-	0.226	-	-
HCM Control Delay (s)	7.9	-	11.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	165	3	169	453	0
Future Vol, veh/h	3	165	3	169	453	0
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	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	28	2	0
Mvmt Flow	4	209	4	214	573	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	795	573	573	0	-	0
Stage 1	573	-	-	-	-	-
Stage 2	222	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	359	523	1010	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	820	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	358	523	1010	-	-	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	820	-	-	-	-	-





Approach	EB	NB	SB
HCM Control Delay, s	16.7	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1010	-	519	-	-
HCM Lane V/C Ratio	0.004	-	0.41	-	-
HCM Control Delay (s)	8.6	0	16.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	2	-	-

HCM 6th Signalized Intersection Summary 8: SW Terwilliger Blvd & SW US Veterans Hospital Rd

01/21/2022



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	312	314	93	149	181	80
Future Volume (veh/h)	312	314	93	149	181	80
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1900	1841	1885	1811	1737
Adj Flow Rate, veh/h	351	353	104	167	203	90
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	5	0	4	1	6	11
Cap, veh/h	386	388	325	705	253	112
Arrive On Green	0.47	0.47	0.08	0.37	0.21	0.21
Sat Flow, veh/h	815	820	1753	1885	1189	527
Grp Volume(v), veh/h	705	0	104	167	0	293
Grp Sat Flow(s),veh/h/ln	1638	0	1753	1885	0	1716
Q Serve(g_s), s	23.5	0.0	2.5	3.6	0.0	9.6
Cycle Q Clear(g_c), s	23.5	0.0	2.5	3.6	0.0	9.6
Prop In Lane	0.50	0.50	1.00			0.31
Lane Grp Cap(c), veh/h	775	0	325	705	0	365
V/C Ratio(X)	0.91	0.00	0.32	0.24	0.00	0.80
Avail Cap(c_a), veh/h	1097	0	714	1327	0	550
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.3	0.0	15.3	12.7	0.0	22.0
Incr Delay (d2), s/veh	8.5	0.0	0.6	0.2	0.0	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	0.9	1.4	0.0	4.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.8	0.0	15.8	12.9	0.0	27.1
LnGrp LOS	C	A	B	B	A	C
Approach Vol, veh/h	705			271	293	
Approach Delay, s/veh	22.8			14.0	27.1	
Approach LOS	C			B	C	
Timer - Assigned Phs	2		4		5	6
Phs Duration (G+Y+Rc), s	26.5		32.4		9.5	17.0
Change Period (Y+Rc), s	4.5		4.5		4.5	4.5
Max Green Setting (Gmax), s	41.5		39.5		18.1	18.9
Max Q Clear Time (g_c+11), s	5.6		25.5		4.5	11.6
Green Ext Time (p_c), s	1.0		2.5		0.2	1.0
Intersection Summary						
HCM 6th Ctrl Delay			21.9			
HCM 6th LOS			C			

Appendix H

Signal Warrants

Signal Warrant Analysis Summary

Intersection	Major Street		Minor Street Higher Volume Approach		Signal Warrant Satisfaction
	Volume (VPH)	Lanes (#)	Volume (VPH)	Lanes (#)	
2020 Year Adjusted - AM Peak Hour					
Terwilliger Blvd / Campus Drive	857	1	209	1	No
Terwilliger Blvd / Veterans Hospital Road	874	1	143	1	No
2020 Year Adjusted - PM Peak Hour					
Terwilliger Blvd / Campus Drive	492	1	438	1	Yes
Terwilliger Blvd / Veterans Hospital Road	452	1	477	1	Yes
2030 Year - AM Peak Hour					
Terwilliger Blvd / Campus Drive	989	2	231	1	Yes
Terwilliger Blvd / Veterans Hospital Road	1086	2	177	1	Yes
2030 Year - PM Peak Hour					
Terwilliger Blvd / Campus Drive	589	2	484	1	Yes
Terwilliger Blvd / Veterans Hospital Road	503	2	626	1	Yes

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT: 2020 Adjusted Condition: Terwilliger Blvd @ Campus Drive

Analyst : JAT
Major Street : 2020 Adjusted Condition: Terwilliger Blvd
Minor Street : Campus Drive
Speed on Major Street : 25

Report Date : January 14, 2021
Counts Date : December 4, 2020
Lanes @ Intersection : Major Street - 1
Minor Street - 1

24-HOUR TRAFFIC VOLUME

TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	444	0	0	444	413	147	36	413
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	362	0	0	362	130	39	30	130
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total	806				543			

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24-HOUR TRAFFIC VOLUME

TABLE 2

Time	Minor Street				Minor Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	209	107	51	209	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	438	246	56	438	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total	647				0			

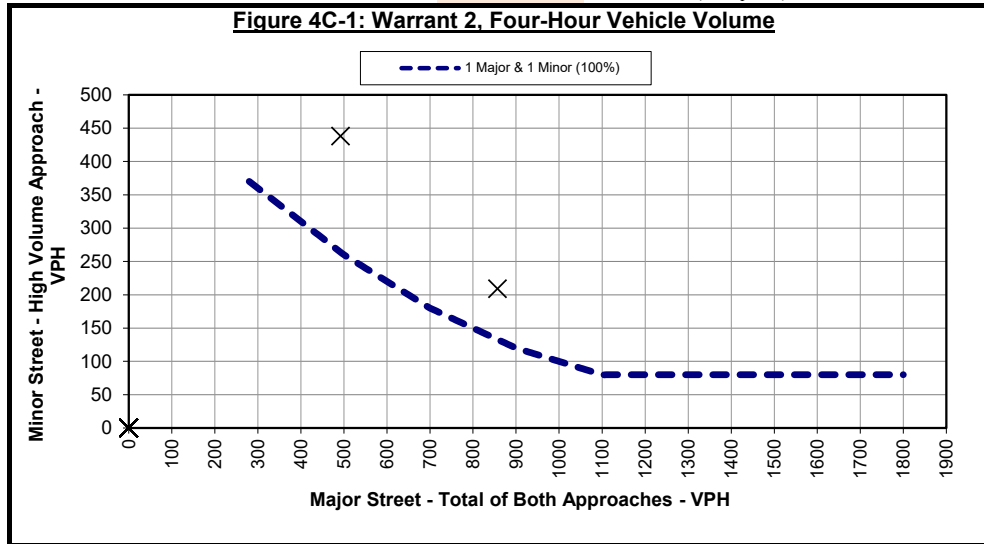
HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	857	209	BOTH	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	492	438	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,349	647	1	1	2	1
MAJOR ST MINOR ST			STD 1 (A OR B)		STD 2 (A & B)	
			500	750	400	600
			150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

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WARRANT 2, FOUR-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 2* NOT SATISFIED

2 HOURS MET (4 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR (100% Thresholds)

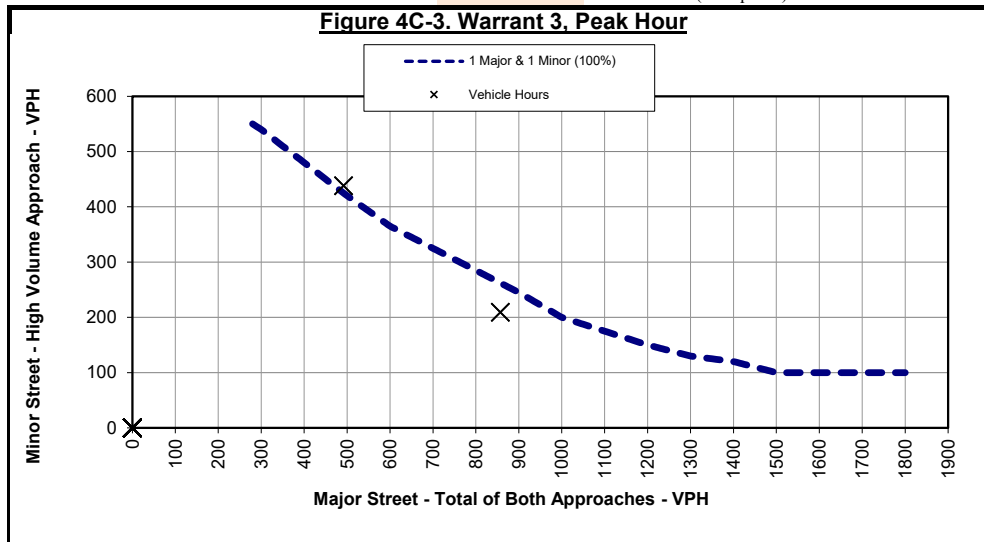
STANDARD A SATISFIED

18 VEHICLE HOURS (4 Required)

438 Peak Hour Minor-Street Volume
147 Average Minor-Street Delay (seconds)
1 Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED

1 HOURS MET (1 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

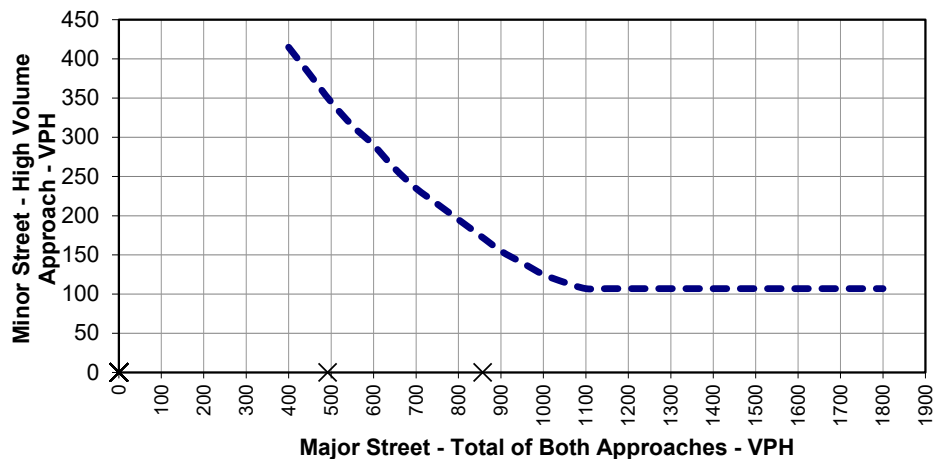
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WARRANT 4, PEDESTRIAN VOLUME (100% Thresholds)

STANDARD A* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

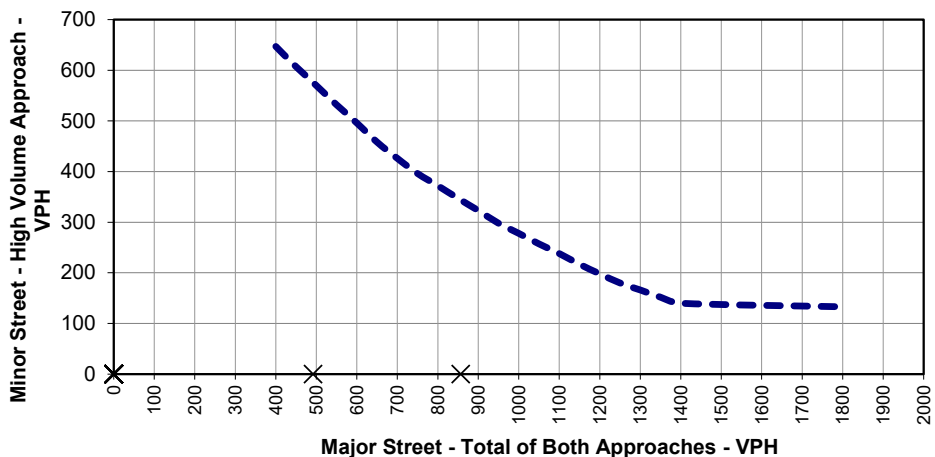


*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5

NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6

NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7

NOT SATISFIED

- Std A adequate trial of alternatives
- Std B ≥5 correctable crashes within 12 months
- Std C-1 meets 80% of Warrants 1 or 4 thresholds

Not Satisfied
Not Satisfied
Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9

NOT EVALUATED

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT: 2020 Adjusted Condition: Terwilliger Blvd @ Veterans Hospital Road

Analyst : JAT
Major Street : 2020 Adjusted Condition: Terwilliger Blvd
Minor Street : Veterans Hospital Road
Speed on Major Street : 25

Report Date : January 13, 2021
Counts Date : December 4, 2020
Lanes @ Intersection : Major Street - 1
Minor Street - 1

24-HOUR TRAFFIC VOLUME

TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	3	0	0
1:00 AM	0	0	0	0	0	2	0	0
2:00 AM	0	0	0	0	0	5	0	0
3:00 AM	0	0	0	0	0	1	0	0
4:00 AM	0	0	0	0	0	4	0	0
5:00 AM	0	0	0	0	0	6	0	0
6:00 AM	0	0	0	0	0	7	0	0
7:00 AM	450	0	0	450	427	315	74	427
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	216	0	0	216	236	72	31	236
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total	666				663			

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24-HOUR TRAFFIC VOLUME

TABLE 2

Time	Minor Street				Minor Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	143	49	34	143	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	477	235	49	477	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total	620				0			

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PLANT ANALYSIS RESULTS - 2020 Adjusted Condition: Terwilliger Blvd @ Veterans Hospital

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 1* NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	1	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	2	HOURS
		CONDITION B	1	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

TABLE 3

HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	877	143	MAJOR	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	452	477	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,329	620	0	1	2	1
MAJOR ST MINOR ST			STD 1 (A OR B)		STD 2 (A & B)	
			500	750	400	600
			150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

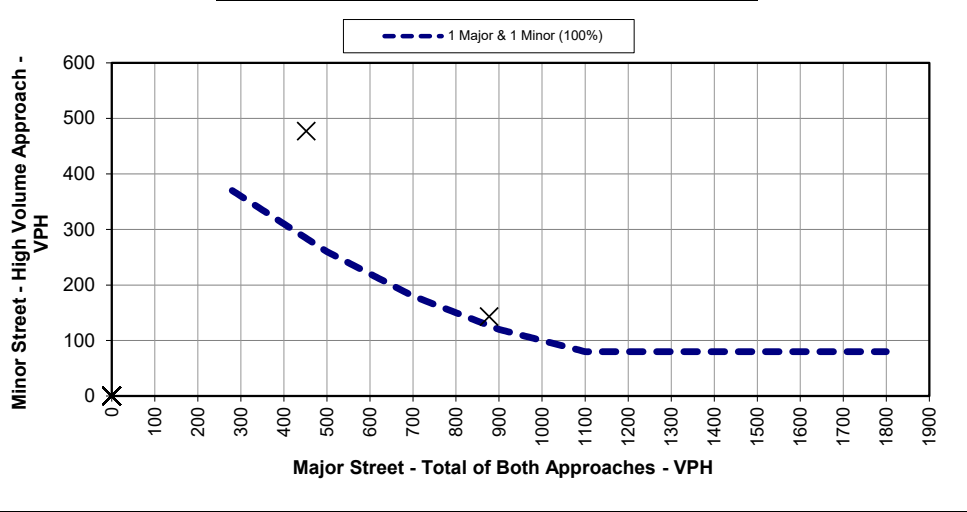
JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 2* NOT SATISFIED

2 HOURS MET (4 Required)

Figure 4C-1: Warrant 2, Four-Hour Vehicle Volume



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR (100% Thresholds)

STANDARD A SATISFIED

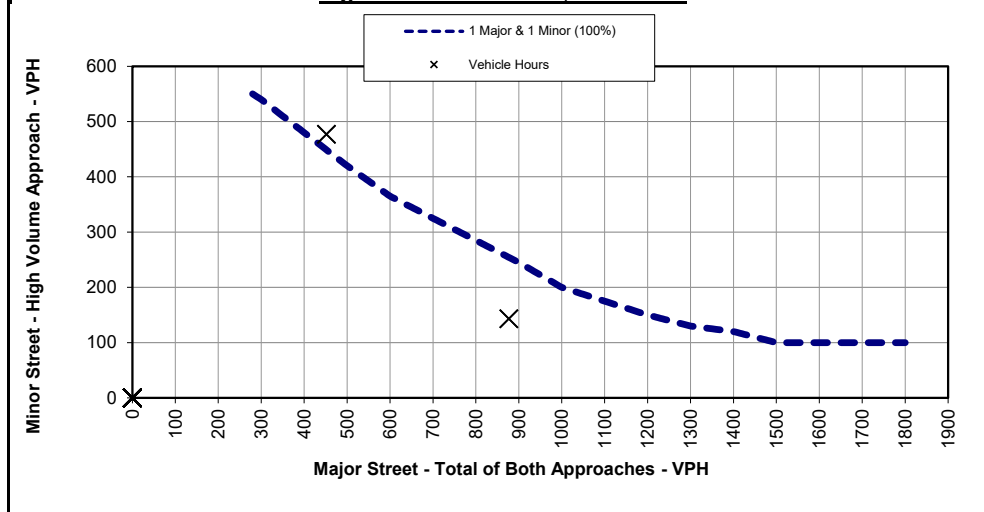
7 VEHICLE HOURS (4 Required)

477 Peak Hour Minor-Street Volume
54 Average Minor-Street Delay (seconds)
1 Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED

1 HOURS MET (1 Required)

Figure 4C-3: Warrant 3, Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

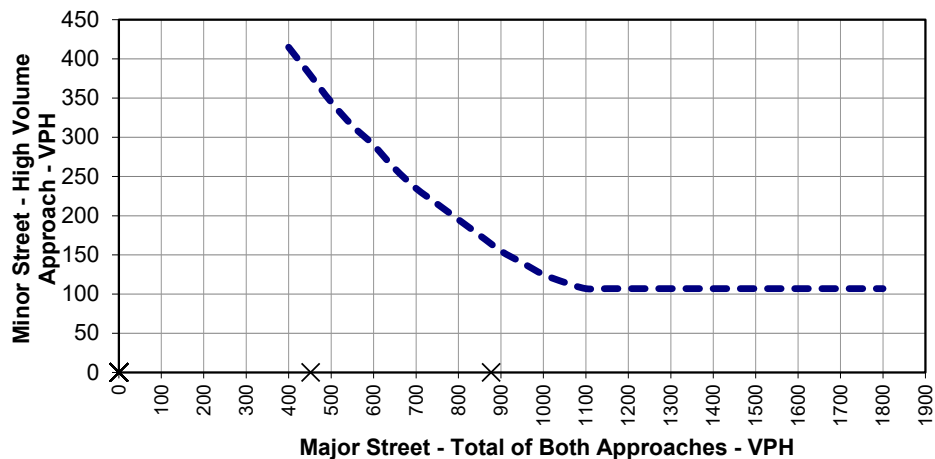
JACOBS ENGINEERING

WARRANT 4, PEDESTRIAN VOLUME (100% Thresholds)

STANDARD A* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

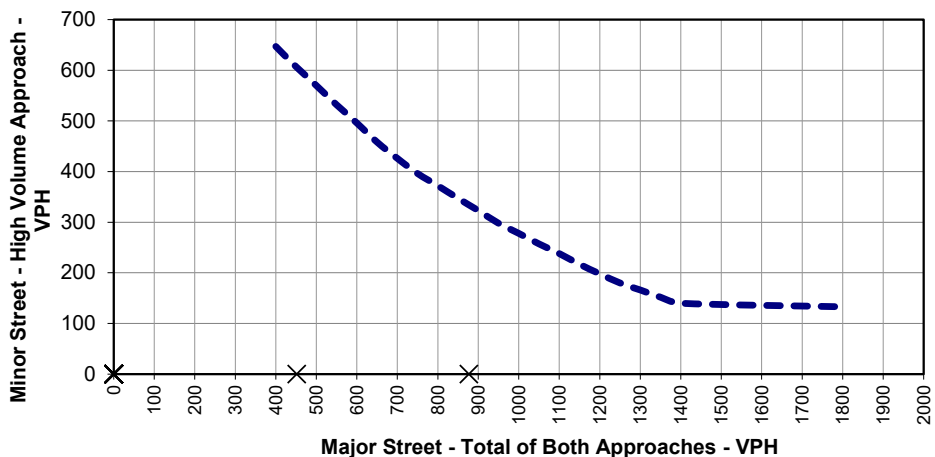


*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5

NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6

NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7

NOT EVALUATED

- Std A adequate trial of alternatives
- Std B ≥5 correctable crashes within 12 months
- Std C-1 meets 80% of Warrants 1 or 4 thresholds

Not Satisfied
Not Satisfied
Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9

NOT EVALUATED

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT: 2030 Build Condition: Terwilliger Blvd @ Campus Drive

Analyst : JAT
Major Street : 2030 Build Condition: Terwilliger Blvd
Minor Street : Campus Drive
Speed on Major Street : 25

Report Date : December 21, 2021
Counts Date : December 4, 2020
Lanes @ Intersection : Major Street - 2
Minor Street - 1

24-HOUR TRAFFIC VOLUME

TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	501	0	0	501	488	162	33	488
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	445	0	0	445	144	43	30	144
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total	946				632			

JACOBS ENGINEERING

24-HOUR TRAFFIC VOLUME
TABLE 2

Time	Minor Street				Minor Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	231	118	51	231	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	484	272	56	484	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total	715				0			

JACOBS ENGINEERING

WARRANT ANALYSIS RESULTS - 2030 Build Condition: Terwilliger Blvd @ Campus Drive

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 1 * NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	1	HOURS
		CONDITION B	1	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	2	HOURS
		CONDITION B	1	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

TABLE 3

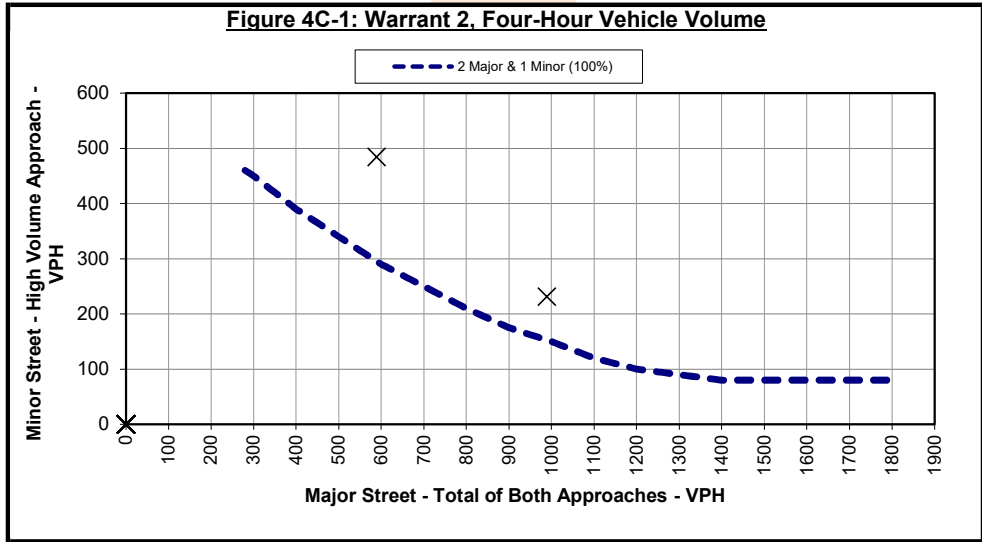
HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	989	231	BOTH	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	589	484	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,578	715	1	1	2	1
MAJOR ST MINOR ST			STD 1 (A OR B)		STD 2 (A & B)	
			600	900	480	720
			150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 2* NOT SATISFIED

2 HOURS MET (4 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR (100% Thresholds)

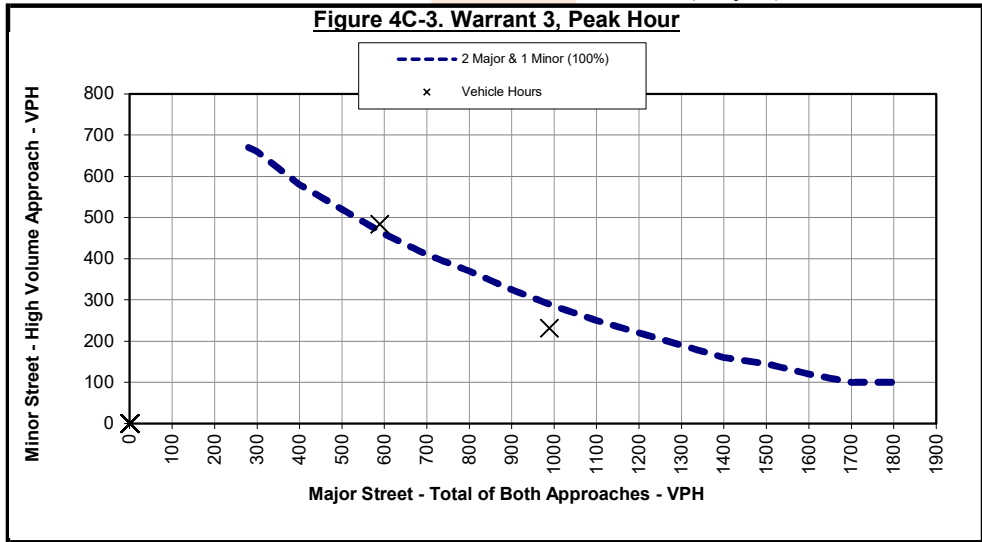
STANDARD A SATISFIED

15 VEHICLE HOURS (4 Required)

- 231 Peak Hour Minor-Street Volume
- 229 Average Minor-Street Delay (seconds)
- 1 Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED

1 HOURS MET (1 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

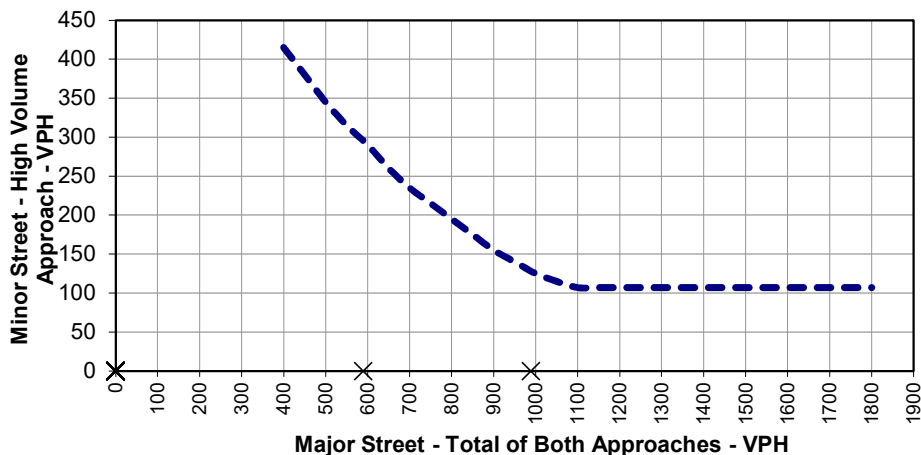
JACOBS ENGINEERING

WARRANT 4, PEDESTRIAN VOLUME (100% Thresholds)

STANDARD A* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

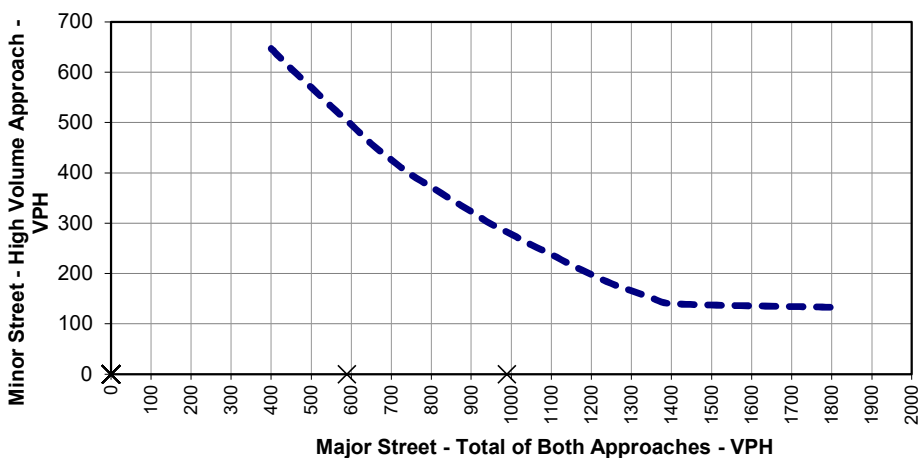


*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5

NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6

NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7

NOT EVALUATED

- Std A adequate trial of alternatives
- Std B ≥ 5 correctable crashes within 12 months
- Std C-1 meets 80% of Warrants 1 or 4 thresholds

Not Satisfied
Not Satisfied
Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9

NOT EVALUATED

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT: 2030 Build Condition: Terwilliger Blvd @ Veterans Hospital Road

Analyst : JAT
Major Street : 2030 Build Condition: Terwilliger Blvd
Minor Street : Veterans Hospital Road
Speed on Major Street : 25

Report Date : December 21, 2021
Counts Date : December 4, 2020
Lanes @ Intersection : Major Street - 2
Minor Street - 1

24-HOUR TRAFFIC VOLUME

TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction
12:00 AM	0	0	0	0	0	3	0	0
1:00 AM	0	0	0	0	0	2	0	0
2:00 AM	0	0	0	0	0	5	0	0
3:00 AM	0	0	0	0	0	1	0	0
4:00 AM	0	0	0	0	0	4	0	0
5:00 AM	0	0	0	0	0	6	0	0
6:00 AM	0	0	0	0	0	7	0	0
7:00 AM	582	0	0	582	504	380	75	504
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	242	0	0	242	261	80	31	261
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total	824				765			

JACOBS ENGINEERING

24-HOUR TRAFFIC VOLUME
TABLE 2

Time	Minor Street				Minor Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	177	62	35	177	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	626	314	50	626	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total				803				0

JACOBS ENGINEERING

WARRANT ANALYSIS RESULTS - 2030 Build Condition: Terwilliger Blvd @ Veterans Hospital Road

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 1 * NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	1	HOURS
		CONDITION B	1	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	2	HOURS
		CONDITION B	1	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

TABLE 3

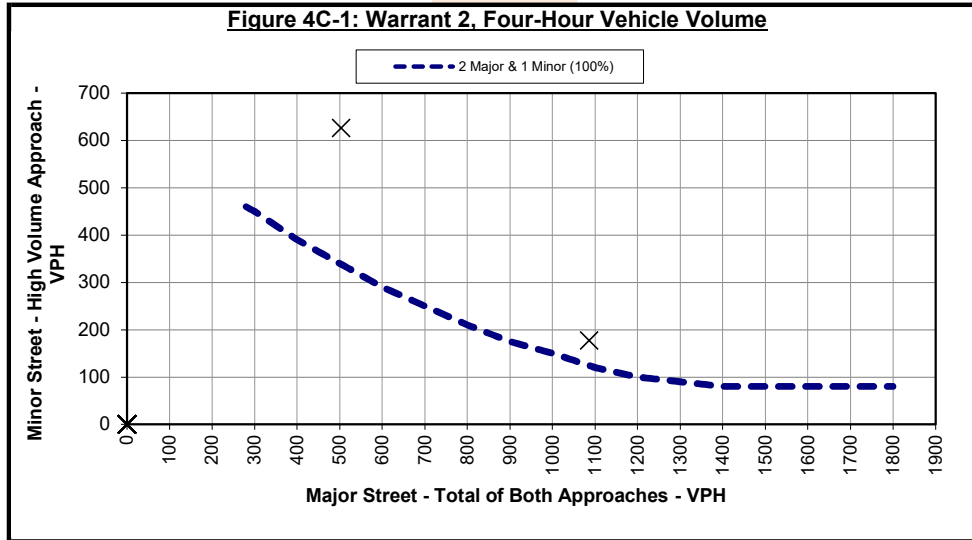
HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	1086	177	BOTH	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	503	626	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,589	803	1	1	2	1
MAJOR ST MINOR ST			STD 1 (A OR B)		STD 2 (A & B)	
			600	900	480	720
			150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 2* NOT SATISFIED

2 HOURS MET (4 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR (100% Thresholds)

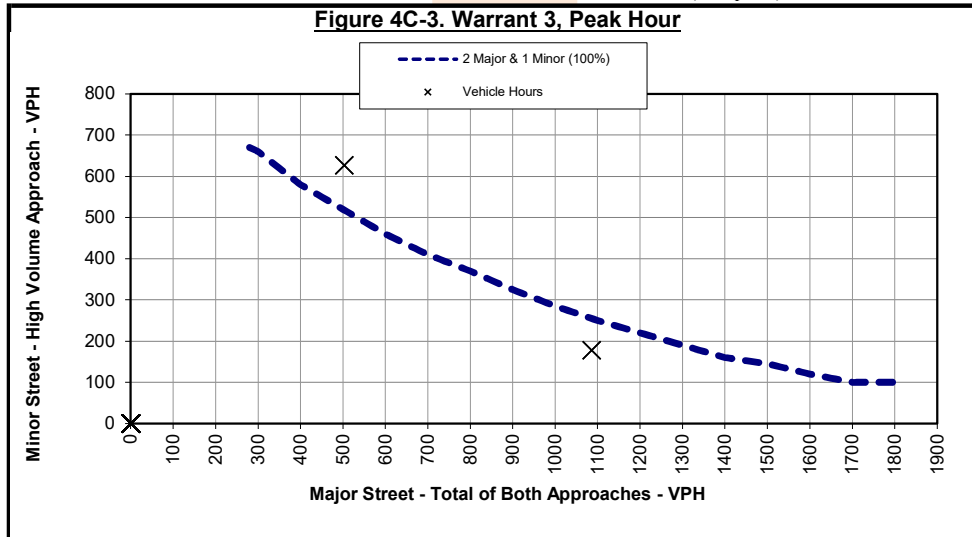
STANDARD A SATISFIED

16 VEHICLE HOURS (4 Required)

- 177 Peak Hour Minor-Street Volume
- 315 Average Minor-Street Delay (seconds)
- 1 Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED

1 HOURS MET (1 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

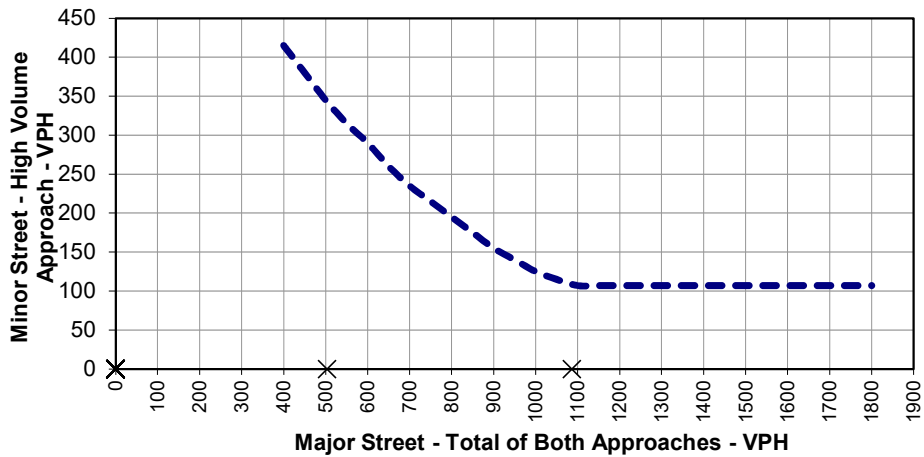
JACOBS ENGINEERING

WARRANT 4, PEDESTRIAN VOLUME (100% Thresholds)

STANDARD A* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

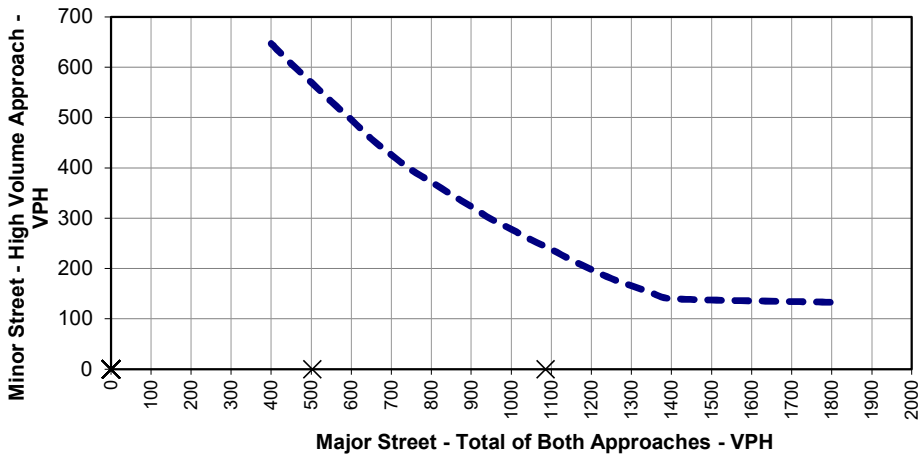


*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED

0 HOURS MET (4 Required)

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5

NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6

NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7

NOT EVALUATED

Std A adequate trial of alternatives

Not Satisfied

Std B ≥ 5 correctable crashes within 12 months

Not Satisfied

Std C-1 meets 80% of Warrants 1 or 4 thresholds

Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9

NOT EVALUATED

Appendix I
PBOT Left Turn Guide Forms

Guide for Determining Left Turn Signal Control Form

Version 05/14/2021

The satisfaction of guideline(s) shall not in itself require the installation of left-turn signal control, and the lack of satisfaction of guideline(s) shall not in itself require the removal of left-turn signal control. Engineering judgment should be used, particularly when applying criteria to unique environments such as Downtown.

BACKGROUND INFORMATION

PREPARED BY	Jerom Theunissen		DATE	01/27/2022
CHECKED BY	John Wirtz		DATE	01/27/2022
INTERSECTION	SW Campus Drive & SW Terwilliger Boulevard		SIGNAL ID	
APPROACH DIRECTION	B	SB	NB	
# of Left Turn Lanes ¹	1	0	1	
# of Opposing Through Lanes (Including Separated In-Roadway Bikeways ²)	0	1	1	
Speed of Opposing Traffic (mph)	n/a	25	25	
Left Turn Volume (vehicles/hour) ³	113 (212 - PM)	n/a	371 (123 - PM)	
Pedestrian Volume in Conflicting Crosswalk (pedestrians/hour) ³	15 (33 - PM)	n/a	0 (0 - PM)	
Opposing Through / Right Turn Volume (vehicles/hour) ³	n/a	n/a	326 (101 - PM)	

¹ Shared left-thru lanes should be counted as left-turn lanes.

² Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

³ Five-year projections may be used if different than existing volumes.

RECOMMENDATION

APPROACH DIRECTION	B	SB	NB	
REQUIRED CRITERIA				
Protected-only left-turn mode SHOULD be provided if ANY of the Required Criteria are satisfied.				
Any Required Criteria satisfied?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Required Criteria?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
SCORE-BASED CRITERIA				
Protected-only left-turn mode SHOULD be provided if any criteria score is greater than or equal to four (≥ 4) OR the total score for all categories is greater than or equal to eight (≥ 8).				
Crash History Score (C)			0	
Volumes Score (V)			8	
Geometry Score (G)			0	
Location Score (L)			0	
Any Score-Based Criteria ≥ 4 ?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Total Score ($T = C + V + G + L$)	0	0	8	0
Total Score ≥ 8 ?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Score-Based Criteria?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
SITE-SPECIFIC FACTORS				
Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.				
Any Site-Specific Factors satisfied?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Site-Specific Factors?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
NOTES	Protected NB left turn lane is justified to minimize queues and delays associated with projected heavy left turn volumes in the AM period			

INTERSECTION	SW Campus Drive & SW Te	SIGNAL ID		APPROACH
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REQUIRED CRITERIA

Protected-only left-turn mode **SHOULD** be provided if **ANY** of the following criteria are satisfied.

Criteria	Description	Reference	Satisfied?
High Crash Network	Approach located on PBOT High Crash Network	PBOT	<input checked="" type="checkbox"/> Yes
Multiple left-turn lanes ¹ on a single approach	2+ on a two-way street (i.e. conflicting vehicle traffic)		<input type="checkbox"/> Yes
Restricted sight distance	Engineering study indicates that sight distance to oncoming traffic is less than the distances in Table 1.	AASHTO 2011; ODOT 2017	<input type="checkbox"/> Yes
Overlapping left-turn paths ²			<input type="checkbox"/> Yes

¹ Shared left-thru lanes should be counted as left-turn lanes.

² Requires special signal timing consideration – split phasing or a fixed separation with lead/lag protected lefts.

Table 1. Sight Distance Criteria

Posted Speed (mph)	Required Sight Distance (feet)	
	One Opposing Vehicle Thru Lane	Two Opposing Vehicle Thru Lanes
20	165	180
25	205	225
30	245	270
35	285	310
40	325	355
45	365	400
50 ¹	425	465
55 ¹	495	540

Source: "A Policy on Geometric Design of Highways and Streets" (2011), AASHTO – Table 9-14.

¹ For speeds higher than 45 mph, the stopping sight distance (higher value from Table 9-14) is used instead of intersection sight distance.

Note: The above table is based on the AASHTO intersection sight distance for passenger cars. Different sight distance values should be used if there are more than two opposing vehicle through lanes or the left turning traffic has a high percentage of trucks. Refer to Tables 9-13 and 9-14 of "A Policy on Geometric Design of Highways and Streets" 2011, 6th Edition, AASHTO.

SCORE-BASED CRITERIA

Crash History

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

CRASH HISTORY TOTAL (C = C.1 + C.2 + C.3)					0	(C)
Criteria	Description	Reference	Satisfied?	Scoring	Score	
Crash history involving left-turn movement	Number of crashes involving the left turn over a 12-month period during the last 3 years that are susceptible to correction	ODOT 2017	<input type="checkbox"/> ≥ 5	= 4	0	(C.1)
			<input type="checkbox"/> 2-4	= 2		
			<input type="checkbox"/> ≤ 1	= 0		
Crash history involving pedestrians	Number of crashes involving the left turn and pedestrians during the last 5 years that are susceptible to correction	LADOT 2020	<input type="checkbox"/> ≥ 4	= 4	0	(C.2)
			<input type="checkbox"/> 2-3	= 2		
			<input type="checkbox"/> ≤ 1	= 0		
Crash severity involving left-turn movement	Most severe crash involving the left turn during the last 5 years that is susceptible to correction		<input type="checkbox"/> Fatal	= 4	0	(C.3)
			<input type="checkbox"/> Non-fatal injury or PDO ¹	= 0		

¹ Property damage only.

INTERSECTION	SW Campus Drive & SW Te	SIGNAL ID		APPROACH	NB
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Volumes

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

VOLUMES TOTAL (V = V.1 + V.2 + V.3)	8	(V)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Vehicle conflicts	Higher Score of Criteria V.1.a OR V.1.b				4 (V.1)
	Product of opposing through vehicle and left-turn vehicle hourly volumes ^{1,2}	ODOT 2017	1 opposing auto lane		(V.1.a)
			<input type="checkbox"/> $\geq 150,000$	= 4	
			<input checked="" type="checkbox"/> $\geq 50,000$	= 2	
			<input type="checkbox"/> $< 50,000$	= 0	
			2 opposing auto lanes		
			<input type="checkbox"/> $\geq 300,000$	= 4	
			<input type="checkbox"/> $\geq 100,000$	= 2	
			<input type="checkbox"/> $< 100,000$	= 0	
	Left-turn vehicle hourly volume (per lane) ¹	ODOT 2017	<input checked="" type="checkbox"/> ≥ 300	= 4	4
<input type="checkbox"/> ≥ 200			= 2	(V.1.b)	
<input type="checkbox"/> < 200			= 0		
Pedestrian conflicts	Higher Score of Criteria V.2.a OR V.2.b				0 (V.2)
	Product of conflicting pedestrian and left-turn vehicle hourly volumes ¹	LADOT 2020	<input type="checkbox"/> 10,000+ on a two-way street	= 4	0 (V.2.a)
			<input type="checkbox"/> 10,000+ on a one-way street	= 2	
			<input checked="" type="checkbox"/> $< 10,000$	= 0	
	Conflicting pedestrian hourly volume ¹	LADOT 2020	<input type="checkbox"/> ≥ 150	= 2	0 (V.2.b)
			<input type="checkbox"/> ≥ 100	= 1	
			<input checked="" type="checkbox"/> < 100	= 0	
Bicycle conflicts	Left-turn vehicle hourly volume ¹ crossing a separated in-roadway bikeway ³ is greater than volumes outlined in Table 2	MassDOT 2015	<input checked="" type="checkbox"/> Yes	= 4	4 (V.3)
			<input type="checkbox"/> No	= 0	

¹ Five-year projections may be used if different than existing volumes.

² When there is a significant lane imbalance, twice the highest single lane volume can be substituted for the total opposing hourly volume when making this calculation. If there is a dedicated right-turn lane, the right-turn volumes may be added to the opposing through volumes.

³ Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

Table 2. Separated Bike Lane Criteria

Separated Bike Lane Operation	Motor Vehicles Per Hour Turning Across Separated Bike Lane			
	Two-Way Street			One-Way Street
	Right Turn	Left Turn Across One Vehicle Lane	Left Turn Across Two Vehicle Lanes	Right or Left Turn
One-Way	150	100	50	150
Two-Way	100	50	0	100

Source: "Separated Bike Lane Planning & Design Guide" (2015), MassDOT – Exhibit 6A.

INTERSECTION	SW Campus Drive & SW Te	SIGNAL ID		APPROACH	NB
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Geometry

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

GEOMETRY TOTAL (G = G.1 + G.2 + G.3 + G.4 + G.5)	0	(G)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Number of through lanes on the opposing approach	3+ (including separated in-roadway bikeways ¹)		<input type="checkbox"/> Yes	= 4	0
			<input checked="" type="checkbox"/> No	= 0	
Speed of opposing traffic			<input type="checkbox"/> ≥ 40 mph	= 4	0
			<input type="checkbox"/> ≥ 30 mph	= 2	
			<input checked="" type="checkbox"/> < 30 mph	= 0	
Multiple left-turn lanes ² on a single approach	2+ on a one-way street (i.e. conflicting pedestrian and bicycle traffic)		<input type="checkbox"/> Yes if outside downtown	= 2	0
			<input type="checkbox"/> Yes if downtown	= 1	
			<input checked="" type="checkbox"/> No	= 0	
U-turns	Allowed		<input type="checkbox"/> Yes	= 2	0
			<input checked="" type="checkbox"/> No	= 0	
Conflicting bi-directional bicycle facility			<input type="checkbox"/> Yes	= 2	0
			<input checked="" type="checkbox"/> No	= 0	

¹ Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

² Shared left-thru lanes should be counted as left-turn lanes.

Location

On its own, Location Criteria will not result in a recommendation for protected-only left turn mode, but it should be considered in combination with the other Score-Based Criteria. Protected-only left-turn mode **SHOULD** be provided if the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

LOCATION TOTAL (L = L.1 + L.2 + L.3)	0	(L)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Pedestrian District	Intersection located in Pedestrian District	PBOT 2019	<input type="checkbox"/> Yes	= 1	0
			<input checked="" type="checkbox"/> No	= 0	
Major City Bikeway	Approach located on a Major City Bikeway	PBOT 2010	<input type="checkbox"/> Yes	= 1	0
			<input checked="" type="checkbox"/> No	= 0	
Safe Routes to School	Approach located on a Safe Routes to School Primary Investment Route	SRTS	<input type="checkbox"/> Yes	= 1	0
			<input checked="" type="checkbox"/> No	= 0	

INTERSECTION	SW Campus Drive & SW Te	SIGNAL ID		APPROACH	NB
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SITE-SPECIFIC FACTORS

Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

Site-Specific Factors	Satisfied?	Notes
Constraints in intersection geometry (e.g., shared left-through lanes, offset approaches, set back stop bars, skewed approaches)	<input type="checkbox"/> Yes	
Drivers make left and/or right turns without the need to yield to oncoming traffic (e.g., T-intersections and intersections with one-way streets)	<input checked="" type="checkbox"/> Yes	T-intersection with limited conflicting traffic turning movements except for northbound lefts and eastbound lefts
Conflicting light rail or streetcar tracks	<input type="checkbox"/> Yes	
Maneuverability of particular classes of vehicles (e.g., heavy trucks, buses)	<input type="checkbox"/> Yes	
Inadequacy of gaps in traffic	<input checked="" type="checkbox"/> Yes	Future volume projections will lead to the intersection having inadequate gaps in traffic (see Synchro reports)
Safety concerns and/or community support	<input type="checkbox"/> Yes	
High pedestrian and/or bicycle volumes	<input type="checkbox"/> Yes	
High number of vulnerable roadway users (e.g., people who need additional time to cross the street)	<input type="checkbox"/> Yes	
High percentage of left-turning heavy vehicles	<input type="checkbox"/> Yes	
Long vehicle delays	<input checked="" type="checkbox"/> Yes	Future volume projections will lead to the intersection having long delays especially for B vehicles (435
Queues exceeding the left-turn pocket	<input type="checkbox"/> Yes	
Transit cycle failures	<input type="checkbox"/> Yes	
Constraints with traffic signal progression	<input type="checkbox"/> Yes	
Preemption-related operational requirements	<input type="checkbox"/> Yes	

Guide for Determining Left Turn Signal Control Form

Version 05/14/2021

The satisfaction of guideline(s) shall not in itself require the installation of left-turn signal control, and the lack of satisfaction of guideline(s) shall not in itself require the removal of left-turn signal control. Engineering judgment should be used, particularly when applying criteria to unique environments such as Downtown.

BACKGROUND INFORMATION

PREPARED BY	Jerom Theunissen		DATE	01/27/2022
CHECKED BY	John Wirtz		DATE	01/27/2022
INTERSECTION	SW US Veterans Hospital Road & SW Terwilliger Boulevard		SIGNAL ID	
APPROACH DIRECTION	B	SB	NB	
# of Left Turn Lanes ¹	1	0	1	
# of Opposing Through Lanes (Including Separated In-Roadway Bikeways ²)	0	n/a	1	
Speed of Opposing Traffic (mph)	n/a	25	25	
Left Turn Volume (vehicles/hour) ³	115 (312 - PM)	n/a	404 (93 - PM)	
Pedestrian Volume in Conflicting Crosswalk (pedestrians/hour) ³	0	n/a	0	
Opposing Through / Right Turn Volume (vehicles/hour) ³	n/a	n/a	124 (181 - PM)	

¹ Shared left-thru lanes should be counted as left-turn lanes.

² Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

³ Five-year projections may be used if different than existing volumes.

RECOMMENDATION

APPROACH DIRECTION	B	SB	NB	
REQUIRED CRITERIA				
Protected-only left-turn mode SHOULD be provided if ANY of the Required Criteria are satisfied.				
Any Required Criteria satisfied?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Required Criteria?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
SCORE-BASED CRITERIA				
Protected-only left-turn mode SHOULD be provided if any criteria score is greater than or equal to four (≥ 4) OR the total score for all categories is greater than or equal to eight (≥ 8).				
Crash History Score (C)			0	
Volumes Score (V)			8	
Geometry Score (G)			0	
Location Score (L)			0	
Any Score-Based Criteria ≥ 4 ?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Total Score ($T = C + V + G + L$)	0	0	8	0
Total Score ≥ 8 ?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Score-Based Criteria?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
SITE-SPECIFIC FACTORS				
Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.				
Any Site-Specific Factors satisfied?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Site-Specific Factors?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
NOTES	Protected NB left turn lane is justified to minimize queues and delays associated with projected heavy left turn volumes in the AM period			

INTERSECTION	SW US Veterans Hospital Rd	SIGNAL ID		APPROACH	NB
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REQUIRED CRITERIA

Protected-only left-turn mode **SHOULD** be provided if **ANY** of the following criteria are satisfied.

Criteria	Description	Reference	Satisfied?
High Crash Network	Approach located on PBOT High Crash Network	PBOT	<input checked="" type="checkbox"/> Yes
Multiple left-turn lanes ¹ on a single approach	2+ on a two-way street (i.e. conflicting vehicle traffic)		<input type="checkbox"/> Yes
Restricted sight distance	Engineering study indicates that sight distance to oncoming traffic is less than the distances in Table 1.	AASHTO 2011; ODOT 2017	<input type="checkbox"/> Yes
Overlapping left-turn paths ²			<input type="checkbox"/> Yes

¹ Shared left-thru lanes should be counted as left-turn lanes.

² Requires special signal timing consideration – split phasing or a fixed separation with lead/lag protected lefts.

Table 1. Sight Distance Criteria

Posted Speed (mph)	Required Sight Distance (feet)	
	One Opposing Vehicle Thru Lane	Two Opposing Vehicle Thru Lanes
20	165	180
25	205	225
30	245	270
35	285	310
40	325	355
45	365	400
50 ¹	425	465
55 ¹	495	540

Source: "A Policy on Geometric Design of Highways and Streets" (2011), AASHTO – Table 9-14.

¹ For speeds higher than 45 mph, the stopping sight distance (higher value from Table 9-14) is used instead of intersection sight distance.

Note: The above table is based on the AASHTO intersection sight distance for passenger cars. Different sight distance values should be used if there are more than two opposing vehicle through lanes or the left turning traffic has a high percentage of trucks. Refer to Tables 9-13 and 9-14 of "A Policy on Geometric Design of Highways and Streets" 2011, 6th Edition, AASHTO.

SCORE-BASED CRITERIA

Crash History

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

CRASH HISTORY TOTAL (C = C.1 + C.2 + C.3)					0	(C)
Criteria	Description	Reference	Satisfied?	Scoring	Score	
Crash history involving left-turn movement	Number of crashes involving the left turn over a 12-month period during the last 3 years that are susceptible to correction	ODOT 2017	<input type="checkbox"/> ≥ 5	= 4	0	(C.1)
			<input type="checkbox"/> 2-4	= 2		
			<input type="checkbox"/> ≤ 1	= 0		
Crash history involving pedestrians	Number of crashes involving the left turn and pedestrians during the last 5 years that are susceptible to correction	LADOT 2020	<input type="checkbox"/> ≥ 4	= 4	0	(C.2)
			<input type="checkbox"/> 2-3	= 2		
			<input type="checkbox"/> ≤ 1	= 0		
Crash severity involving left-turn movement	Most severe crash involving the left turn during the last 5 years that is susceptible to correction		<input type="checkbox"/> Fatal	= 4	0	(C.3)
			<input type="checkbox"/> Non-fatal injury or PDO ¹	= 0		

¹ Property damage only.

INTERSECTION	SW US Veterans Hospital Rd	SIGNAL ID		APPROACH	NB
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Volumes

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

VOLUMES TOTAL (V = V.1 + V.2 + V.3)	8	(V)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Vehicle conflicts	Higher Score of Criteria V.1.a OR V.1.b				4 (V.1)
	Product of opposing through vehicle and left-turn vehicle hourly volumes ^{1,2}	ODOT 2017	1 opposing auto lane		(V.1.a)
			<input type="checkbox"/> $\geq 150,000$	= 4	
			<input checked="" type="checkbox"/> $\geq 50,000$	= 2	
			<input type="checkbox"/> $< 50,000$	= 0	
			2 opposing auto lanes		
			<input type="checkbox"/> $\geq 300,000$	= 4	
			<input type="checkbox"/> $\geq 100,000$	= 2	
			<input type="checkbox"/> $< 100,000$	= 0	
	Left-turn vehicle hourly volume (per lane) ¹	ODOT 2017	<input checked="" type="checkbox"/> ≥ 300	= 4	4 (V.1.b)
<input type="checkbox"/> ≥ 200			= 2		
<input type="checkbox"/> < 200			= 0		
Pedestrian conflicts	Higher Score of Criteria V.2.a OR V.2.b				0 (V.2)
	Product of conflicting pedestrian and left-turn vehicle hourly volumes ¹	LADOT 2020	<input type="checkbox"/> 10,000+ on a two-way street	= 4	0 (V.2.a)
			<input type="checkbox"/> 10,000+ on a one-way street	= 2	
			<input checked="" type="checkbox"/> $< 10,000$	= 0	
	Conflicting pedestrian hourly volume ¹	LADOT 2020	<input type="checkbox"/> ≥ 150	= 2	0 (V.2.b)
			<input type="checkbox"/> ≥ 100	= 1	
			<input checked="" type="checkbox"/> < 100	= 0	
Bicycle conflicts	Left-turn vehicle hourly volume ¹ crossing a separated in-roadway bikeway ³ is greater than volumes outlined in Table 2	MassDOT 2015	<input checked="" type="checkbox"/> Yes	= 4	4 (V.3)
			<input type="checkbox"/> No	= 0	

¹ Five-year projections may be used if different than existing volumes.

² When there is a significant lane imbalance, twice the highest single lane volume can be substituted for the total opposing hourly volume when making this calculation. If there is a dedicated right-turn lane, the right-turn volumes may be added to the opposing through volumes.

³ Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

Table 2. Separated Bike Lane Criteria

Separated Bike Lane Operation	Motor Vehicles Per Hour Turning Across Separated Bike Lane			
	Two-Way Street			One-Way Street
	Right Turn	Left Turn Across One Vehicle Lane	Left Turn Across Two Vehicle Lanes	Right or Left Turn
One-Way	150	100	50	150
Two-Way	100	50	0	100

Source: "Separated Bike Lane Planning & Design Guide" (2015), MassDOT – Exhibit 6A.

INTERSECTION	SW US Veterans Hospital Pkwy	SIGNAL ID		APPROACH	NB
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Geometry

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

GEOMETRY TOTAL (G = G.1 + G.2 + G.3 + G.4 + G.5)	0	(G)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Number of through lanes on the opposing approach	3+ (including separated in-roadway bikeways ¹)		<input type="checkbox"/> Yes	= 4	0
			<input checked="" type="checkbox"/> No	= 0	
Speed of opposing traffic			<input type="checkbox"/> ≥ 40 mph	= 4	0
			<input type="checkbox"/> ≥ 30 mph	= 2	
			<input checked="" type="checkbox"/> < 30 mph	= 0	
Multiple left-turn lanes ² on a single approach	2+ on a one-way street (i.e. conflicting pedestrian and bicycle traffic)		<input type="checkbox"/> Yes if outside downtown	= 2	0
			<input type="checkbox"/> Yes if downtown	= 1	
			<input checked="" type="checkbox"/> No	= 0	
U-turns	Allowed		<input type="checkbox"/> Yes	= 2	0
			<input checked="" type="checkbox"/> No	= 0	
Conflicting bi-directional bicycle facility			<input type="checkbox"/> Yes	= 2	0
			<input checked="" type="checkbox"/> No	= 0	

¹ Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

² Shared left-thru lanes should be counted as left-turn lanes.

Location

On its own, Location Criteria will not result in a recommendation for protected-only left turn mode, but it should be considered in combination with the other Score-Based Criteria. Protected-only left-turn mode **SHOULD** be provided if the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

LOCATION TOTAL (L = L.1 + L.2 + L.3)	0	(L)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Pedestrian District	Intersection located in Pedestrian District	PBOT 2019	<input type="checkbox"/> Yes	= 1	0
			<input checked="" type="checkbox"/> No	= 0	
Major City Bikeway	Approach located on a Major City Bikeway	PBOT 2010	<input type="checkbox"/> Yes	= 1	0
			<input checked="" type="checkbox"/> No	= 0	
Safe Routes to School	Approach located on a Safe Routes to School Primary Investment Route	SRTS	<input type="checkbox"/> Yes	= 1	0
			<input checked="" type="checkbox"/> No	= 0	

INTERSECTION	SW US Veterans Hospital Rd	SIGNAL ID		APPROACH	NB
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SITE-SPECIFIC FACTORS

Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

Site-Specific Factors	Satisfied?	Notes
Constraints in intersection geometry (e.g., shared left-through lanes, offset approaches, set back stop bars, skewed approaches)	<input type="checkbox"/> Yes	
Drivers make left and/or right turns without the need to yield to oncoming traffic (e.g., T-intersections and intersections with one-way streets)	<input checked="" type="checkbox"/> Yes	T-intersection with limited conflicting traffic turning movements except for northbound lefts and eastbound lefts
Conflicting light rail or streetcar tracks	<input type="checkbox"/> Yes	
Maneuverability of particular classes of vehicles (e.g., heavy trucks, buses)	<input type="checkbox"/> Yes	
Inadequacy of gaps in traffic	<input checked="" type="checkbox"/> Yes	Future volume projections will lead to the intersection having inadequate gaps in traffic (see Synchro reports)
Safety concerns and/or community support	<input type="checkbox"/> Yes	
High pedestrian and/or bicycle volumes	<input type="checkbox"/> Yes	
High number of vulnerable roadway users (e.g., people who need additional time to cross the street)	<input type="checkbox"/> Yes	
High percentage of left-turning heavy vehicles	<input type="checkbox"/> Yes	
Long vehicle delays	<input checked="" type="checkbox"/> Yes	Future volume projections will lead to the intersection having long delays especially for B vehicles (558
Queues exceeding the left-turn pocket	<input type="checkbox"/> Yes	
Transit cycle failures	<input type="checkbox"/> Yes	
Constraints with traffic signal progression	<input type="checkbox"/> Yes	
Preemption-related operational requirements	<input type="checkbox"/> Yes	

Guide for Determining Left Turn Signal Control

This document summarizes the Portland Bureau of Transportation's (PBOT) current practice for determining the appropriate left-turn phasing treatment at new and existing signalized intersections.

1. LEFT-TURN PHASING OPTIONS

There are three ways to operate a signalized left-turn movement (Urbanik 2015):

- **Protected:** When left-turning vehicles receive a green without having to yield to any conflicting movements. This is recognized as the safest type of left-turn operation, but the time used exclusively for the left turn may increase delay for other movements. This type of phasing typically requires an exclusive left-turn lane. In rare instances, it is accomplished through split phasing (e.g., shared left-thru lane).
- **Permitted:** When left-turning vehicles receive a green with the adjacent (or opposing) through movement, requiring vehicles to yield to conflicting vehicles, bicyclists, and pedestrians. This type of left turn has the most efficient allocation of green time, but there can be adverse effects on safety as volumes increase.
- **Protected-Permitted:** Combination of protected and permitted phasing when there is a protected interval but left-turning vehicles can also make permitted movements as the adjacent (or opposing) through receives a green.

2. GUIDELINES FOR ALL INTERSECTIONS

Selecting left-turn phasing that aligns with site-specific conditions, volumes, and modes requires careful consideration of safety and operational factors. Guidelines that apply to all intersections include:

- **Opposing left-turn modes** are often the same based on driver expectation. Opposing movements should be evaluated together to ensure that a yellow trap is not introduced. A yellow trap can occur if a left-turn movement receives a yellow indication when the opposing through movement is still receiving a green indication, potentially causing the left-turning driver to think oncoming traffic is stopping when it is not. The yellow trap can be avoided by not using lead/lag left-turn phasing when there is a five-section ("doghouse") signal head or by using a flashing yellow arrow (FYA) signal head.
- **Variable left-turn modes** can be used based on time of day, presence of gaps in oncoming traffic, or the presence of conflicting pedestrians. Protected and permitted phasing is often applied variably where FYAs are installed. For example, the permitted portion of the phase may be omitted if there is a conflicting pedestrian movement or if gaps in opposing traffic are below a certain threshold.
- **Leading Pedestrian Intervals (LPIs)** are another method for providing separation between turning vehicles and people crossing the street. An LPI gives pedestrians a walk indication a few seconds before vehicles are given a green indication. This allows pedestrians to establish presence in the crosswalk and improves their visibility to drivers. Refer to the *PBOT Leading Pedestrian Interval (LPI) Assessment & Implementation Guidelines* for more information.
- **Intersections owned by another agency** (e.g., Oregon Department of Transportation, ODOT) but maintained by PBOT will require concurrence for phasing decisions.

- **Separated in-roadway bikeways** include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks. This left-turn guidance uses a definition from the *Portland Bicycle Plan for 2030*. This definition does not require vertical separation for the bikeways to be considered “separated,” as defined by the Federal Highway Administration (FHWA). According to the *Portland Bicycle Plan for 2030*, “separated in-roadway bikeways are used where motor vehicle traffic volumes or speeds are high. They include:
 - **Bike lanes:** The portion of a roadway designated by an eight-inch stripe and bicycle symbol that is protected by Oregon law for exclusive bicycle travel.
 - **Wide bike lanes, buffered bike lanes, passing bike lanes and colored bike lanes:** New bike lane types that achieve greater capacity and a more comfortable experience for bicyclists.
 - **Cycle tracks:** An exclusive bicycle facility adjacent to the roadway but separated from motor vehicle traffic by a physical barrier or other buffer. (PBOT 2010)”

3. FORM INSTRUCTIONS

The **Guide for Determining Left Turn Signal Control Form** (Appendix A) outlines three types of criteria that should be evaluated to determine a recommendation for the left turns. The criteria can also be used to prioritize locations if scores are assigned.

- **Required Criteria:** If one or more of these criteria are satisfied, protected-only left-turn mode should be provided for that approach.
- **Score-Based Criteria:** Approaches are assigned scores for crash history, volumes, geometry, and location. There are two ways that a protected-only left-turn mode might be recommended based on Score-Based Criteria: (1) if any one category scores four or more points (≥ 4) or (2) if the sum of all four categories is eight or more points (≥ 8).
- **Site-Specific Criteria:** Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

4. REFERENCES

References used to develop the criteria are cited throughout the form with details available below. Maps with key location information are provided in Appendix B. However, the references below should be reviewed for updated information.

Classifications	Website
High Crash Network	https://www.portland.gov/transportation/vision-zero/high-crash-network-streets-and-intersections
Speed Limits	https://www.portland.gov/transportation/vision-zero/speed-limits
Pedestrian Districts	https://www.portlandoregon.gov/transportation/72504
Major City Bikeways	https://www.portlandoregon.gov/transportation/44597
Safe Routes to School	http://www.saferoutesprojects.com

1. American Association of State Highway Transportation Officials. 2011. *A Policy on Geometric Design of Highways and Streets*.
2. City of Los Angeles Department of Transportation (LADOT). 2020. *Left Turn Signal Control Selection Guidelines*.
3. Massachusetts Department of Transportation (MassDOT). 2015. *Separated Bike Lane Planning & Design Guide*. <https://www.mass.gov/lists/separated-bike-lane-planning-design-guide>

4. Oregon Department of Transportation (ODOT). 2017. *Traffic Signal Policy and Guidelines*. https://www.oregon.gov/ODOT/Engineering/Documents_TrafficStandards/Traffic-Signal-Policy-Guidelines.pdf
5. Portland Bureau of Transportation (PBOT). 2019. *PBOT Leading Pedestrian Interval (LPI) Assessment & Implementation Guidelines*.
6. Portland Bureau of Transportation (PBOT). 2019. *PedPDX: Portland's Citywide Pedestrian Plan*. <https://www.portlandoregon.gov/transportation/78224>
7. Portland Bureau of Transportation (PBOT). 2010. *Portland Bicycle Plan for 2030*. <https://www.portlandoregon.gov/transportation/44597>
8. Portland Bureau of Transportation (PBOT). *High Crash Network Streets and Intersections*. <https://www.portland.gov/transportation/vision-zero/high-crash-network-streets-and-intersections>
9. Safe Routes to School (SRTS). *SRTS Project Planning*. <http://www.saferoutesprojects.com>
10. Urbanik, T., A. Tanaka, B. Lozner, E. Lindstrom, K. Lee, S. Quayle, S. Beaird, S. Tsoi, P. Ryus, D. Gettman, S. Sunkari, K. Balke, and D. Bullock. 2015. *NCHRP Report 812: Signal Timing Manual, Second Edition*. Transportation Research Board (TRB), Washington, D.C.

APPENDIX A: FORM

Guide for Determining Left Turn Signal Control Form

Version 05/14/2021

The satisfaction of guideline(s) shall not in itself require the installation of left-turn signal control, and the lack of satisfaction of guideline(s) shall not in itself require the removal of left-turn signal control. Engineering judgment should be used, particularly when applying criteria to unique environments such as Downtown.

BACKGROUND INFORMATION

PREPARED BY		DATE	
CHECKED BY		DATE	
INTERSECTION		SIGNAL ID	
APPROACH DIRECTION			
# of Left Turn Lanes ¹			
# of Opposing Through Lanes (Including Separated In-Roadway Bikeways ²)			
Speed of Opposing Traffic (mph)			
Left Turn Volume (vehicles/hour) ³			
Pedestrian Volume in Conflicting Crosswalk (pedestrians/hour) ³			
Opposing Through / Right Turn Volume (vehicles/hour) ³			

¹ Shared left-thru lanes should be counted as left-turn lanes.

² Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

³ Five-year projections may be used if different than existing volumes.

RECOMMENDATION

APPROACH DIRECTION				
REQUIRED CRITERIA				
Protected-only left-turn mode SHOULD be provided if ANY of the Required Criteria are satisfied.				
Any Required Criteria satisfied?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Required Criteria?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
SCORE-BASED CRITERIA				
Protected-only left-turn mode SHOULD be provided if any criteria score is greater than or equal to four (≥ 4) OR the total score for all categories is greater than or equal to eight (≥ 8).				
Crash History Score (C)				
Volumes Score (V)				
Geometry Score (G)				
Location Score (L)				
Any Score-Based Criteria ≥ 4 ?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Total Score ($T = C + V + G + L$)	0	0	0	0
Total Score ≥ 8 ?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Score-Based Criteria?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
SITE-SPECIFIC FACTORS				
Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.				
Any Site-Specific Factors satisfied?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Protected-only left turn recommended based on Site-Specific Factors?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
NOTES				

INTERSECTION		SIGNAL ID		APPROACH
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REQUIRED CRITERIA

Protected-only left-turn mode **SHOULD** be provided if **ANY** of the following criteria are satisfied.

Criteria	Description	Reference	Satisfied?
High Crash Network	Approach located on PBOT High Crash Network	PBOT	<input type="checkbox"/> Yes
Multiple left-turn lanes ¹ on a single approach	2+ on a two-way street (i.e. conflicting vehicle traffic)		<input type="checkbox"/> Yes
Restricted sight distance	Engineering study indicates that sight distance to oncoming traffic is less than the distances in Table 1.	AASHTO 2011; ODOT 2017	<input type="checkbox"/> Yes
Overlapping left-turn paths ²			<input type="checkbox"/> Yes

¹ Shared left-thru lanes should be counted as left-turn lanes.

² Requires special signal timing consideration – split phasing or a fixed separation with lead/lag protected lefts.

Table 1. Sight Distance Criteria

Posted Speed (mph)	Required Sight Distance (feet)	
	One Opposing Vehicle Thru Lane	Two Opposing Vehicle Thru Lanes
20	165	180
25	205	225
30	245	270
35	285	310
40	325	355
45	365	400
50 ¹	425	465
55 ¹	495	540

Source: "A Policy on Geometric Design of Highways and Streets" (2011), AASHTO – Table 9-14.

¹ For speeds higher than 45 mph, the stopping sight distance (higher value from Table 9-14) is used instead of intersection sight distance.

Note: The above table is based on the AASHTO intersection sight distance for passenger cars. Different sight distance values should be used if there are more than two opposing vehicle through lanes or the left turning traffic has a high percentage of trucks. Refer to Tables 9-13 and 9-14 of "A Policy on Geometric Design of Highways and Streets" 2011, 6th Edition, AASHTO.

SCORE-BASED CRITERIA

Crash History

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

CRASH HISTORY TOTAL (C = C.1 + C.2 + C.3)	0	(C)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Crash history involving left-turn movement	Number of crashes involving the left turn over a 12-month period during the last 3 years that are susceptible to correction	ODOT 2017	<input type="checkbox"/> ≥ 5	= 4	(C.1)
			<input type="checkbox"/> 2-4	= 2	
			<input type="checkbox"/> ≤ 1	= 0	
Crash history involving pedestrians	Number of crashes involving the left turn and pedestrians during the last 5 years that are susceptible to correction	LADOT 2020	<input type="checkbox"/> ≥ 4	= 4	(C.2)
			<input type="checkbox"/> 2-3	= 2	
			<input type="checkbox"/> ≤ 1	= 0	
Crash severity involving left-turn movement	Most severe crash involving the left turn during the last 5 years that is susceptible to correction		<input type="checkbox"/> Fatal	= 4	(C.3)
			<input type="checkbox"/> Non-fatal injury or PDO ¹	= 0	

¹ Property damage only.

INTERSECTION		SIGNAL ID		APPROACH	
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Volumes

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

VOLUMES TOTAL (V = V.1 + V.2 + V.3)	0	(V)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Vehicle conflicts	Higher Score of Criteria V.1.a OR V.1.b				0 (V.1)
	Product of opposing through vehicle and left-turn vehicle hourly volumes ^{1,2}	ODOT 2017	1 opposing auto lane		(V.1.a)
			<input type="checkbox"/> >=150,000	= 4	
			<input type="checkbox"/> >=50,000	= 2	
			<input type="checkbox"/> <50,000	= 0	
			2 opposing auto lanes		
			<input type="checkbox"/> >=300,000	= 4	
			<input type="checkbox"/> >=100,000	= 2	
			<input type="checkbox"/> <100,000	= 0	
	Left-turn vehicle hourly volume (per lane) ¹	ODOT 2017	<input type="checkbox"/> >=300	= 4	(V.1.b)
			<input type="checkbox"/> >=200	= 2	
			<input type="checkbox"/> <200	= 0	
Pedestrian conflicts	Higher Score of Criteria V.2.a OR V.2.b				0 (V.2)
	Product of conflicting pedestrian and left-turn vehicle hourly volumes ¹	LADOT 2020	<input type="checkbox"/> 10,000+ on a two-way street	= 4	(V.2.a)
			<input type="checkbox"/> 10,000+ on a one-way street	= 2	
			<input type="checkbox"/> <10,000	= 0	
	Conflicting pedestrian hourly volume ¹	LADOT 2020	<input type="checkbox"/> >=150	= 2	(V.2.b)
			<input type="checkbox"/> >=100	= 1	
			<input type="checkbox"/> <100	= 0	
Bicycle conflicts	Left-turn vehicle hourly volume ¹ crossing a separated in-roadway bikeway ³ is greater than volumes outlined in Table 2	MassDOT 2015	<input type="checkbox"/> Yes	= 4	(V.3)
			<input type="checkbox"/> No	= 0	

¹ Five-year projections may be used if different than existing volumes.

² When there is a significant lane imbalance, twice the highest single lane volume can be substituted for the total opposing hourly volume when making this calculation. If there is a dedicated right-turn lane, the right-turn volumes may be added to the opposing through volumes.

³ Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

Table 2. Separated Bike Lane Criteria

Separated Bike Lane Operation	Motor Vehicles Per Hour Turning Across Separated Bike Lane			
	Two-Way Street			One-Way Street
	Right Turn	Left Turn Across One Vehicle Lane	Left Turn Across Two Vehicle Lanes	Right or Left Turn
One-Way	150	100	50	150
Two-Way	100	50	0	100

Source: "Separated Bike Lane Planning & Design Guide" (2015), MassDOT – Exhibit 6A.

INTERSECTION		SIGNAL ID		APPROACH	
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Geometry

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (≥ 4) or the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

GEOMETRY TOTAL ($G = G.1 + G.2 + G.3 + G.4 + G.5$)	0	(G)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Number of through lanes on the opposing approach	3+ (including separated in-roadway bikeways ¹)		<input type="checkbox"/> Yes	= 4	(G.1)
			<input type="checkbox"/> No	= 0	
Speed of opposing traffic			<input type="checkbox"/> ≥ 40 mph	= 4	(G.2)
			<input type="checkbox"/> ≥ 30 mph	= 2	
			<input type="checkbox"/> < 30 mph	= 0	
Multiple left-turn lanes ² on a single approach	2+ on a one-way street (i.e. conflicting pedestrian and bicycle traffic)		<input type="checkbox"/> Yes if outside downtown	= 2	(G.3)
			<input type="checkbox"/> Yes if downtown	= 1	
			<input type="checkbox"/> No	= 0	
U-turns	Allowed		<input type="checkbox"/> Yes	= 2	(G.4)
			<input type="checkbox"/> No	= 0	
Conflicting bi-directional bicycle facility			<input type="checkbox"/> Yes	= 2	(G.5)
			<input type="checkbox"/> No	= 0	

¹ Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

² Shared left-thru lanes should be counted as left-turn lanes.

Location

On its own, Location Criteria will not result in a recommendation for protected-only left turn mode, but it should be considered in combination with the other Score-Based Criteria. Protected-only left-turn mode **SHOULD** be provided if the total score for all Score-Based Criteria is greater than or equal to eight (≥ 8).

LOCATION TOTAL ($L = L.1 + L.2 + L.3$)	0	(L)
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Criteria	Description	Reference	Satisfied?	Scoring	Score
Pedestrian District	Intersection located in Pedestrian District	PBOT 2019	<input type="checkbox"/> Yes	= 1	(L.1)
			<input type="checkbox"/> No	= 0	
Major City Bikeway	Approach located on a Major City Bikeway	PBOT 2010	<input type="checkbox"/> Yes	= 1	(L.2)
			<input type="checkbox"/> No	= 0	
Safe Routes to School	Approach located on a Safe Routes to School Primary Investment Route	SRTS	<input type="checkbox"/> Yes	= 1	(L.3)
			<input type="checkbox"/> No	= 0	

INTERSECTION		SIGNAL ID		APPROACH
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SITE-SPECIFIC FACTORS

Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

Site-Specific Factors	Satisfied?	Notes
Constraints in intersection geometry (e.g., shared left-through lanes, offset approaches, set back stop bars, skewed approaches)	<input type="checkbox"/> Yes	
Drivers make left and/or right turns without the need to yield to oncoming traffic (e.g., T-intersections and intersections with one-way streets)	<input type="checkbox"/> Yes	
Conflicting light rail or streetcar tracks	<input type="checkbox"/> Yes	
Maneuverability of particular classes of vehicles (e.g., heavy trucks, buses)	<input type="checkbox"/> Yes	
Inadequacy of gaps in traffic	<input type="checkbox"/> Yes	
Safety concerns and/or community support	<input type="checkbox"/> Yes	
High pedestrian and/or bicycle volumes	<input type="checkbox"/> Yes	
High number of vulnerable roadway users (e.g., people who need additional time to cross the street)	<input type="checkbox"/> Yes	
High percentage of left-turning heavy vehicles	<input type="checkbox"/> Yes	
Long vehicle delays	<input type="checkbox"/> Yes	
Queues exceeding the left-turn pocket	<input type="checkbox"/> Yes	
Transit cycle failures	<input type="checkbox"/> Yes	
Constraints with traffic signal progression	<input type="checkbox"/> Yes	
Preemption-related operational requirements	<input type="checkbox"/> Yes	

APPENDIX B: MAPS

Figure 1. Map

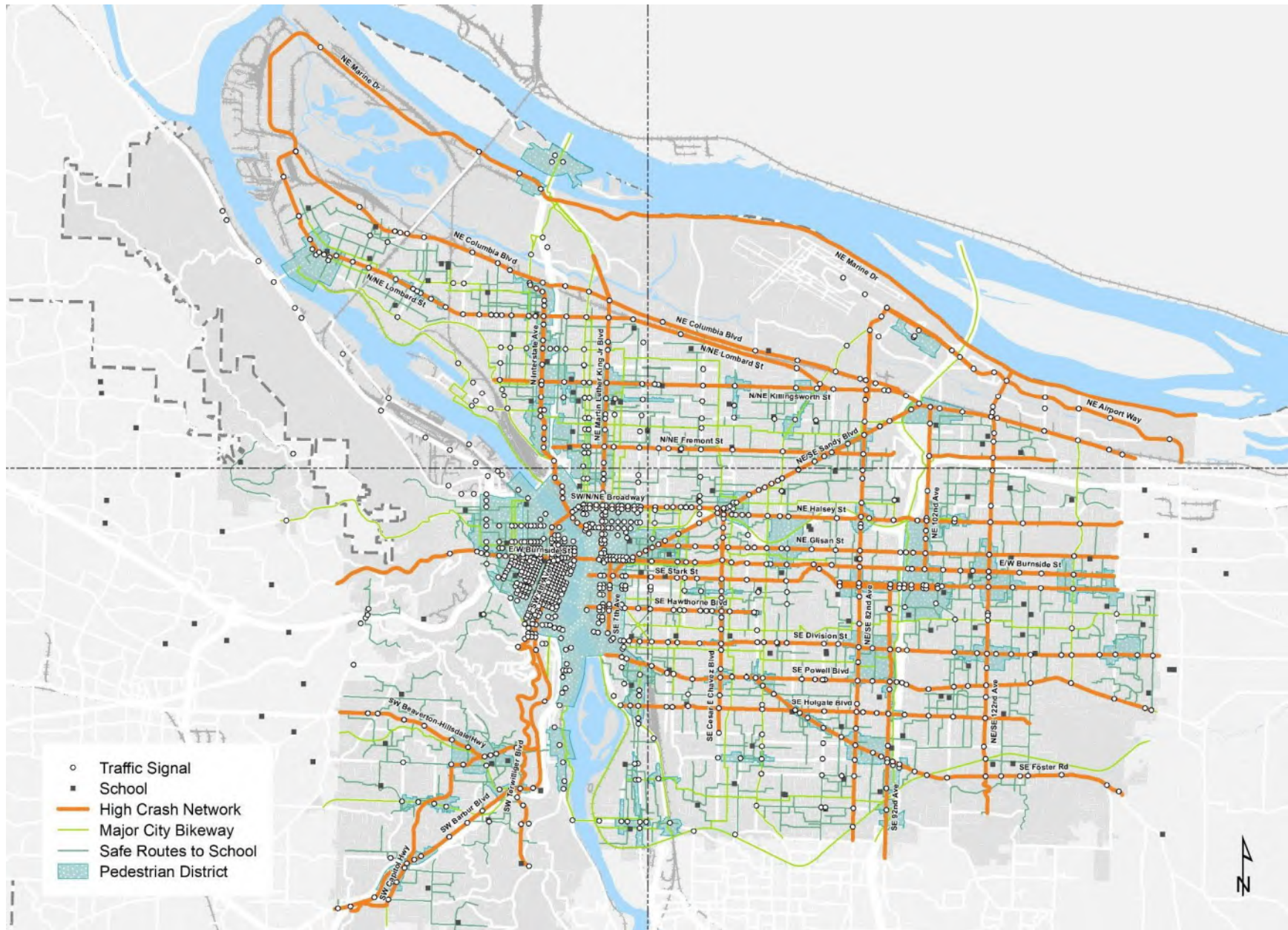


Figure 2. Map (NW)

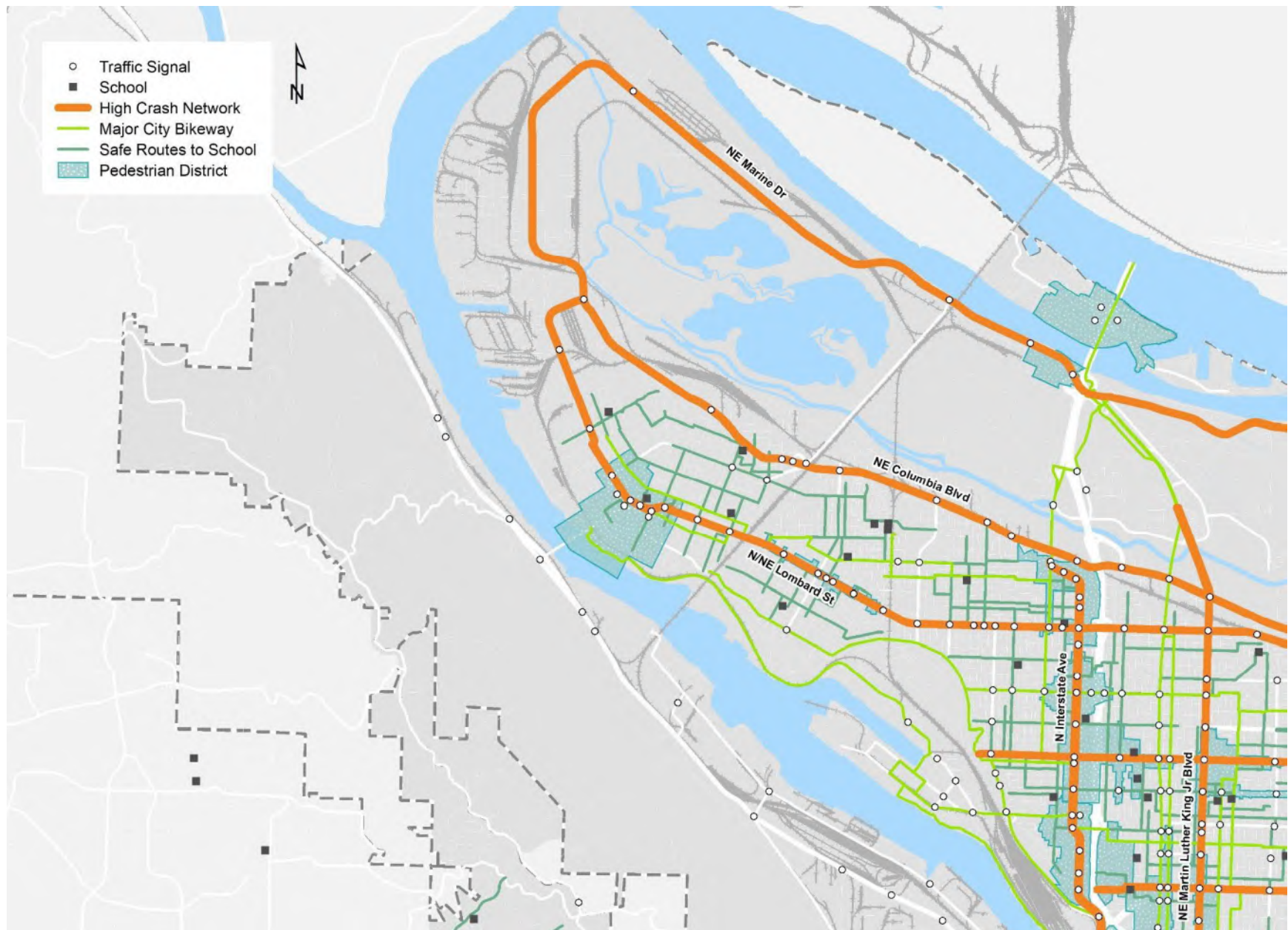


Figure 3. Map (NE)

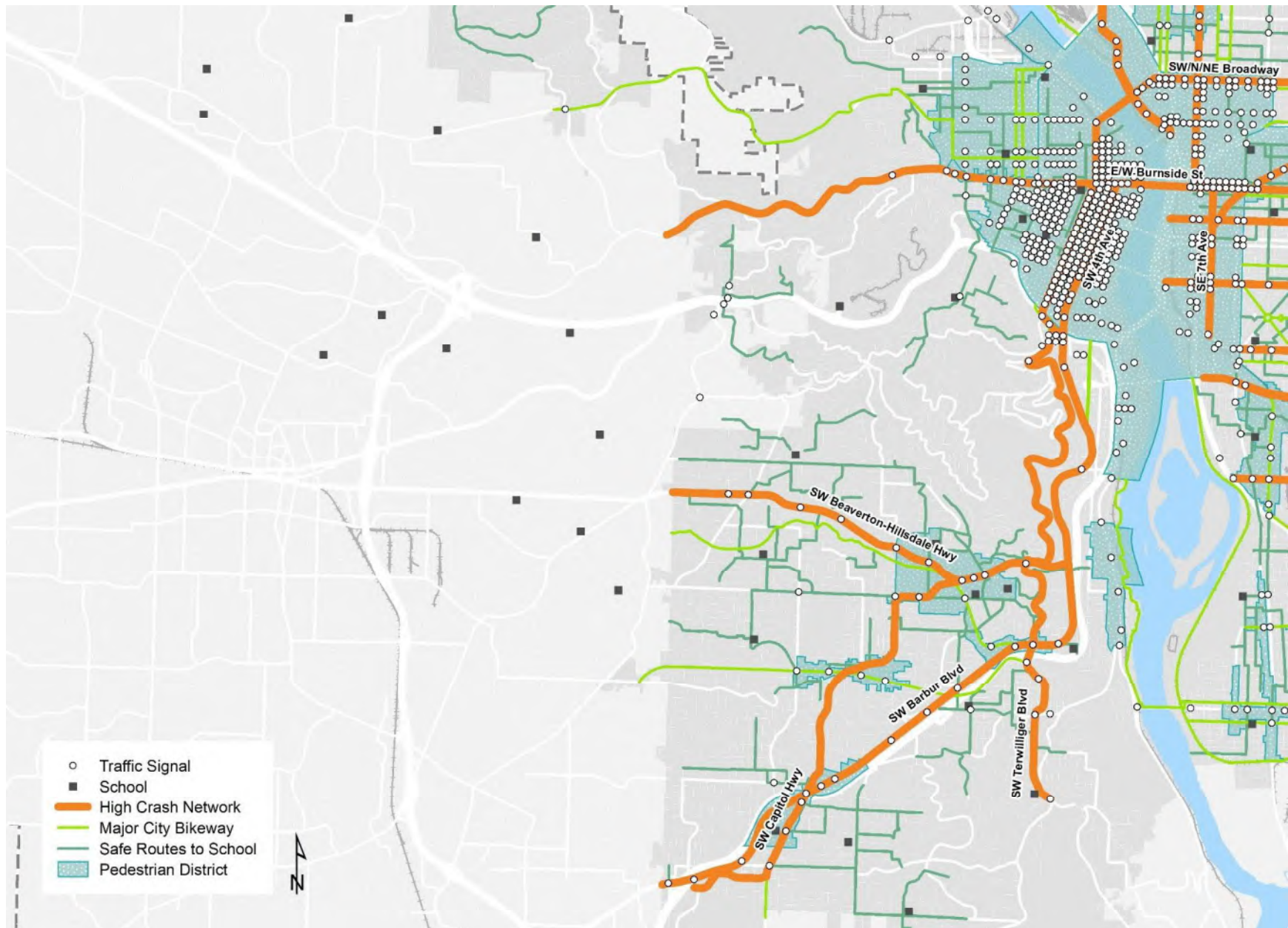


Figure 4. Map (SW)

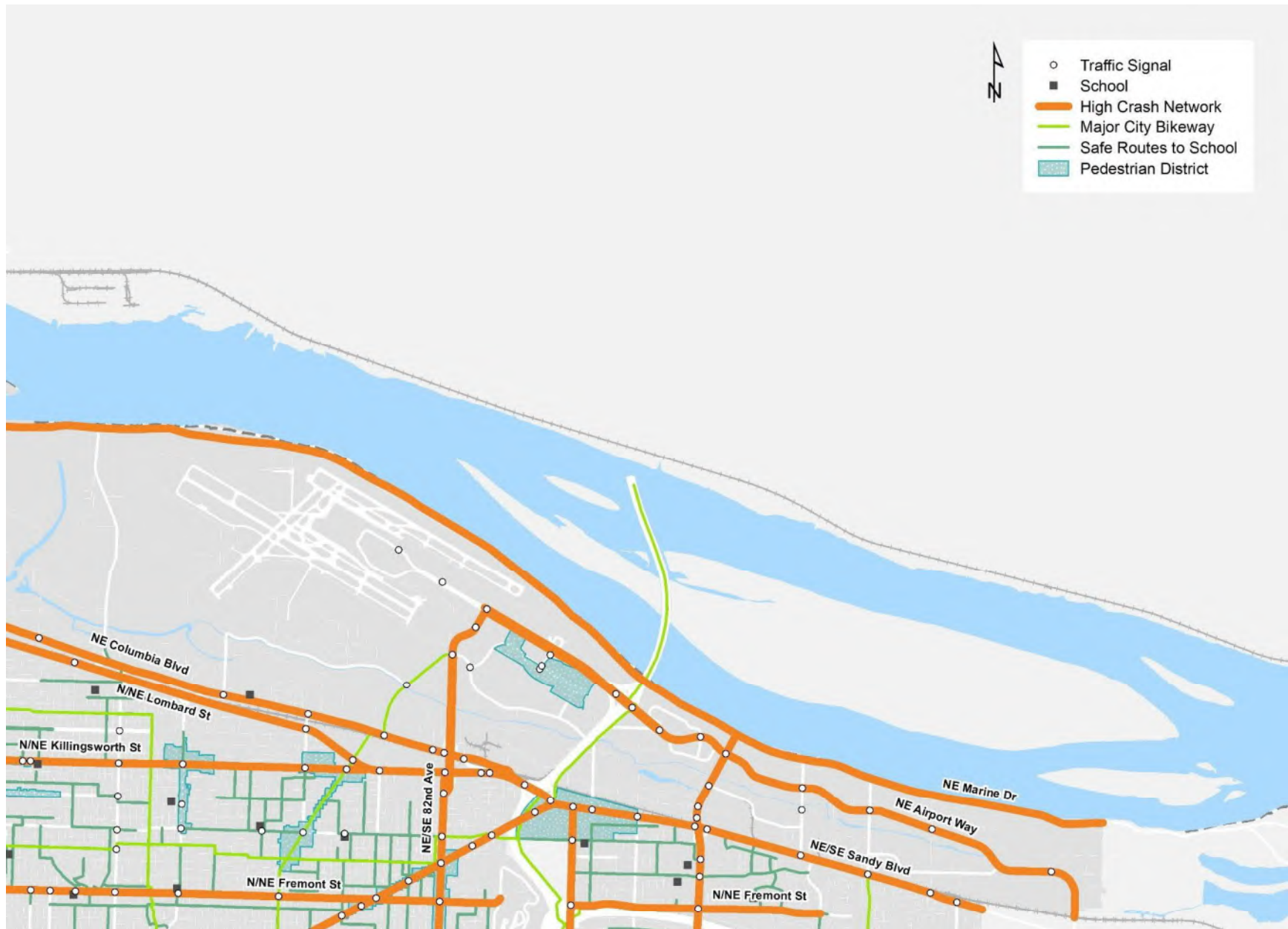


Figure 5. Map (SE)

