FINAL - TERMINAL 91 2018 TRAFFIC MONITORING STUDY

Prepared for:
Port of Seattle

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Introduction

The purpose of this report is to summarize the 2018 traffic monitoring study conducted for the Port of Seattle at Terminal 91. This study is conducted annually, as originally outlined in the Terminal 91 Short Fill Redevelopment Agreement (SFRA) between the neighborhood community councils of Magnolia and Queen Anne and the Port of Seattle. As part of this study, traffic counts at and around Terminal 91 are conducted and an evaluation is performed on the transportation system based on the performance measures and thresholds identified in the SFRA. The results of this study are compared to each of the annual reports dating back to 2012. Prior to 2016, the traffic monitoring study was prepared by Heffron Transportation.

Short Fill Redevelopment Agreement and the Monitoring Process

The SFRA was established as a method of resolving disputes surrounding the Port's short fill redevelopment of Terminal 91. There were concerns from local residents and neighborhood community councils that the Port's redevelopment would cause significant adverse impacts to the surrounding roadway network. The SFRA outlines an annual monitoring program and a set of thresholds for traffic volumes and intersection level of service that were agreed upon by the Port and the neighborhood community councils. If these thresholds are exceeded, the SFRA states that further intensive review by the Port will be required as well as any mitigation measures, if deemed necessary.

Key steps within the monitoring program stated in the SFRA are as follows:

- ***Gates:*** The Port will obtain daily (24 hour), AM and PM peak period gate counts of trucks and autos entering or leaving all Terminal 91 gates for one week each year. Gate counts will be reported as trip ends. A trip end is an arrival or a departure. As such, a single vehicle which enters and then leaves the terminal will generate two trip ends.

- ***Intersections:*** Congestion and delay at intersections are measured in terms of Level of Service (LOS) under a system described in the Highway Capacity Manual. Levels of service range from A through F, with LOS A representing congestion-free service and LOS F representing jammed conditions. The Port will obtain LOS determinations for the peak hours at the following intersections once a year:

    - Elliott Avenue West and West Galer Street (now the Galer Street flyover)
    - Elliott Avenue West/15th Avenue West and West Garfield Street
    - Elliott Avenue West and West Mercer Place
    - 15th Avenue West and West Dravus Street (no longer counted due to north gate closure)
    - 20th Avenue West and West Dravus Street (no longer counted due to north gate closure)

According to industry standard, the methodology to determine level of service has been updated many times since the original SFRA agreement was drafted. The original methodology for determining level of service was via hand-calculations. Software now allows more accurate measurement of intersection operations and vehicle delays, and was used to perform the analysis in this report. Intersection LOS is based on the average delay per vehicle traveling through that intersection. Appendix B provides a breakdown of how much delay equates to each LOS. For this report, Trafficware's Synchro software (version 9) was used to perform LOS calculations.

Another change that has occurred since the SFRA was created is construction of the Galer Street Flyover. The Galer Street Flyover/Elliott Avenue West intersection was evaluated instead of the West Galer Street/Elliott Avenue West intersection because the Galer Street Flyover is the new access roadway for Terminal 91, and the West Galer Street railroad crossing is closed to vehicle traffic. Additionally, because the Center Gate to Terminal 91 is currently closed, no analysis was performed along the Magnolia Bridge. Finally, with the closure of the north gate, no intersections on West Dravus Street

were counted or included in the study. However, traffic counts on the main access points (rail crossings) to Magnolia are included to allow comparisons on those streets (see pages 23 and 24).

The SFRA established thresholds for both automobile and truck traffic volumes over three specific time periods. The time periods and volume thresholds are summarized in Table 1. The SFRA defines a 75-minute period for the AM peak and a 105-minute period for the PM peak. This differs from a typical traffic analysis, where a 60-minute peak period is used.

Table 1. SFRA Traffic Volume Threshold Criteria

	Time Period	Automobiles	Trucks
AM Peak	7:15 – 8:30 A.M.	395	25
PM Peak	3:45 – 5:30 P.M.	612	48
Daily	24 hours	3,500	325

Traffic Counts

Vehicle Classification Count Locations

During the course of this study there were two locations where vehicular traffic could enter and exit Terminal 91; these are shown in Figure 1.

1. **East Gate** – This gate is located off Alaskan Way West and is accessed by the Galer Street Flyover.
2. **West Gate** – On days with cruise activity, a retractable gate at the west end of the Magnolia Bridge is open. Vehicles can enter or exit through this gate to access parking lot D, or to travel the area beneath the Magnolia Bridge to access Pier 91 south of the bridge. When cruise vessels are at sea, the gate is locked to the public in order to secure the cruise parking lot. Vehicles use the on/off ramps at the west end of the Magnolia Bridge to access the parking lot, as do general public vehicles traveling to Elliott Bay Marina (which are not included in this count).

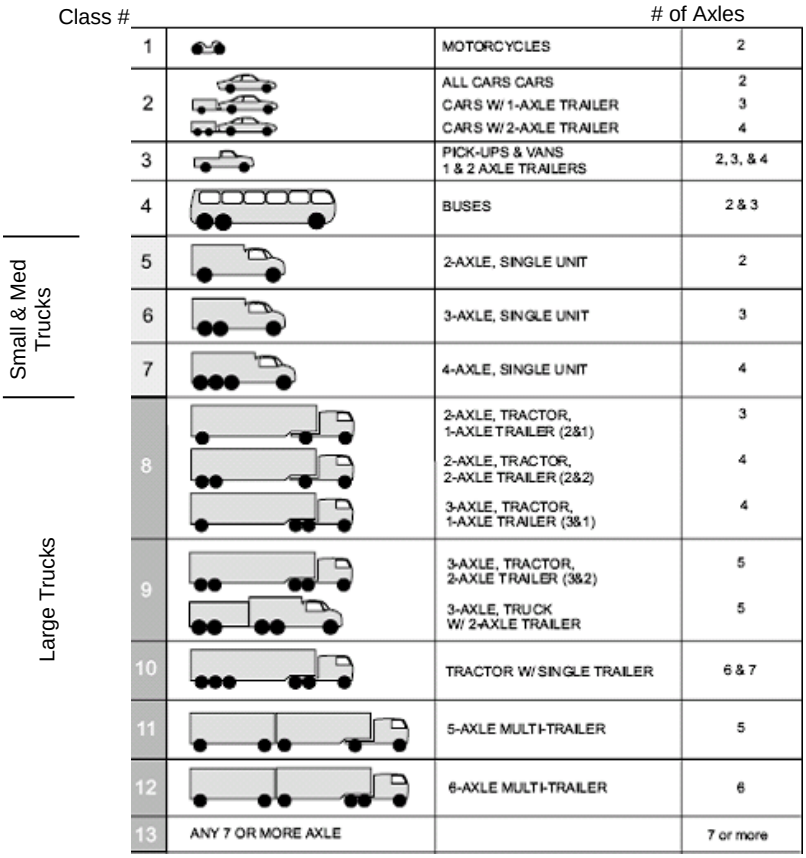
Figure 1. Terminal 91 Access Locations

Vehicle classification counts (classification breakdown shown in Figure 2) were performed at both Terminal 91 gates in late August and early September 2018. The classification counts (performed by pneumatic tube counters) track the types of vehicles entering and exiting the terminals for each hour of the day. These tube counters are thin tubes, laid across the study roadway in pairs a set distance apart, that use pressure measurements to record when a vehicle passes over them. The tubes are able to count the number of axles per vehicle to determine the classification of the vehicle. These data were collected over an eleven-day period from Thursday, August 30, 2018 through Sunday, September 9, 2018.

To complement the tube counts, camera counts were performed at the same locations for four days: Thursday, August 30; Friday, August 31; Saturday, September 1; and Sunday, September 2. Three of these days, Friday, Saturday, and Sunday were cruise days and Thursday was a non-cruise day. These counts were performed during the peak hours for disembarkation (7:30 to 9:45 A.M.) and embarkation (11:00 A.M. to 12:45 P.M.). The cameras were mounted upon existing light or maintenance poles that record video of a specific location. Software systems and manual observations of the camera footage are used to count the number and type of vehicles. The vehicle types were categorized: passenger vehicle (non-

commercial, including TNCs such as Uber and Lyft), taxi, limo/towncar, shuttle van/bus, charter bus, school bus, small truck, medium truck and large truck. Figure 2 provides a breakdown of each of the vehicle classifications.

Figure 2. Vehicle Classification Breakdown



The tube counts classify vehicles based on the number and spacing of axles; however, the accuracy of the classification counts can be affected by travel speed. A vehicle that travels faster or slower than expected could be registered as a different type of vehicle. The camera counts were used to validate the tube counts and determine if adjustments were needed. Discrepancies between the vehicle classification counts and the pneumatic tube counts were discovered, especially for small and medium trucks. These discrepancies are common for locations with low speeds, and this is likely the cause of the discrepancy for this count due to the tube counts being placed at the gates.

Small and medium trucks were over-counted by pneumatic tube counters for all days by approximately a factor of two. To correct for this, all small and medium truck values were divided by two. It was also noted that large trucks were undercounted on all days, and as a result large truck counts were multiplied by two.

2018 Cruise Schedule

Cruise vessels were present at Terminal 91 on seven of the ten days surveyed in 2018. Table 2 provides a summary of the cruise schedule and the number of passengers per cruise ship during the ten-day study period (August 31 through September 9, 2018). Passenger volumes were highest on the two Fridays, when two ships were present at Terminal 91. Monday, Tuesday and Thursday were days of the ten-day study period where no cruise ships were present. The Carnival cruise ship that arrived at port on Wednesday (September 5, 2018) typically sails on Tuesdays, and only sailed on Wednesday during the last week of the cruise ship season (when the study was conducted). Additionally, cruise ships typically sail on every other Monday throughout cruise ship season and this study was conducted during a week when no cruise ships sailed on Monday.

Table 2. Cruise Passengers at Terminal 91 During 2018 Monitoring Survey

		Number of Passengers		
Date	**Vessel**	**Disembark**	**Embark**	**Total Passengers**
Fri, 8/31/18	CELEBRITY CRUISES	2818	2846	5664
	ROYAL CARIBBEAN	3413	3642	7055
Sat, 9/1/18	PRINCESS CRUISES	3078	3179	6257
	HOLLAND AMERICA LINE	2098	2146	4244
Sun, 9/2/18	HOLLAND AMERICA LINE	1354	1405	2759
	PRINCESS CRUISES	3145	3228	6373
Mon, 9/3/18				
Tues, 9/4/18				
Wed[1], 9/5/18	CARNIVAL CRUISE LINE	2195	2232	4427
Thurs, 9/6/18				
Fri, 9/7/18	ROYAL CARIBBEAN	3327	3404	6731
	CELEBRITY CRUISES	2827	2771	5598
Sat, 9/8/18	HOLLAND AMERICA LINE	1914	2045	3959
	PRINCESS CRUISES	3018	3069	6087
Sun, 9/9/18	HOLLAND AMERICA LINE	1242	1344	2586
	PRINCESS CRUISES	3139	3113	6252

Source: *Port of Seattle and Cruise Terminals of America*, 2018.

1. Carnival ship typically sails on Tuesdays, and only sailed on Wednesday because it was the end of its season. This ship sailed on Tuesdays for the rest of the 2018 season.

Automobile Traffic

Automobile traffic that entered or exited Terminal 91 was added for both access locations (east and west gate) to determine the total number of automobiles accessing Terminal 91. In addition to passenger cars, vans and small shuttles (i.e. 10-person passenger vans) were also classified as an automobile. Table 3 summarizes the automobile trip ends (a trip to and from T91 counts as two trips) and compares them to the thresholds established in the SFRA.

Figure 3 through Figure 5 summarize the AM, PM and daily volumes as compared to their respective thresholds. As shown, the AM peak period exceeded the thresholds on Wednesday when there was one ship call, and both Fridays, Saturdays and Sundays when there were two cruise ships. Daily automobile thresholds were exceeded on all the days when a cruise ship was present at T91. The PM peak period threshold was never exceeded.

Table 3. Automobile Traffic to and from Terminal 91

Date	AM Peak (7:15 – 8:30 AM) Threshold = 395	PM Peak (3:45 – 5:30 PM) Threshold = 612	Daily (24-Hour) Threshold = 3,500
Fri, 8/31/18	**1,024**	271	**8,182**
Sat, 9/1/18	**784**	203	**6,392**
Sun, 9/2/18	**628**	155	**5,270**
Mon, 9/3/18	30	111	866
Tue, 9/4/18	121	235	2,010
Wed, 9/5/18	**396**	341	**4,735**
Thu, 9/6/18	128	208	2,191
Fri, 9/7/18	**1,034**	280	**8,694**
Sat, 9/8/18	**750**	212	**6,019**
Sun, 9/9/18	**629**	117	**5,393**

Source: *Ten-day tube counts conducted by IDAX, Friday, August 31 to Sunday, September 9, 2018. Combined volumes at both East Gate and West Gate for entry to and from Terminal 91.*
Volumes in bold identify time periods where the SFRA threshold limit is met or exceeded.

Figure 3. Automobile Traffic – AM Peak Period (7:15 – 8:30 AM)

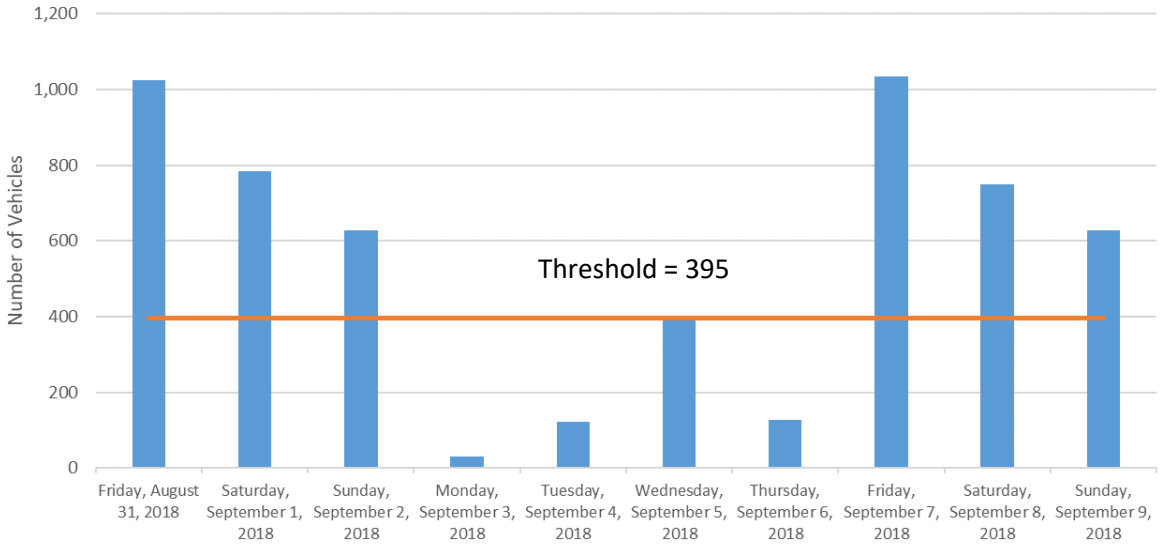


Figure 4. Automobile Traffic – PM Peak Period (3:45 – 5:30 PM)

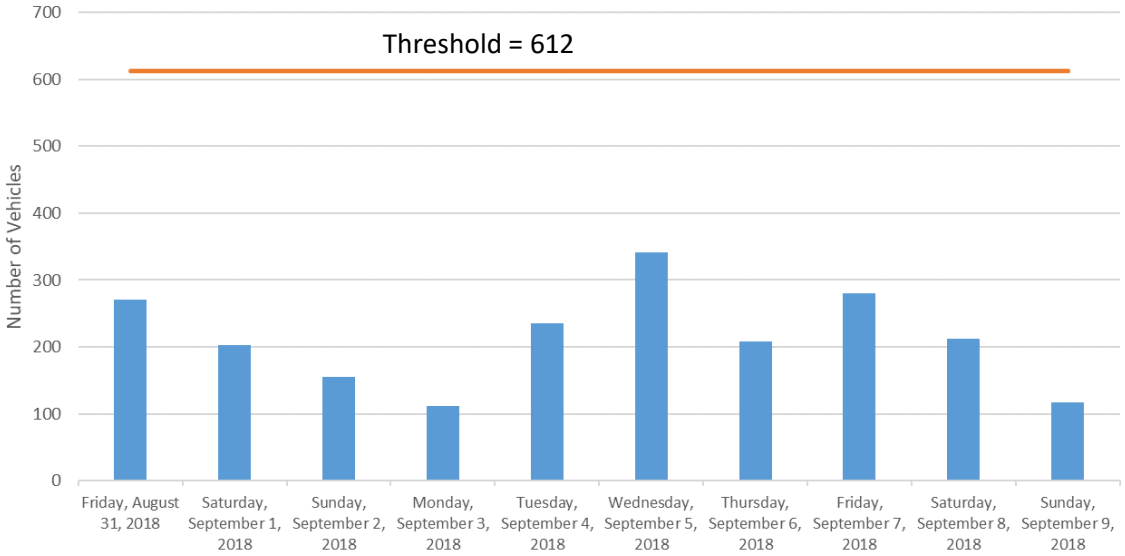
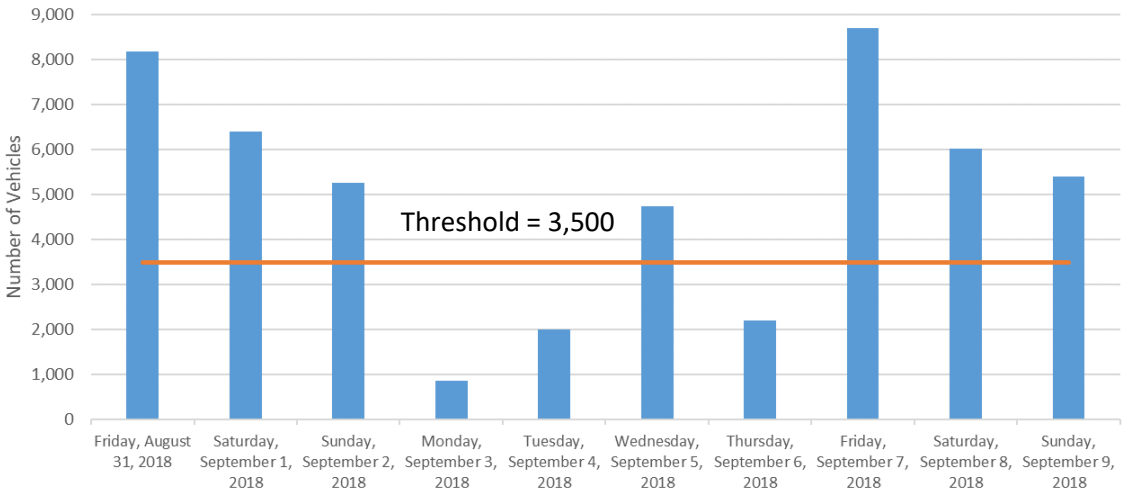
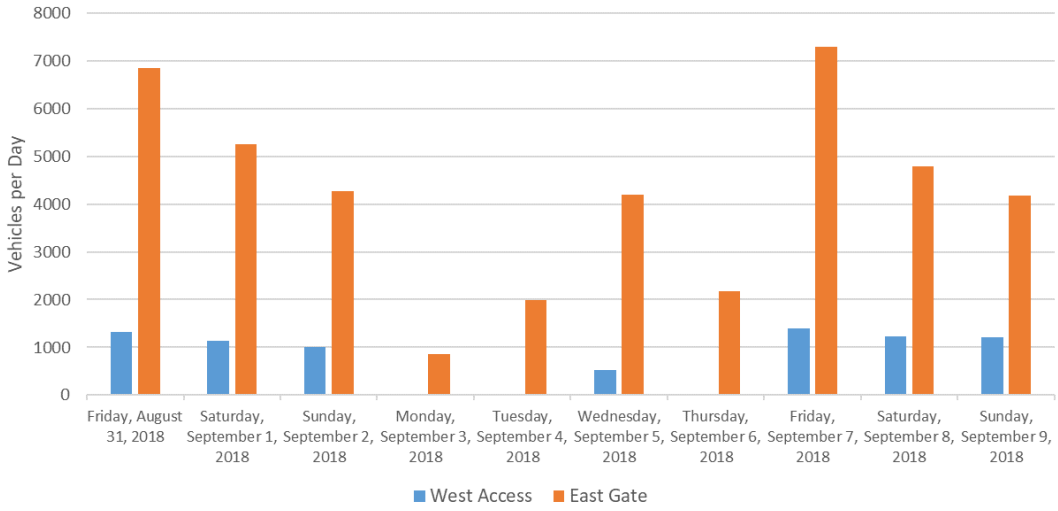


Figure 5. Automobile Traffic – Daily (24-Hour Period)



The daily automobile volume by access location is shown on Figure 6. On days without a cruise ship call, the parking lot at the West Gate is locked, and the small number of trips that entered or exited the terminal at the West Gate are likely related to security or maintenance personnel. Days with the largest number of vehicles accessing Terminal 91 correspond to days with cruise ship activity.

Figure 6. Daily Automobile Trips by Access Location



Truck Traffic

As was done with the automobile traffic, the truck traffic volumes were counted for large vehicles (trucks and buses) entering at both gates to Terminal 91 and compared to SFRA thresholds. Almost all large vehicles access Terminal 91 through the East Gate, although some smaller trucks and shuttles may use the West Gate. The total number of truck trip ends for both access locations is summarized in Table 4. As shown, the volume of trucks, shuttles and buses exceeded the AM peak and daily thresholds on all days of the week except Monday. The PM peak threshold was exceeded on both Fridays and Tuesday (9/4), Wednesday (9/5) and Thursday (9/6).

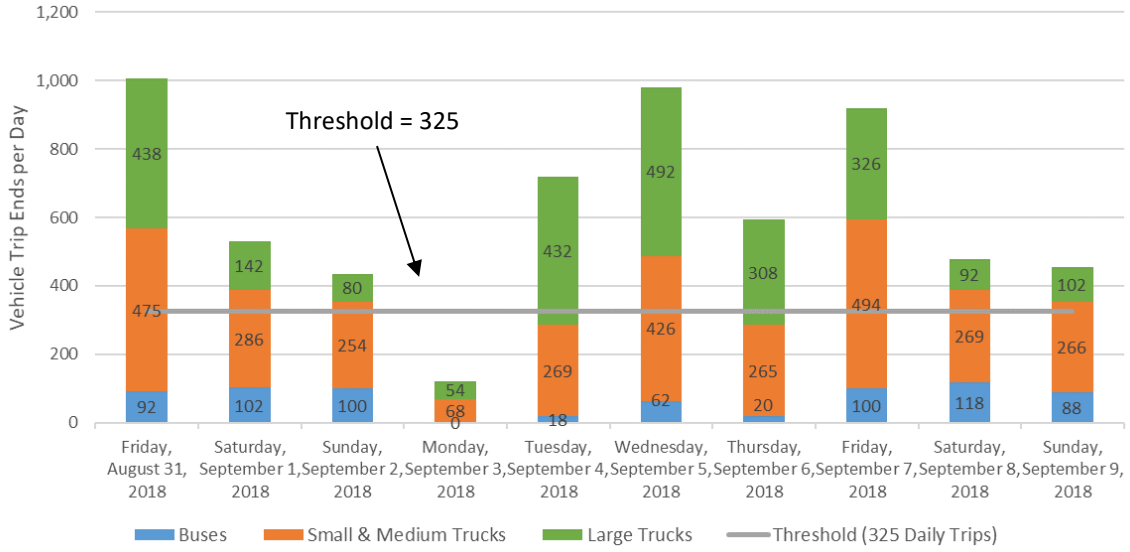
Table 4. Truck, Bus and Shuttle Volumes to and from Terminal 91

Date	AM Peak (7:15 – 8:30 AM) Threshold = 25	PM Peak (3:45 – 5:30 PM) Threshold = 48	Daily (24-Hour) Threshold = 325
Fri, 8/31/18	**91**	**59**	**1,005**
Sat, 9/1/18	**74**	21	**530**
Sun, 9/2/18	**65**	10	**434**
Mon, 9/3/18	6	8	122
Tue, 9/4/18	**31**	**72**	**719**
Wed, 9/5/18	**108**	**62**	**980**
Thu, 9/6/18	**48**	**51**	**593**
Fri, 9/7/18	**79**	**53**	**920**
Sat, 9/8/18	**61**	10	**479**
Sun, 9/9/18	**58**	11	**456**

Source: *Ten-day tube counts conducted by IDAX, Friday, August 31 to Sunday, September 9, 2018. Combined volumes at both East Gate and West Gate for entry to and from Terminal 91.*
Volumes in bold identify time periods where the Short-Fill Redevelopment Agreement threshold limit is met or exceeded.

The types of vehicles were compiled for each day to show the proportion of each type of large vehicle: buses, small and medium trucks and large trucks (see Figure 2 for classification breakdown). Figure 7 summarizes the daily truck and bus volumes entering Terminal 91.

Figure 7. Large Vehicles by Day of Week



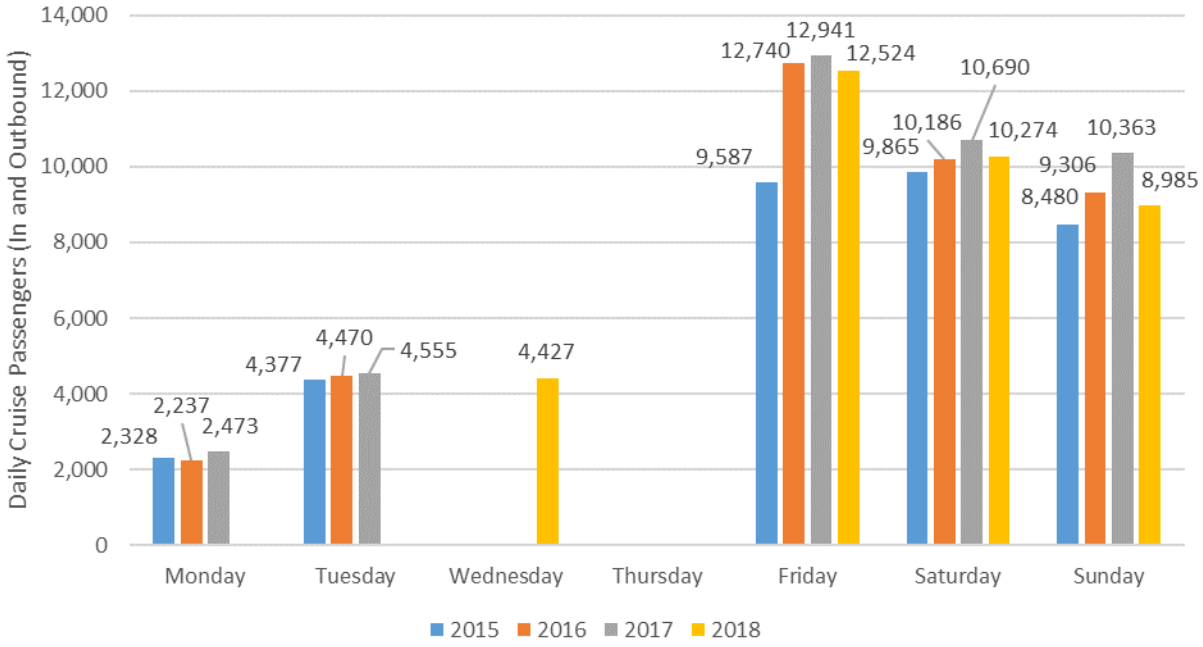
Historic Trends

This section compares results from the four most recent traffic monitoring studies—September 2015, 2016, 2017 and 2018[1].

Passenger Trends

Traffic volumes at Terminal 91 fluctuate from day to day. The largest changes result from cruise activities. Figure 8 shows the number of passengers that embark and disembark cruise ships at the terminal by day of week for the past four monitoring years. As shown, mid-week cruise activity changed significantly in 2018 with a cruise ship call on Wednesday, and no cruise activity on Monday, Tuesday or Thursday. 2018 is the only year in the last 4 years where cruise activity has occurred on Wednesday instead of Monday and Tuesday during the study period. However, as noted previously, the cruise ship schedule during the 10-day study period was not reflective of the typical 2018 schedule. Typical 2018 cruise ship schedules included cruise ship calls at T91 on Tuesdays instead of Wednesday, and cruise activity every other Monday. No cruise activity has occurred on Thursday in recent years. Cruise ship passenger volumes decreased in 2018 for the first time in the last few years. Cruise ship volumes were lower on Friday, Saturday and Sunday in 2018 compared to previous years. Cruise ship passenger volumes on Wednesday in 2018 were also slightly lower than cruise ship passenger counts on Tuesday in previous years.

Figure 8. Cruise Ship Passenger Volume Trends



[1]Report from 2015 completed by Heffron Transportation. 2016, 2017 and 2018 reports completed by Transpo Group. Previous reports available by request from the Port of Seattle.

Automobile Traffic Trends

Figures 9, 10, and 11 compare historic automobile traffic monitoring results for the AM peak, PM peak and 24-hour periods, respectively. Traffic volumes remain consistent with cruise ship passenger trends during the last four years of traffic monitoring. The AM peak period automobile traffic volumes continue to exceed the threshold on Friday, Saturday and Sunday. The threshold was also exceeded on Wednesday this year. AM traffic volumes decreased on Monday and Tuesday in 2018 compared to previous years, while Wednesday AM volumes increased as a result of the one-time Wednesday cruise ship. The PM peak period automobile traffic volumes remain similar to volumes from 2017. Volumes during the PM are well below the established threshold. Daily automobile traffic volumes exceed the threshold on Tuesday, Wednesday, Friday, Saturday and Sunday.

Figure 9. Automobile Trends – AM Peak Period (7:15 – 8:30 AM)

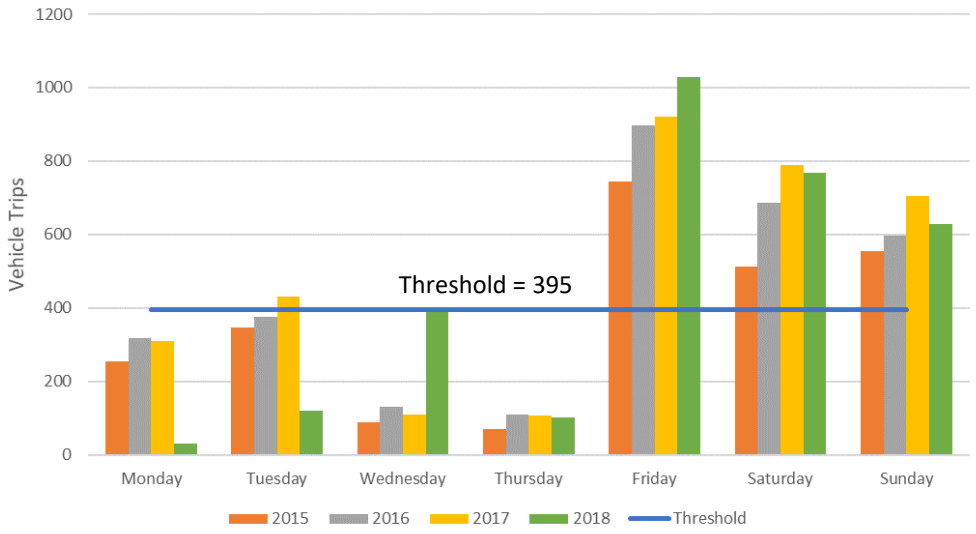


Figure 10. Automobile Trends – PM Peak Period (3:45 – 5:30 PM)

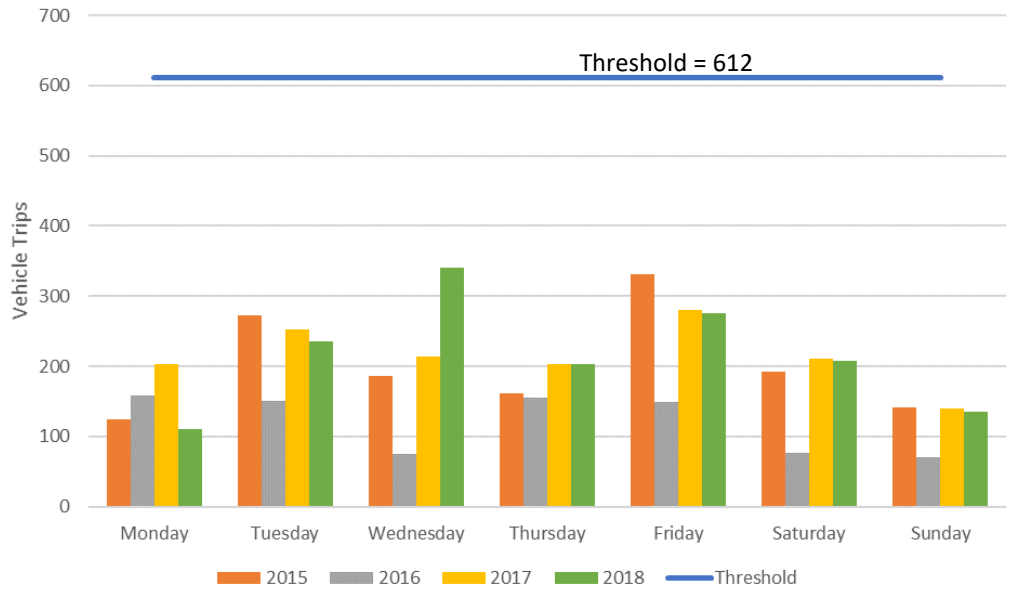
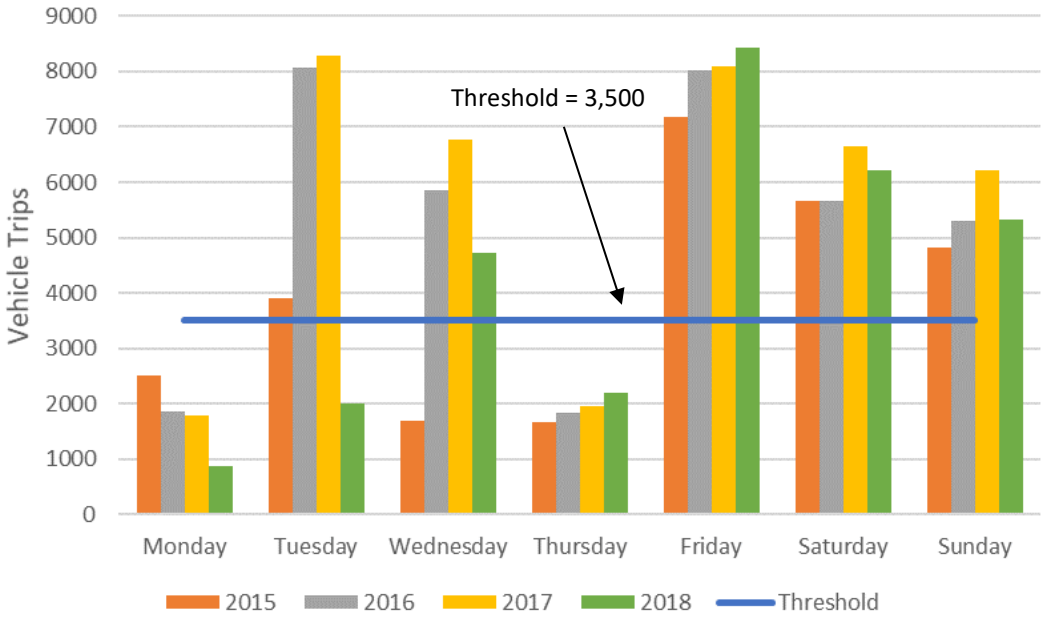


Figure 11. Automobile Trends – Daily (24-Hour Period)



Truck and Bus Traffic Trends

Figures 12, 13, and 14 compare truck volumes to prior monitoring results for the AM peak, PM peak, and 24-hour periods, respectively. These volumes include buses and trucks. The AM peak period and daily volumes of trucks have generally decreased during the weekdays (apart from Wednesday in 2018, where AM truck volumes were high). PM truck volumes increased in 2018 compared to previous years, especially on Tuesday through Wednesday. As in past years, truck volume thresholds were met or exceeded every day during the AM peak period and the daily (24-hour) period except Mondays. Similar to past years, the PM peak period threshold was met on Tuesday, Wednesday and Friday.

Figure 12. Truck and Bus Trends – AM Peak Period (7:15 – 8:30 AM)

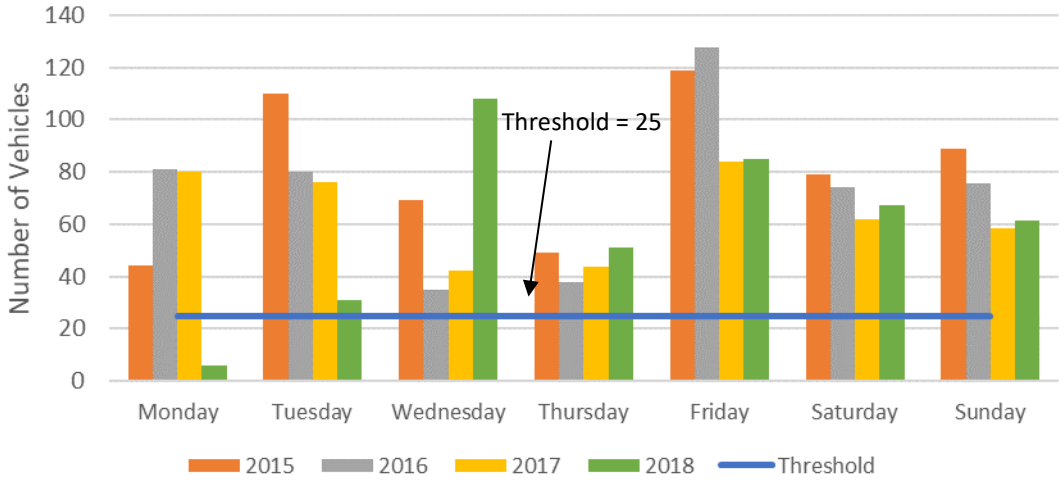


Figure 13. Truck and Bus Trends – PM Peak Period (3:45 – 5:30 PM)

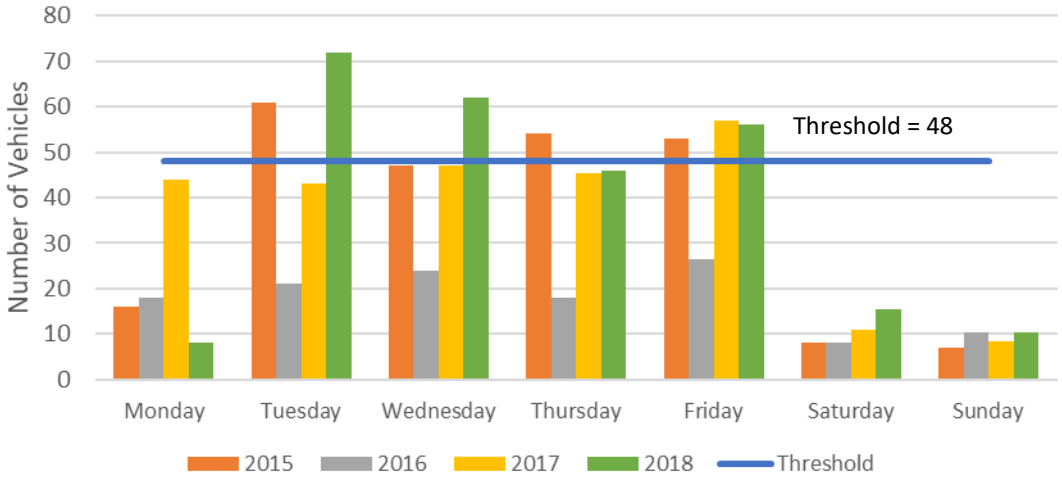
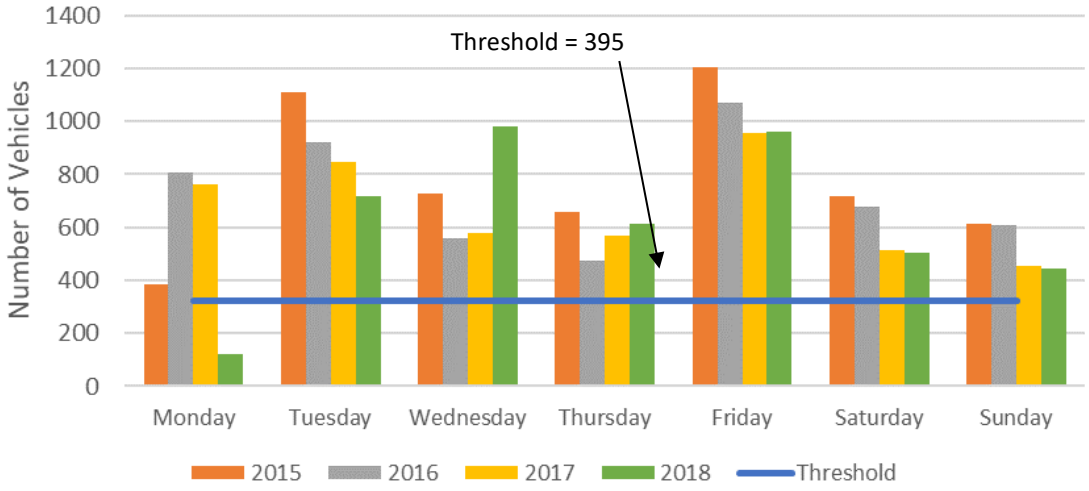


Figure 14. Truck and Bus Trends – Daily (24-Hour Period)



Intersection Level of Service

Trigger Levels

The SFRA established level of service trigger levels for three off-site intersections. Level of service is a qualitative measure used to characterize traffic operating conditions. Six letter designations, "A" through "F," are used to define level of service. LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. The trigger levels are summarized in Table 5. It is noted that the SFRA included the West Galer Street intersection on Elliott Avenue West, which was the primary access to Terminal 91 when the SFRA was created. That access has been replaced with the Galer Street Flyover. Therefore, the trigger level previously established for Galer Street was applied to the Elliott Avenue West/West Galer Street Flyover intersection.

Table 5. Level of Service Trigger Levels from SFRA

Intersection	Trigger Level
Elliott Avenue W / Galer Street Flyover	**LOS E**
Elliott Avenue W / W Garfield Street	**LOS C**
Elliott Avenue W / W Mercer Place	**LOS E**

Source: Terminal 91 Short Fill Redevelopment Agreement (as amended 1985 and 1998).
SFRA included the Elliott Avenue West / West Galer Street Intersection, which was the primary access to Terminal 91. That access has been replaced with the Galer Street Flyover

As previously discussed, the level of service methodology prescribed by the SFRA (Critical Lane Analysis) is outdated. Computers now allow more complex calculations to occur, which have resulted in more accurate analyses of intersection operations. For this study, intersection levels of service were determined using the methodologies in the Highway Capacity Manual (Transportation Research Board, 2000). Levels of service for study area intersections were calculated using Trafficware's Synchro 9 traffic operations analysis software, which is also the latest version of software. Current level of service criteria for signalized intersections can be found in Appendix B.

In 2013, SDOT installed Traffic Responsive Operations Systems technology along the Elliott Avenue/15th Avenue corridor between West Armour Street and West Harrison Street. The signalized intersections along this corridor section use volume detection technology to change the traffic signal cycles and operation based on traffic volume. The technology allows for 15 different operational programs that are available during the day (five AM peak hour options, five PM peak hour options, and five off-peak options), instead of just one per time period under the former signal system. Each operational program is triggered when a specific traffic demand threshold is met. Since the operations can change as volumes change throughout the day, SDOT staff recommended that the Synchro model's cycle length and signal phase times should be "optimized" for each condition. This analysis uses the recommended approach.

The levels of service models developed by Seattle Department of Transportation (SDOT) for the Elliott Avenue/15th Avenue corridor were used for all analyses; these models reflect the current configuration (with the BAT lanes) and the volume-responsive traffic signal timing. However, these models use phasing plans that are not compatible with the stricter HCM 2010 phasing requirements (such as dedicated pedestrian phases). As a result, HCM 2000 was used to evaluate the intersection level of service in 2016, 2017 and 2018. It is noted that HCM methodology was not used to calculate intersection level of service in years prior to 2016. This change, along with slight alterations to the traffic signal timing and phasings implemented by the City of Seattle, result in more variation in average vehicle delay when comparing 2016, 2017 and 2018 to previous years.

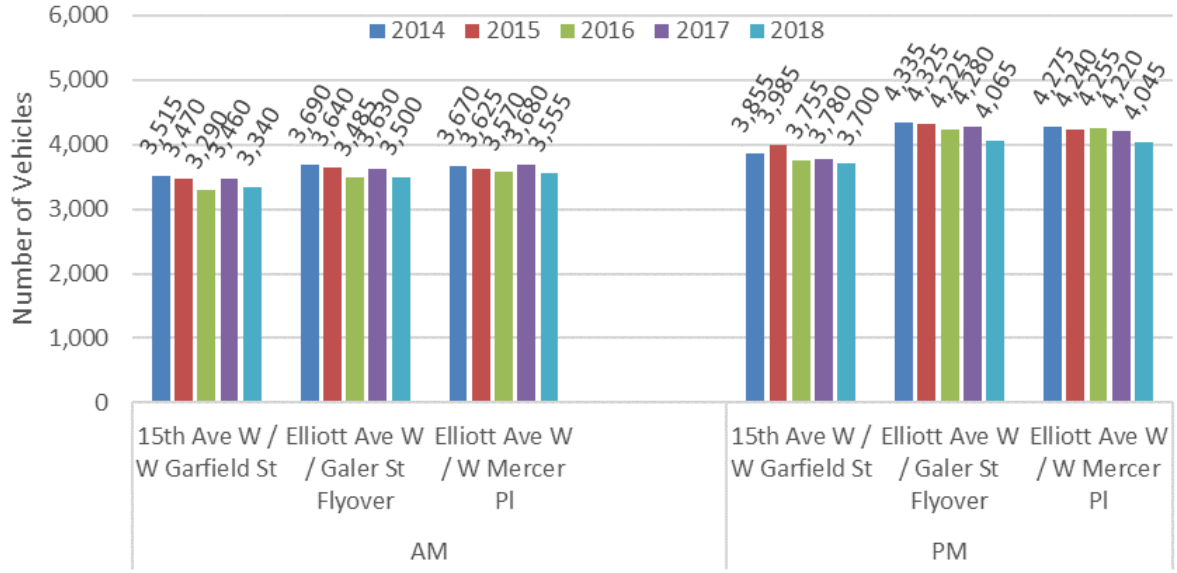
Year 2018 Traffic Volumes

Without Cruise Activity

New intersection counts were performed at all three study intersections on Thursday August 30, 2018 for two hours during the AM (7:00 – 9:00 AM) and PM (4:00 – 6:00 PM) peak periods. These counts were performed when no cruise activity was occurring at the Port. The peak one hour during each of the count periods was identified and used for the intersection analysis. These peak one-hour traffic volumes are reported from 7:45 to 8:45 A.M. and from 4:30 to 5:30 P.M. It is noted that these peak hours differ from the longer-than-60-minute periods prescribed by the SFRA. The peak hours were selected to meet industry standard for traffic analysis and level of service definitions, and are consistent with other traffic studies performed by the City of Seattle. Traffic volumes without cruise activity are shown on Figure 16 for the AM and PM peak hours, respectively. Additionally, the raw intersection turning movement counts are shown in Appendix A.

The study found that intersection traffic volumes have changed little since 2014. For each year since 2014, the total number of vehicles entering each of the intersections during the peak hours is compared on Figure 15. All sets of counts reflect late August or September conditions without cruise activity at Terminal 91. Volumes during both the AM and PM peak hours have remained nearly constant from 2014 to 2018, as both intersections are near capacity. This makes processing more vehicles during peak periods difficult, even if roadway volumes are generally increasing.

Figure 15. Total Traffic Entering Intersection – Without Cruise Activity



Source: Intersection turning movement counts performed for the respective Terminal 91 Monitoring Studies. All sets of counts reflect Q3 conditions without cruise activity at Terminal 91.

With Cruise Activity

The gate counts described in the prior sections were used to determine the net change in AM and PM peak hour traffic associated with cruise activity at Terminal 91. Two conditions with cruise activity were evaluated: a typical weekday with one ship call at the terminal (Wednesday) and a peak weekday with two large ship calls (Friday). These were compared to a day with no cruise (Tuesday) to determine the traffic associated with cruise activity. The trip generation estimates are summarized in Table 6. As shown, cruise related trips are highest during the AM peak hour with 812 trips generated on the peak Friday. During the PM peak hour, on the same day, there were 32 fewer trips on a peak cruise-ship day than on a non-cruise ship day accessing Terminal 91, highlighting that PM peak hour traffic is largely unaffected by cruise ship activity. The raw intersection turning movement counts are shown in Appendix A.

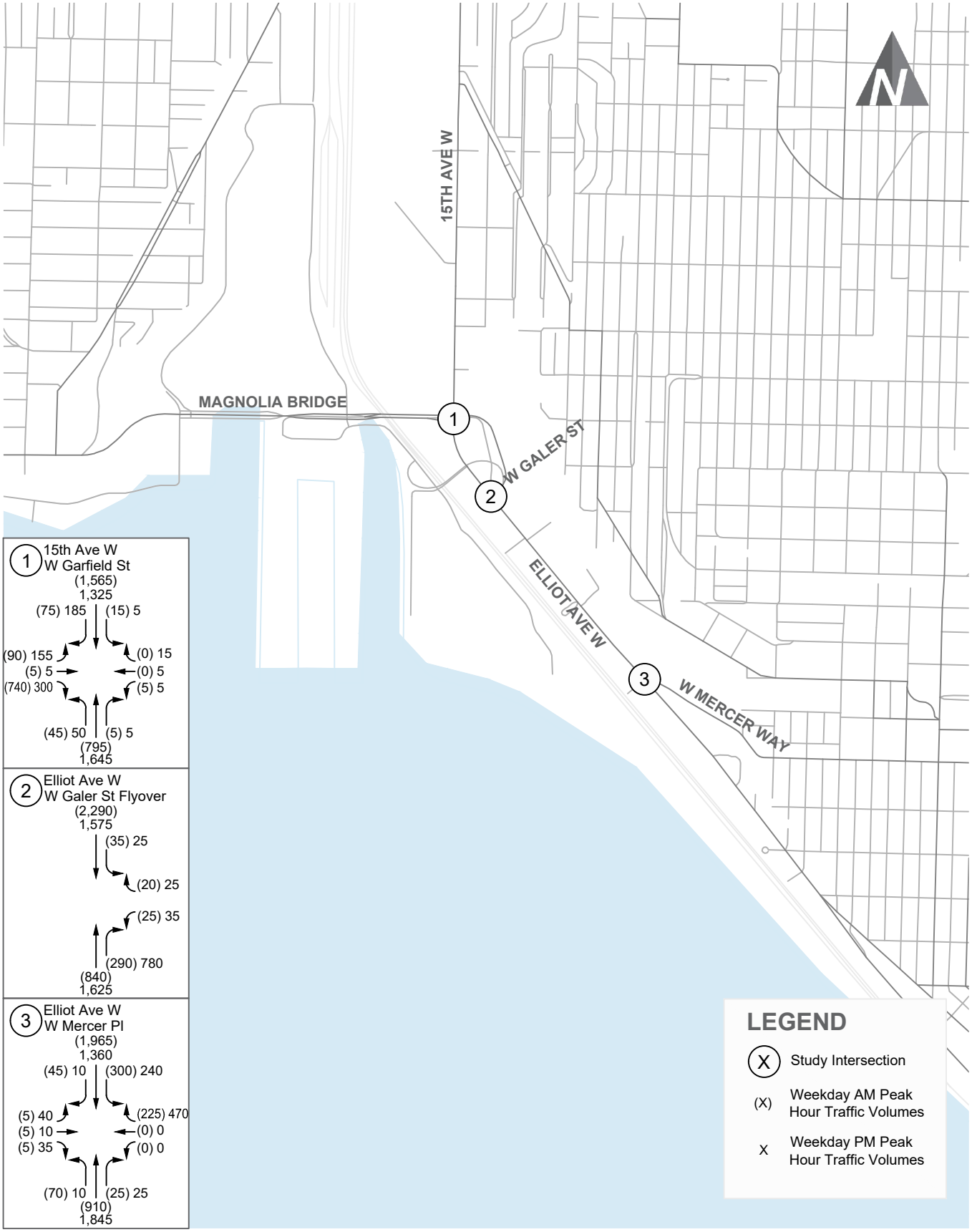
Due to low traffic volumes during the PM peak hour at both gates, in addition to the small number of vehicles generated by one cruise in the PM peak hour, a small change in daily traffic volumes can result in a net negative number of vehicles when comparing a cruise day to a non-cruise day.

Table 6. Weekday Peak Hour Traffic: Cruise Day vs. Non-Cruise Day - 2018

	East Gate		West Gate		Total Terminal 91		
	Enter	Exit	Enter	Exit	Enter	Exit	Total
AM Peak Hour (7:45 to 8:45 AM)							
Non-Cruise Day (Tues 9/4/2018)	38	69	0	0	38	69	107
Typical Weekday Cruise Day (Wed 9/5/2018)	197	190	44	38	241	228	469
Peak Weekday Cruise Day (Fri 9/7/2018)	338	412	95	74	433	486	919
Net Change with Typical Weekday Cruise	**159**	**121**	**44**	**38**	**203**	**159**	**362**
Net Change with Peak Weekday Cruise	**300**	**343**	**95**	**74**	**395**	**417**	**812**
PM Peak Hour (4:30 to 5:30 PM)							
Non-Cruise Day (Tues 9/4/2018)	92	54	0	0	92	54	146
Typical Weekday Cruise Day (Wed 9/5/2018)	152	37	0	0	152	37	189
Peak Weekday Cruise Day (Fri 9/7/2018)	65	49	0	0	65	49	114
Net Change with Typical Weekday Cruise	**60**	**-17**	**0**	**0**	**60**	**-17**	**43**
Net Change with Peak Weekday Cruise	**-27**	**-5**	**0**	**0**	**-27**	**-5**	**-32**

Source: *Ten-day tube counts conducted by IDAX, Friday, August 31 to Sunday, September 9, 2018. Combined volumes at both East Gate and West Gate for entry to and from Terminal 91.*

The additional peak hour traffic generated by the cruise terminal on an average weekday (with one ship call) and the peak weekday (two ship calls) was distributed to the roadway network and assigned to the study-area intersections according to travel patterns defined by traffic counts performed for the 2010 Monitoring study. The AM and PM cruise terminal trips are shown on Figure 17.

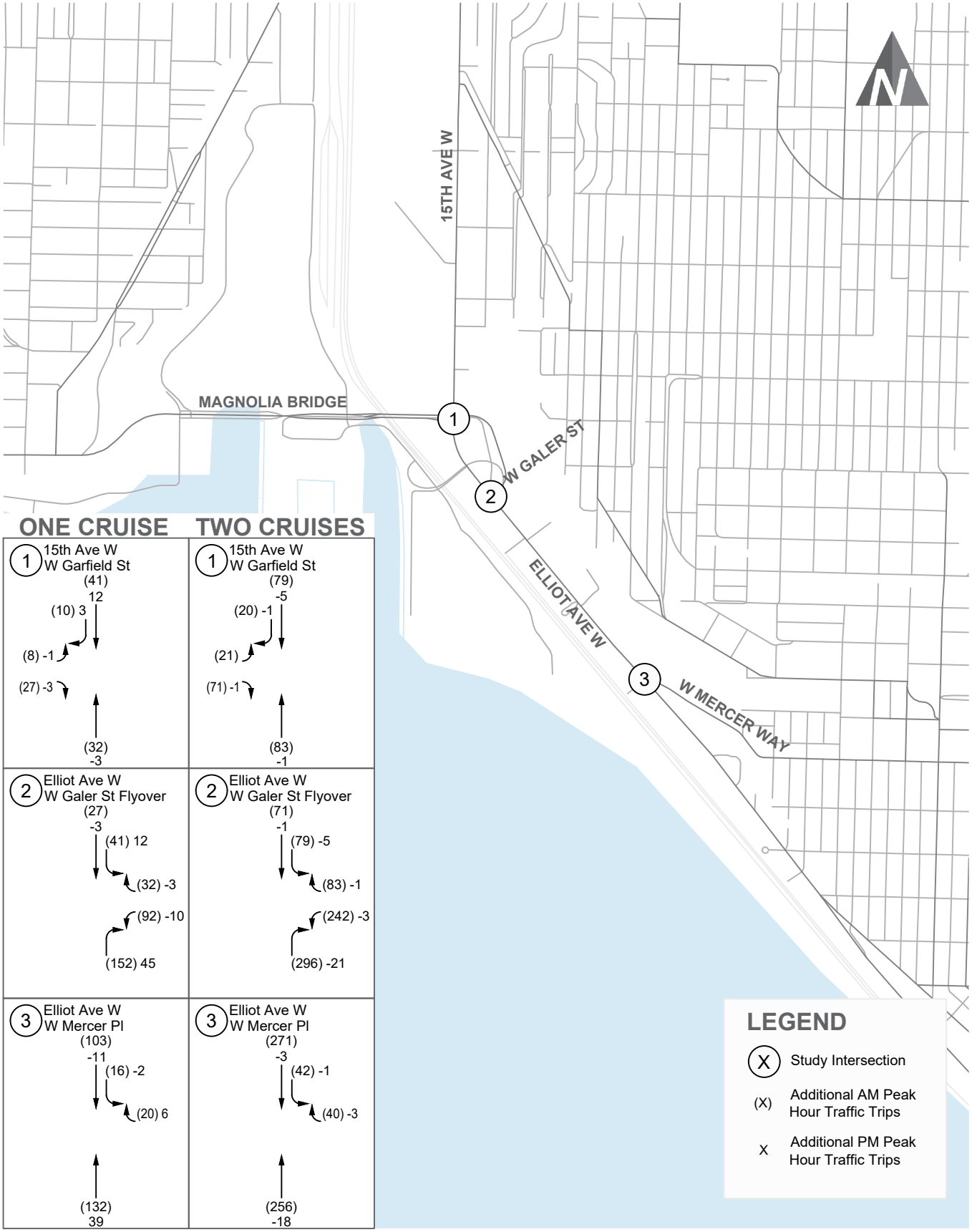


Existing (2018) Peak Hour Traffic Volumes Without Cruise Activity at T91

FIGURE 16

Terminal 91 - Annual Traffic Monitoring - 2018

transpogroup

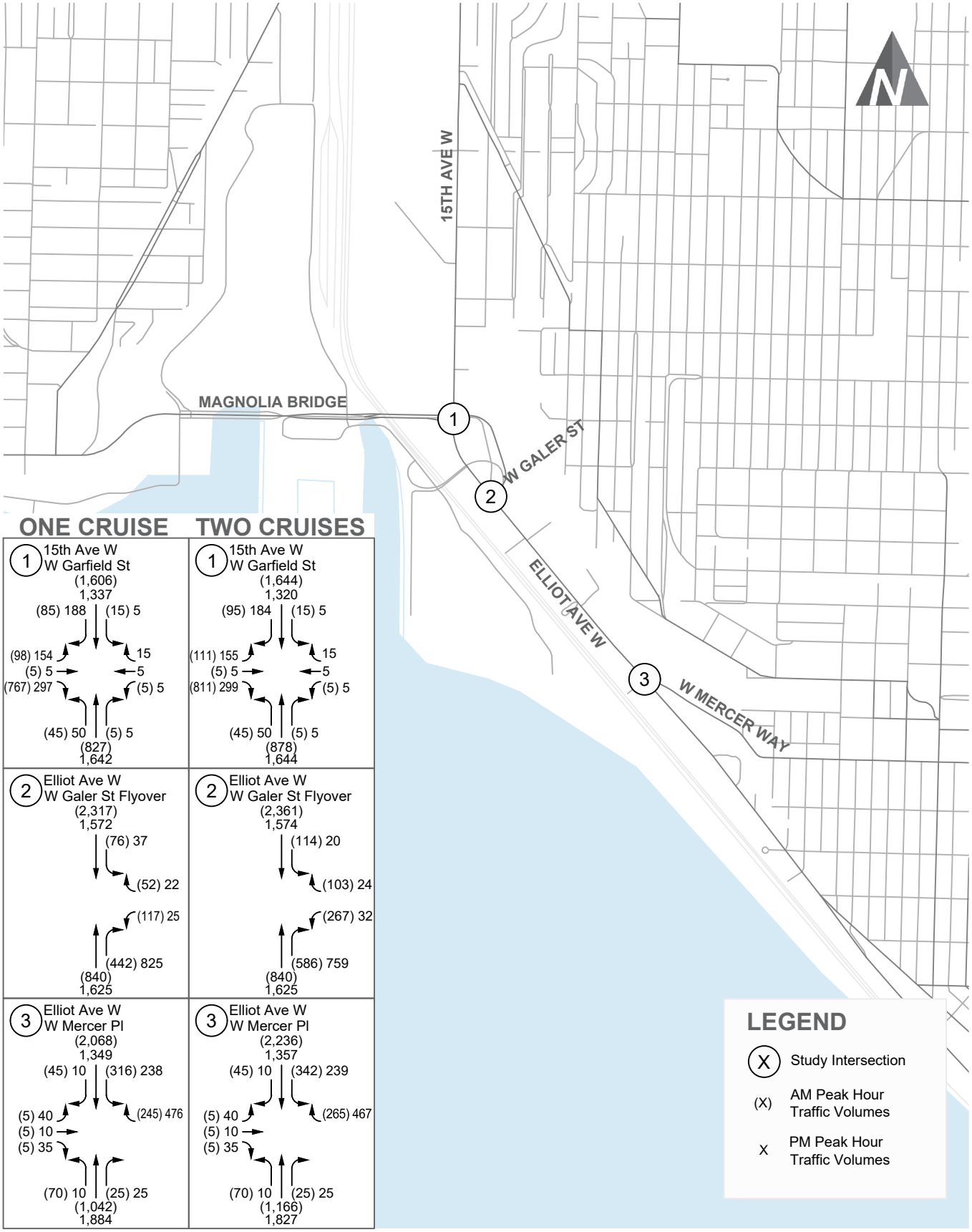


Additional Peak Hour Traffic due to Cruise Activity

FIGURE 17

Terminal 91 - Annual Traffic Monitoring - 2018

transpogroup



ONE CRUISE	TWO CRUISES
1 15th Ave W W Garfield St (1,606) 1,337 (85) 188 (15) 5 (98) 154 15 (5) 5 5 (767) 297 (5) 5 (45) 50 (5) 5 (827) 1,642	1 15th Ave W W Garfield St (1,644) 1,320 (95) 184 (15) 5 (111) 155 15 (5) 5 5 (811) 299 (5) 5 (45) 50 (5) 5 (878) 1,644
2 Elliot Ave W W Galer St Flyover (2,317) 1,572 (76) 37 (52) 22 (117) 25 (442) 825 (840) 1,625	2 Elliot Ave W W Galer St Flyover (2,361) 1,574 (114) 20 (103) 24 (267) 32 (586) 759 (840) 1,625
3 Elliot Ave W W Mercer Pl (2,068) 1,349 (45) 10 (316) 238 (5) 40 (245) 476 (5) 10 (5) 35 (70) 10 (25) 25 (1,042) 1,884	3 Elliot Ave W W Mercer Pl (2,236) 1,357 (45) 10 (342) 239 (5) 40 (265) 467 (5) 10 (5) 35 (70) 10 (25) 25 (1,166) 1,827

LEGEND

- (X) Study Intersection
- (X) AM Peak Hour Traffic Volumes
- X PM Peak Hour Traffic Volumes

Peak Hour Traffic Volumes - with Cruise Activity

FIGURE **18**

Terminal 91 - Annual Traffic Monitoring - 2018

transpogroup

Level of Service Analysis

Peak hour traffic volumes shown on Figures 16 through 18 were used to determine the levels of service for study-area intersections. This analysis reflects existing conditions on a normal day (without cruise operations at Terminal 91), on a weekday with one ship call, and on a weekday with two ship calls. The methodology used to determine level of service was previously described in the *Trigger Levels* section. The results are summarized in Table 7, and the detailed level of service reports can be found in Appendix C.

The study found that the level of service results for the 'without cruise conditions' at each study intersection all operate well below the SFRA threshold level. The addition of the traffic resulting from a typical one-ship day does not significantly impact operations at any of the three study intersections. On two-cruise ship days, intersection LOS results also operate well below the SFRA threshold level. During the periods of heaviest activity in 2018, queuing occasionally occurred along the Galer flyover stretching onto Elliott Avenue.

Table 7. Weekday Peak Hour Traffic: Cruise Day vs. Non-Cruise Day – 2018

		Average Weekday Without Cruise		Average Weekday With One Ship		Peak Weekday With Two Ships	
	SFRA Trigger Level[A]	LOS[B]	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)
AM Peak Hour							
15th Ave / Garfield Street	LOS C	A	5.0	A	5.4	A	6.0
Elliott Ave / Galer Flyover	LOS E	A	4.2	A	8.4	B	14.5
Elliott Ave / W Mercer Place	LOS E	C	22.0	C	26.3	D	35.0
PM Peak Hour							
15th Ave / Garfield Street	LOS C	A	7.3	A	7.3	A	7.3
Elliott Ave / Galer Flyover	LOS E	A	9.9	B	14.8	A	8.9
Elliott Ave / W Mercer Place	LOS E	C	26.4	C	28.0	C	25.9

Source: Levels of service were calculated using traffic operations models developed by SDOT for the Elliott Avenue corridor. They reflect existing signal timing and lane geometry. All analysis was performed using the Synchro 9.0 model and analysis methodology.

A. Level of service threshold established by Short-Fill Redevelopment Agreement, January 2000. The SFRA included the Elliot Avenue W / W Galer Street intersection which was the primary access to Terminal 91. That access has been replaced with the Galer Street Flyover.

B. Level of Service

Level of service results from Terminal 91 Monitoring Reports dating back to 2011 are compared on Figure 19 for the Elliott Avenue West/Galer Street Flyover intersection and on Figure 20 for the Elliott Avenue West / West Mercer Place intersection. The intersection of 15th Ave W / W Garfield St has operated well (LOS A) throughout the course of the annual T91 studies, as is therefore not included below. The charts compare the average vehicle delay without and with cruise traffic. The condition with one cruise ship is used because that is the only condition that existed in prior years for an accurate comparison. Operations during the PM peak period improved during 2018 due to lower traffic volumes, and as a result, the delay during cruise conditions also decreased. Figures 19 and 20 show that both intersections operate well within the delay associated with the LOS E threshold established by the SFRA.

Figure 19. Traffic Operations at Elliott Ave West / Galer Street Flyover Intersection

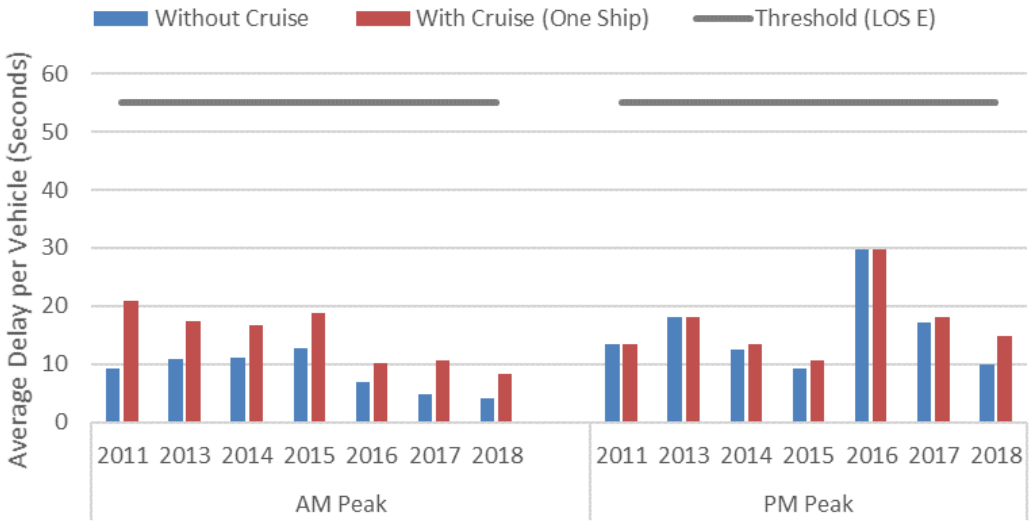
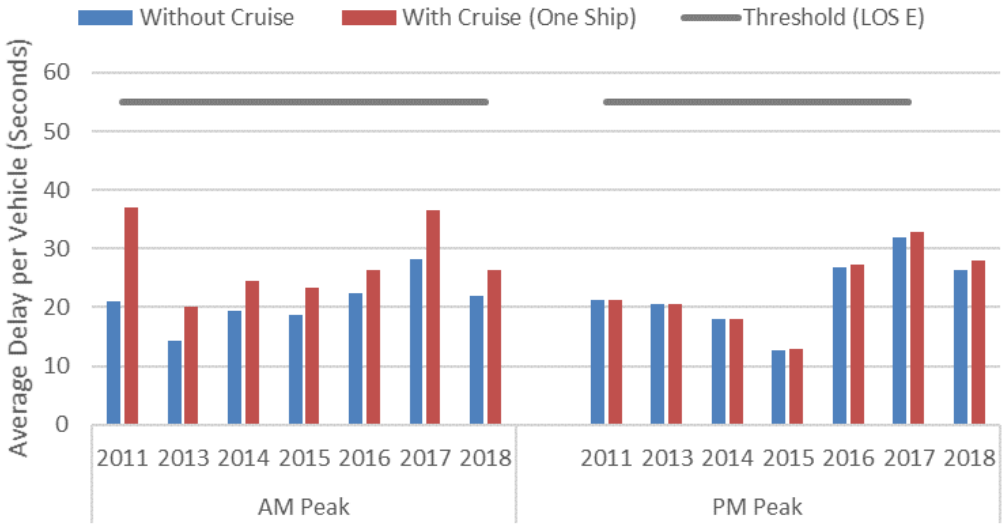


Figure 20. Traffic Operations at Elliott Ave West / West Mercer Place Intersection



Future Projects around Terminal 91

When the SFRA was originally established, the north gate at Terminal 91 was open, allowing access to T91 from 20th Avenue W and 21st Avenue W. There has been some discussion about development around the north end of T91 that may include opening of the north gate sometime in the future. Additionally, the Magnolia Bridge Replacement Study is currently underway which is evaluating different alternatives to replace the function of the Magnolia Bridge. In an effort to establish a baseline of current roadway operations, traffic counts from three key roadways generally outside the scope of this report are included in Figures 21 to 31 for all years between 2012 and 2017 where the Seattle Department of Transportation had collected traffic counts.

Figure 21. Magnolia Bridge Average Weekday Traffic Volumes, 2012

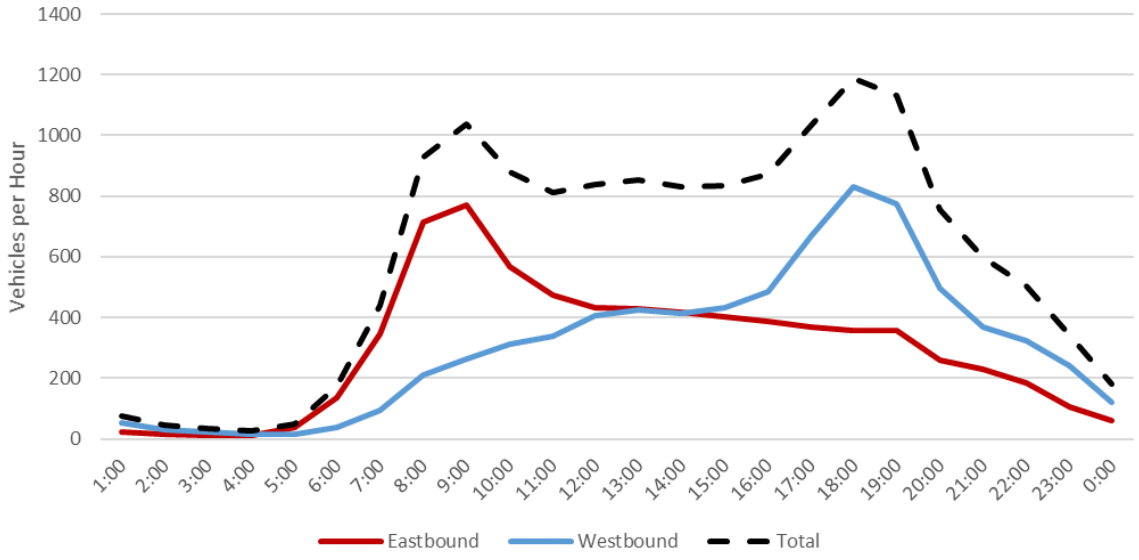


Figure 22. Magnolia Bridge Average Weekday Traffic Volumes, 2013

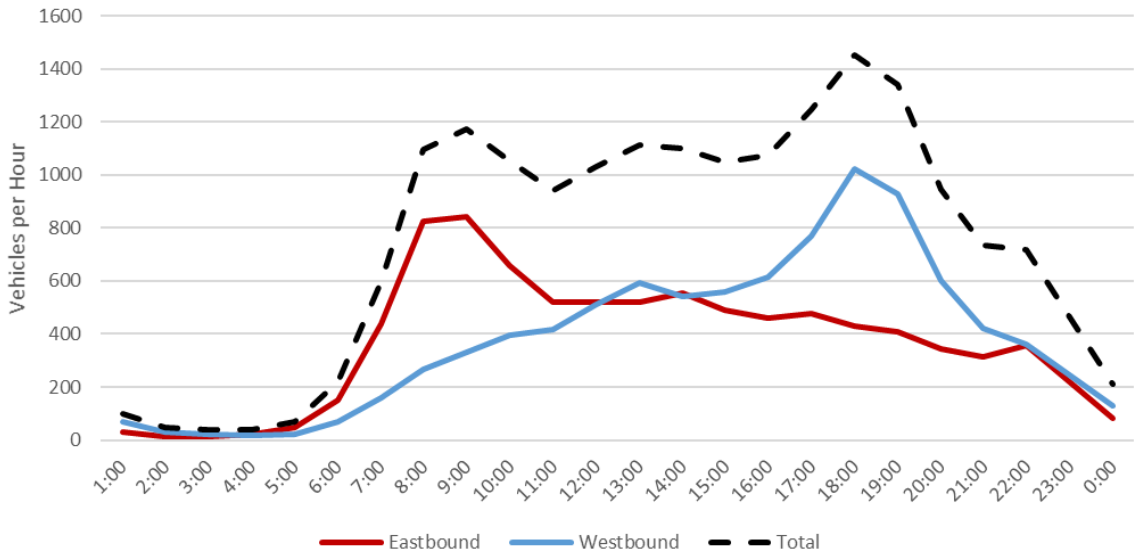


Figure 23. Magnolia Bridge Average Weekday Traffic Volumes, 2014

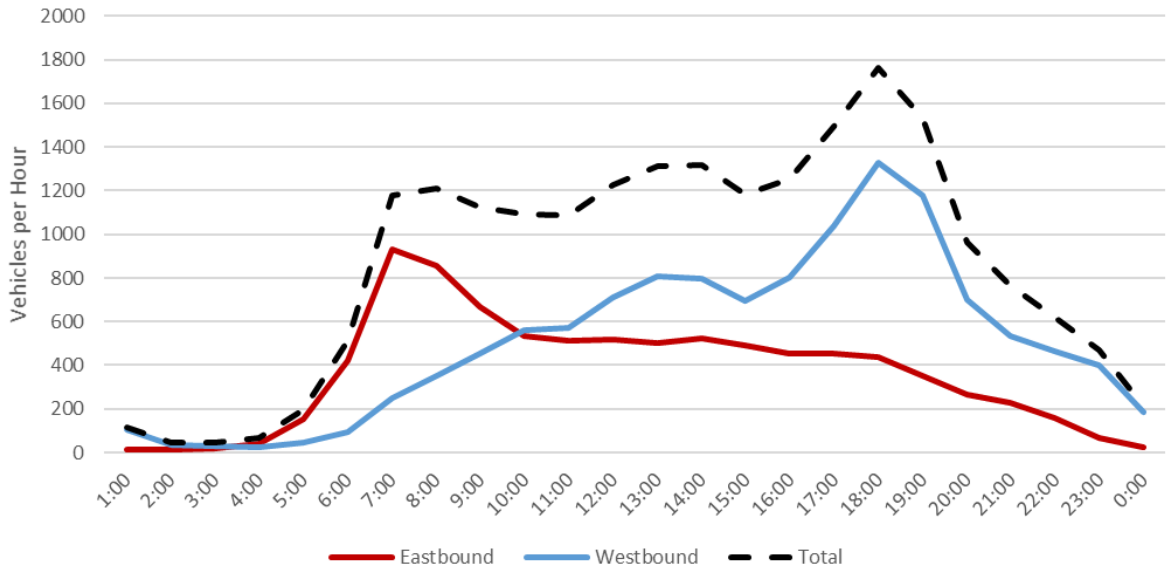


Figure 24. Magnolia Bridge Average Weekday Traffic Volumes, 2015

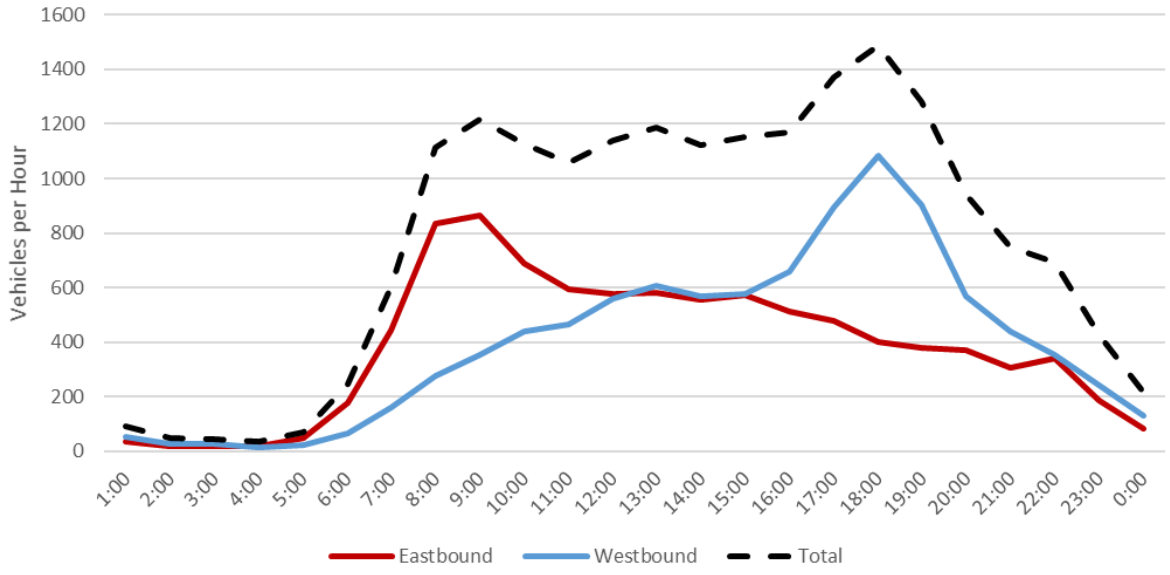


Figure 25. Magnolia Bridge Average Weekday Traffic Volumes, 2017

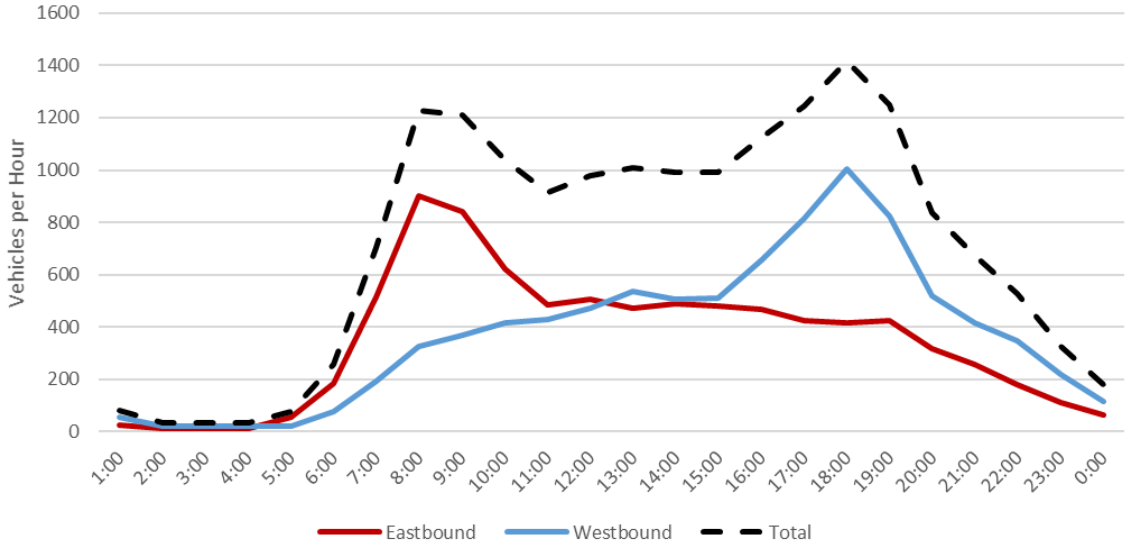


Figure 26. W Emerson Place Average Weekday Traffic Volumes, 2013

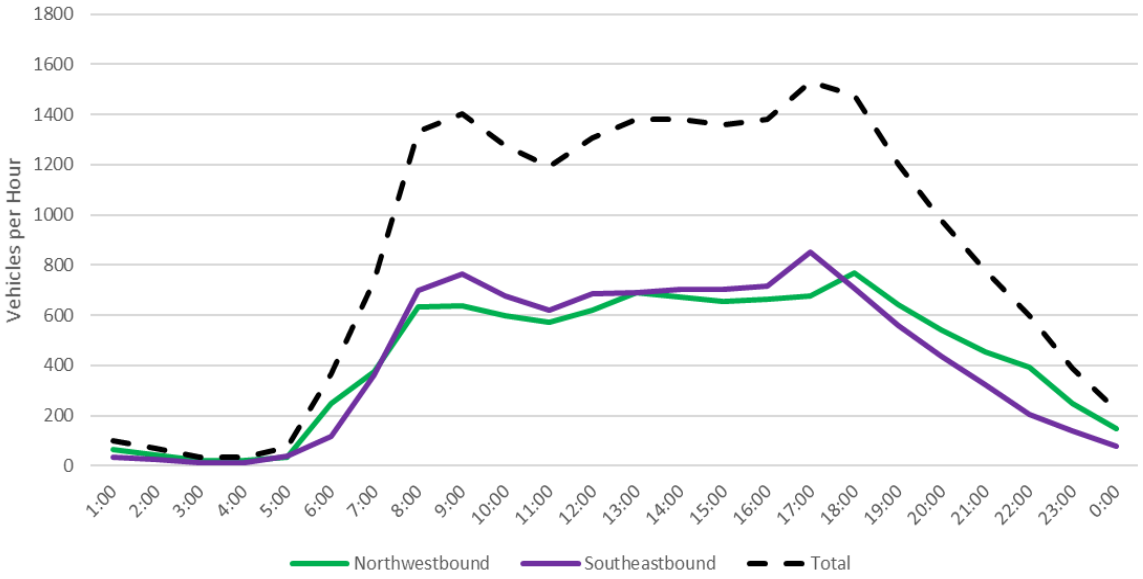


Figure 27. W Emerson Place Average Weekday Traffic Volumes, 2014

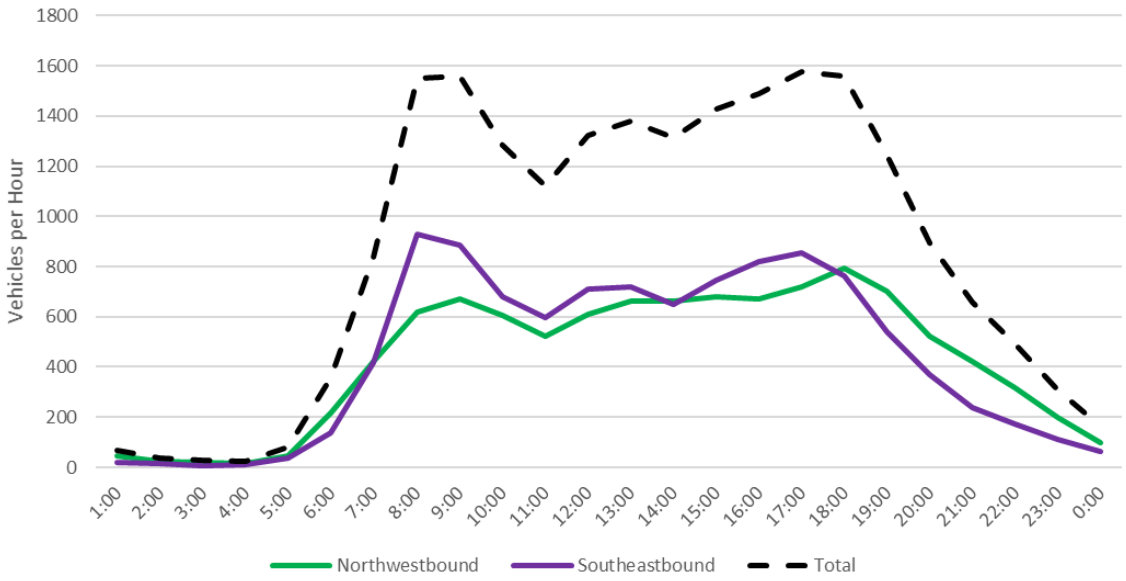


Figure 28. W Emerson Place Average Weekday Traffic Volumes, 2015

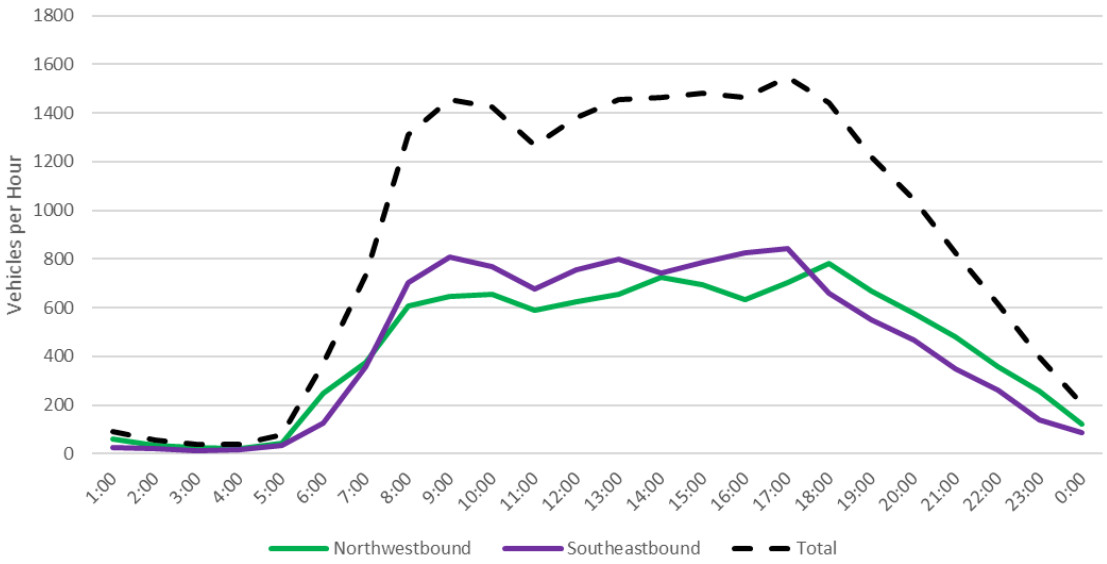


Figure 29. W Emerson Place Average Weekday Traffic Volumes, 2017

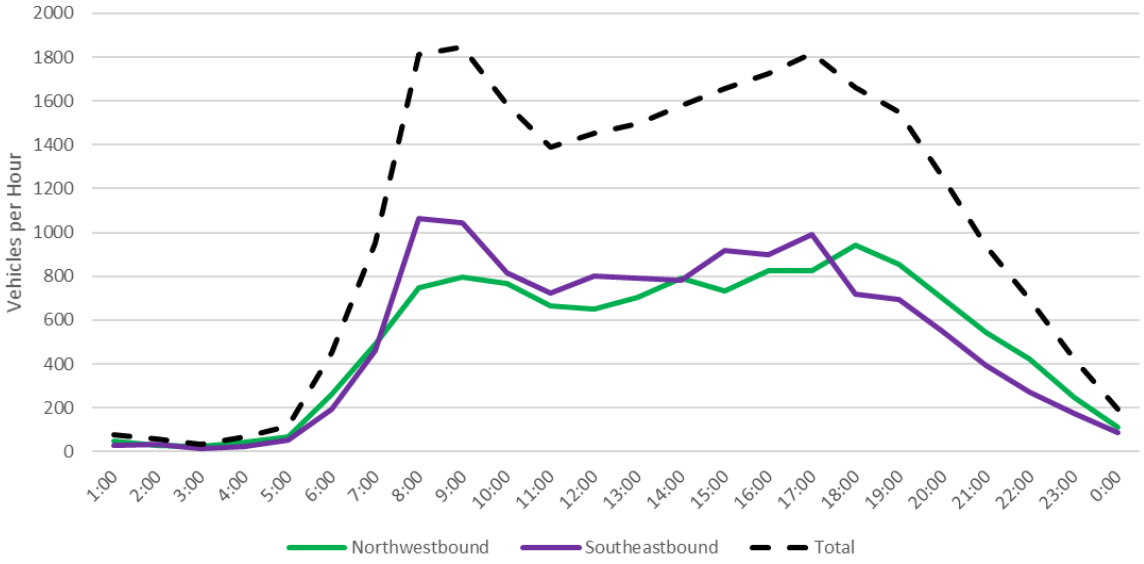


Figure 30. W Dravus Street Average Weekday Traffic Volumes, 2013

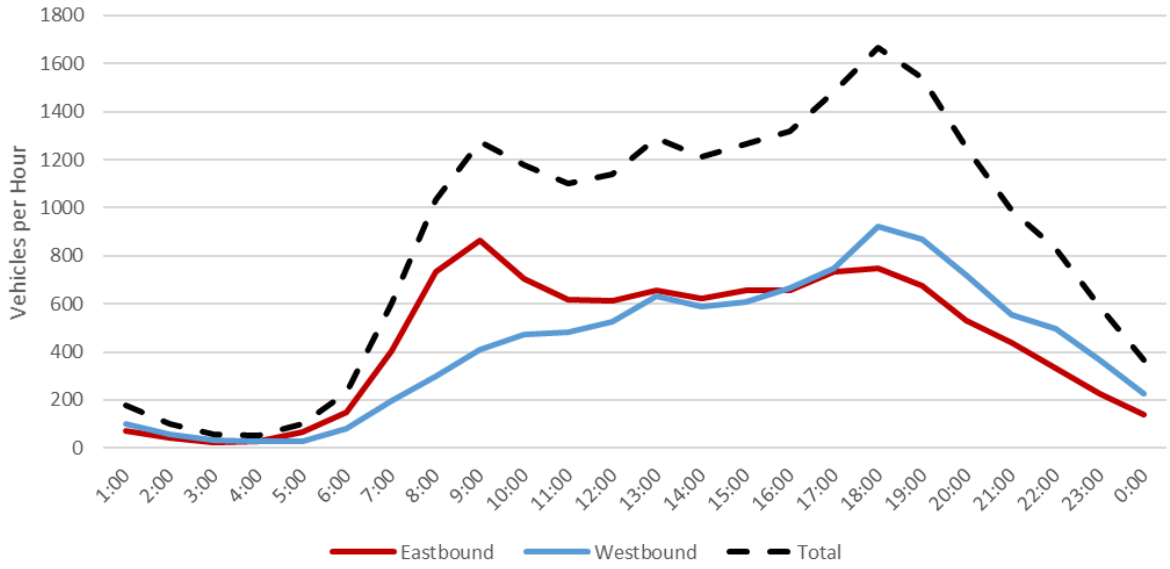
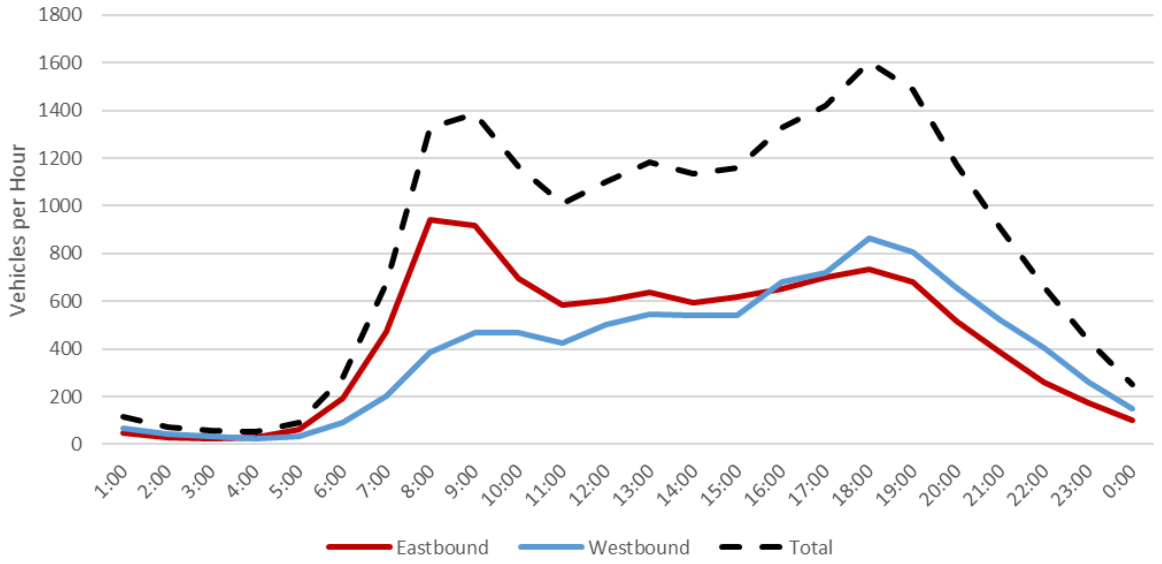


Figure 31. W Dravus Street Average Weekday Traffic Volumes, 2017



Conclusions

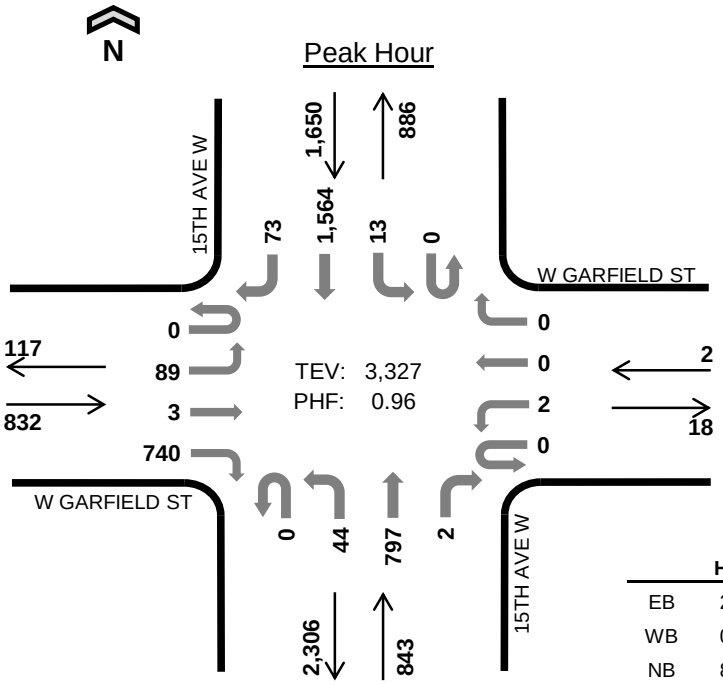
The 2018 Terminal 91 Traffic Monitoring Study shows that truck trips continue to exceed the volume thresholds for AM, PM and daily periods, consistent with results for many prior years. Automobile trips exceed the thresholds during the AM and daily periods on days with cruise operations. However, despite the fact that the traffic volume thresholds are exceeded, traffic operations along the Elliott Avenue West/15th Avenue West corridor still operate below the trigger levels listed in the Short Fill Agreement at each of the study intersections during both the AM and PM peak hours.

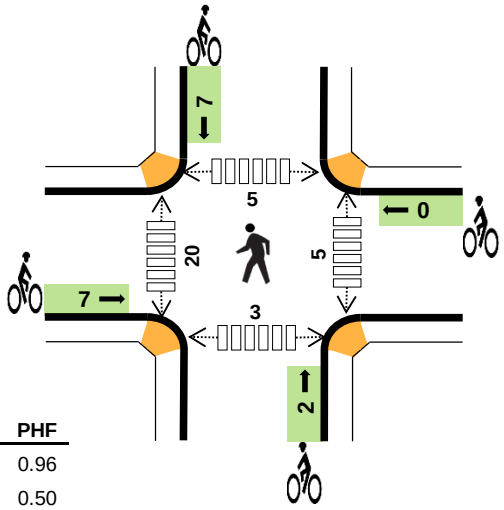
Appendix A:Intersection Traffic Counts

AM Counts

15TH AVE W
W GARFIELD ST

Date: Thu, Aug 30, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:45 AM to 8:45 AM





	HV %:	PHF
EB	2.4%	0.96
WB	0.0%	0.50
NB	8.3%	0.90
SB	4.4%	0.95
TOTAL	4.9%	0.96

Two-Hour Count Summaries

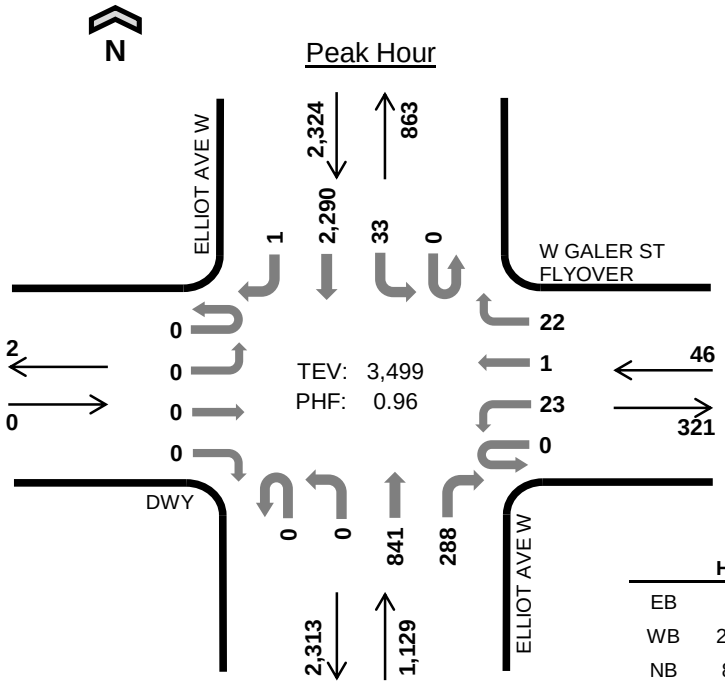
Interval Start	W GARFIELD ST Eastbound				W GARFIELD ST Westbound				15TH AVE W Northbound				15TH AVE W Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	12	0	161	0	0	0	0	0	12	194	1	0	3	364	11	758	0
7:15 AM	0	12	0	210	0	0	1	0	0	5	176	1	0	5	406	13	829	0
7:30 AM	0	14	0	197	0	0	0	1	0	11	185	3	0	2	403	15	831	0
7:45 AM	**0**	**16**	**1**	**198**	**0**	**0**	**0**	**0**	**0**	**11**	**223**	**0**	**0**	**2**	**384**	**22**	**857**	3,275
8:00 AM	**0**	**17**	**0**	**183**	**0**	**0**	**0**	**0**	**0**	**5**	**160**	**0**	**0**	**6**	**372**	**16**	**759**	3,276
8:15 AM	**0**	**27**	**2**	**187**	**0**	**1**	**0**	**0**	**0**	**12**	**203**	**1**	**0**	**3**	**411**	**18**	**865**	3,312
8:30 AM	**0**	**29**	**0**	**172**	**0**	**1**	**0**	**0**	**0**	**16**	**211**	**1**	**0**	**2**	**397**	**17**	**846**	**3,327**
8:45 AM	0	26	0	160	0	0	0	0	0	10	178	1	0	3	384	25	787	3,257
Count Total	0	153	3	1,468	0	2	1	1	0	82	1,530	8	0	26	3,121	137	6,532	0
Peak Hour	**0**	**89**	**3**	**740**	**0**	**2**	**0**	**0**	**0**	**44**	**797**	**2**	**0**	**13**	**1,564**	**73**	**3,327**	**0**

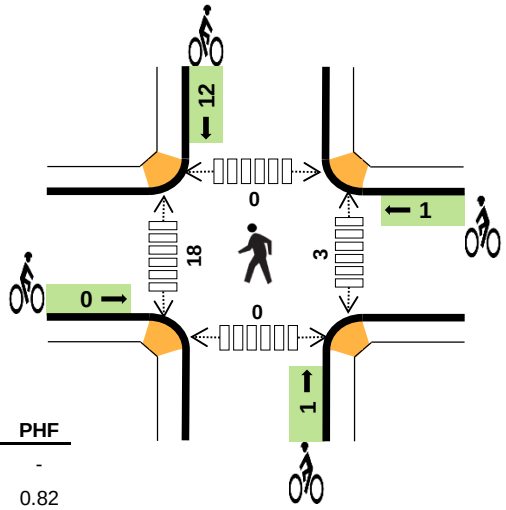
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	4	0	19	10	*33*	1	0	1	3	*5*	0	3	2	1	*6*
7:15 AM	2	0	18	12	*32*	0	0	0	5	*5*	2	4	0	0	*6*
7:30 AM	5	0	16	11	*32*	2	0	0	1	*3*	1	3	1	0	*5*
7:45 AM	**6**	**0**	**18**	**21**	***45***	**0**	**0**	**1**	**1**	***2***	**0**	**6**	**1**	**1**	*8*
8:00 AM	**6**	**0**	**18**	**14**	***38***	**2**	**0**	**1**	**1**	***4***	**0**	**9**	**0**	**1**	*10*
8:15 AM	**6**	**0**	**16**	**15**	***37***	**2**	**0**	**0**	**4**	***6***	**4**	**4**	**4**	**0**	*12*
8:30 AM	**2**	**0**	**18**	**23**	***43***	**3**	**0**	**0**	**1**	***4***	**1**	**1**	**0**	**1**	***3***
8:45 AM	3	0	13	11	*27*	2	0	0	3	*5*	3	5	1	1	*10*
Count Total	34	0	136	117	*287*	12	0	3	19	*34*	11	35	9	5	*60*
Peak Hour	**20**	**0**	**70**	**73**	***163***	**7**	**0**	**2**	**7**	***16***	**5**	**20**	**5**	**3**	***33***

ELLIOT AVE W
W GALER ST FLYOVER

Date: Thu, Aug 30, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:45 AM to 8:45 AM





	HV %:	PHF
EB	-	-
WB	28.3%	0.82
NB	8.2%	0.91
SB	3.8%	0.99
TOTAL	5.6%	0.96

Two-Hour Count Summaries

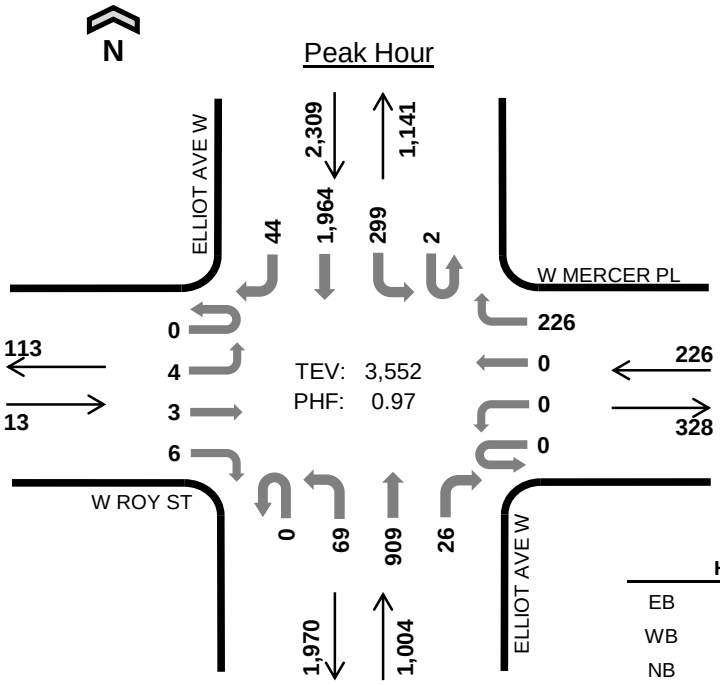
Interval Start	DWY				W GALER ST FLYOVER				ELLIOT AVE W				ELLIOT AVE W				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	6	0	5	1	0	200	78	0	5	517	1	813	0
7:15 AM	0	0	0	0	0	4	0	3	0	0	186	62	0	10	582	0	847	0
7:30 AM	0	0	0	0	0	2	0	6	0	0	190	61	0	8	588	0	855	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**7**	**0**	**0**	**227**	**84**	**0**	**6**	**577**	**1**	**909**	3,424
8:00 AM	**0**	**0**	**0**	**0**	**0**	**7**	**1**	**1**	**0**	**0**	**177**	**71**	**0**	**7**	**569**	**0**	**833**	3,444
8:15 AM	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**7**	**0**	**0**	**217**	**60**	**0**	**11**	**578**	**0**	**879**	3,476
8:30 AM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**7**	**0**	**0**	**220**	**73**	**0**	**9**	**566**	**0**	**878**	**3,499**
8:45 AM	0	0	0	0	0	8	0	7	0	0	185	68	0	12	529	2	811	3,401
Count Total	0	0	0	0	0	43	1	43	1	0	1,602	557	0	68	4,506	4	6,825	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**23**	**1**	**22**	**0**	**0**	**841**	**288**	**0**	**33**	**2,290**	**1**	**3,499**	**0**

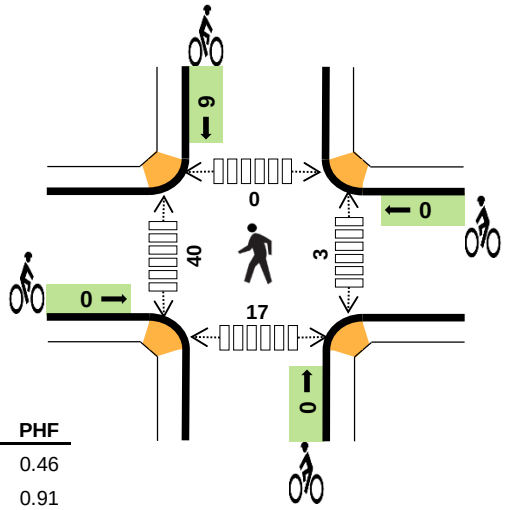
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	4	25	14	*43*	0	0	0	5	*5*	0	2	0	0	*2*
7:15 AM	0	3	22	12	*37*	0	0	0	5	*5*	1	1	1	0	*3*
7:30 AM	0	3	22	15	*40*	0	0	0	3	*3*	2	5	0	0	*7*
7:45 AM	**0**	**5**	**25**	**24**	***54***	**0**	**0**	**1**	**2**	***3***	**1**	**5**	**0**	**0**	*6*
8:00 AM	**0**	**4**	**23**	**22**	***49***	**0**	**1**	**0**	**2**	***3***	**0**	**3**	**0**	**0**	*3*
8:15 AM	**0**	**3**	**22**	**19**	***44***	**0**	**0**	**0**	**5**	***5***	**1**	**3**	**0**	**0**	*4*
8:30 AM	**0**	**1**	**23**	**24**	***48***	**0**	**0**	**0**	**3**	***3***	**1**	**7**	**0**	**0**	***8***
8:45 AM	0	3	20	16	*39*	0	0	0	5	*5*	4	7	1	0	*12*
Count Total	0	26	182	146	*354*	0	1	1	30	*32*	10	33	2	0	*45*
Peak Hour	**0**	**13**	**93**	**89**	***195***	**0**	**1**	**1**	**12**	***14***	**3**	**18**	**0**	**0**	***21***

ELLIOT AVE W
W MERCER PL

Date: Thu, Aug 30, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:45 AM to 8:45 AM





	HV %:	PHF
EB	0.0%	0.46
WB	9.3%	0.91
NB	6.5%	0.90
SB	4.2%	0.96
TOTAL	5.1%	0.97

Two-Hour Count Summaries

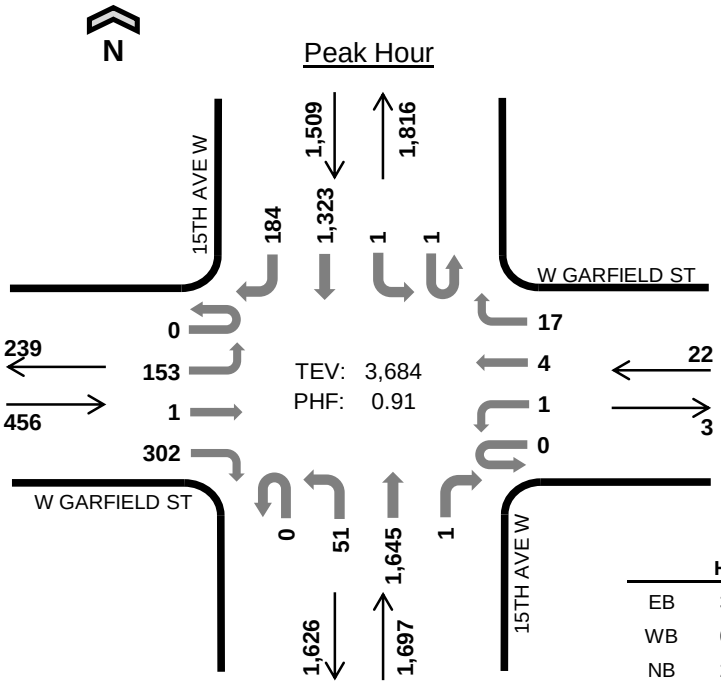
Interval Start	W ROY ST Eastbound				W MERCER PL Westbound				ELLIOT AVE W Northbound				ELLIOT AVE W Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	1	0	0	0	0	42	0	14	251	2	0	58	402	5	775	0
7:15 AM	0	0	0	2	0	0	0	50	1	22	203	4	0	82	486	6	856	0
7:30 AM	0	0	0	0	0	0	0	45	1	19	214	8	0	88	474	10	859	0
7:45 AM	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**57**	**0**	**23**	**251**	**6**	**0**	**69**	**500**	**8**	**917**	3,407
8:00 AM	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**51**	**0**	**16**	**200**	**10**	**1**	**64**	**482**	**12**	**839**	3,471
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**56**	**0**	**21**	**232**	**5**	**0**	**81**	**507**	**14**	**916**	3,531
8:30 AM	**0**	**2**	**2**	**3**	**0**	**0**	**0**	**62**	**0**	**9**	**226**	**5**	**1**	**85**	**475**	**10**	**880**	**3,552**
8:45 AM	0	1	0	1	0	0	0	58	0	14	200	7	0	82	465	10	838	3,473
Count Total	0	5	4	9	0	0	0	421	2	138	1,777	47	2	609	3,791	75	6,880	0
Peak Hour	**0**	**4**	**3**	**6**	**0**	**0**	**0**	**226**	**0**	**69**	**909**	**26**	**2**	**299**	**1,964**	**44**	**3,552**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

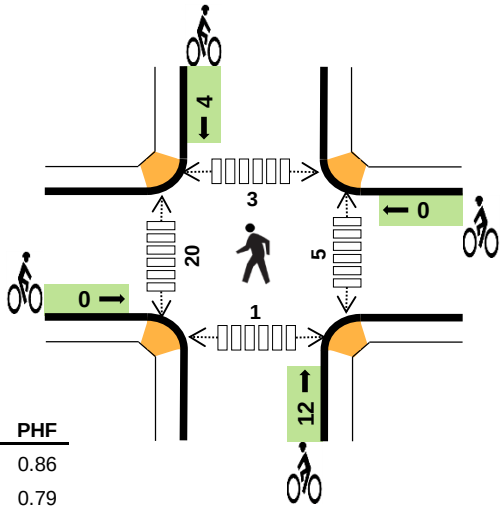
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	1	22	16	*39*	0	0	0	2	*2*	0	1	0	6	*7*
7:15 AM	0	6	18	15	*39*	0	0	0	5	*5*	2	5	0	3	*10*
7:30 AM	0	5	17	13	*35*	0	0	0	2	*2*	3	8	0	9	*20*
7:45 AM	**0**	**5**	**22**	**27**	***54***	**0**	**0**	**0**	**1**	***1***	**1**	**15**	**0**	**4**	*20*
8:00 AM	**0**	**6**	**16**	**28**	***50***	**0**	**0**	**0**	**1**	***1***	**1**	**1**	**0**	**0**	*2*
8:15 AM	**0**	**5**	**16**	**20**	***41***	**0**	**0**	**0**	**5**	***5***	**0**	**12**	**0**	**8**	*20*
8:30 AM	**0**	**5**	**11**	**21**	***37***	**0**	**0**	**0**	**2**	***2***	**1**	**12**	**0**	**5**	***18***
8:45 AM	0	8	12	15	*35*	1	0	0	3	*4*	2	8	0	6	*16*
Count Total	0	41	134	155	*330*	1	0	0	21	*22*	10	62	0	41	*113*
Peak Hour	**0**	**21**	**65**	**96**	***182***	**0**	**0**	**0**	**9**	***9***	**3**	**40**	**0**	**17**	***60***

PM Counts

15TH AVE W
W GARFIELD ST



Date: Thu, Aug 30, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	3.3%	0.86
WB	0.0%	0.79
NB	2.1%	0.89
SB	3.0%	0.96
TOTAL	2.6%	0.91

Two-Hour Count Summaries

Interval Start	W GARFIELD ST Eastbound				W GARFIELD ST Westbound				15TH AVE W Northbound				15TH AVE W Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	33	0	95	0	0	0	2	0	5	386	0	1	0	322	41	885	0
4:15 PM	0	30	1	64	0	0	0	1	0	10	444	0	1	1	298	48	898	0
4:30 PM	**0**	**45**	**0**	**56**	**0**	**0**	**0**	**6**	**0**	**14**	**405**	**1**	**0**	**1**	**323**	**40**	**891**	0
4:45 PM	**0**	**35**	**0**	**72**	**0**	**0**	**0**	**3**	**0**	**9**	**380**	**0**	**0**	**0**	**319**	**55**	**873**	3,547
5:00 PM	**0**	**32**	**1**	**100**	**0**	**0**	**0**	**7**	**0**	**9**	**466**	**0**	**1**	**0**	**351**	**42**	**1,009**	3,671
5:15 PM	**0**	**41**	**0**	**74**	**0**	**1**	**4**	**1**	**0**	**19**	**394**	**0**	**0**	**0**	**330**	**47**	**911**	**3,684**
5:30 PM	0	26	0	69	0	0	1	1	0	11	393	0	0	1	287	43	832	3,625
5:45 PM	0	26	0	61	0	0	1	2	0	18	383	1	0	0	295	33	820	3,572
Count Total	0	268	2	591	0	1	6	23	0	95	3,251	2	3	3	2,525	349	7,119	0
Peak Hour	**0**	**153**	**1**	**302**	**0**	**1**	**4**	**17**	**0**	**51**	**1,645**	**1**	**1**	**1**	**1,323**	**184**	**3,684**	**0**

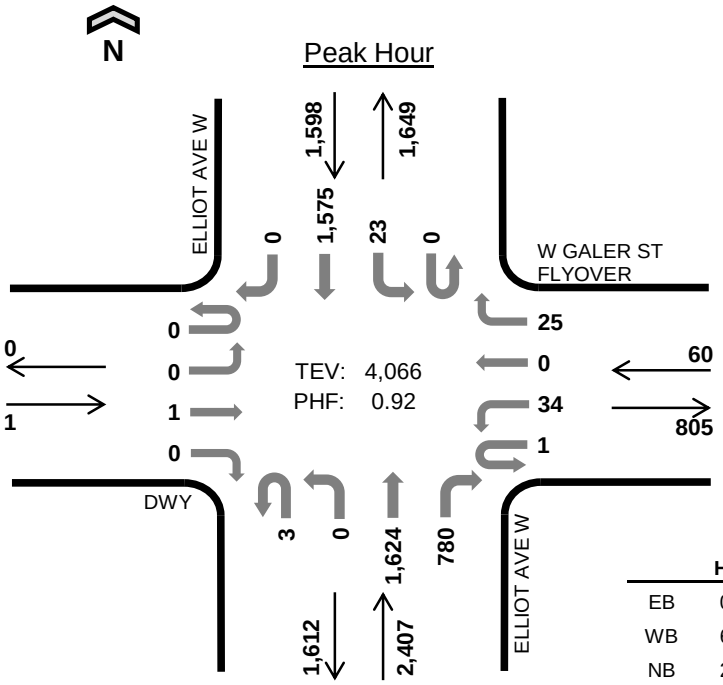
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

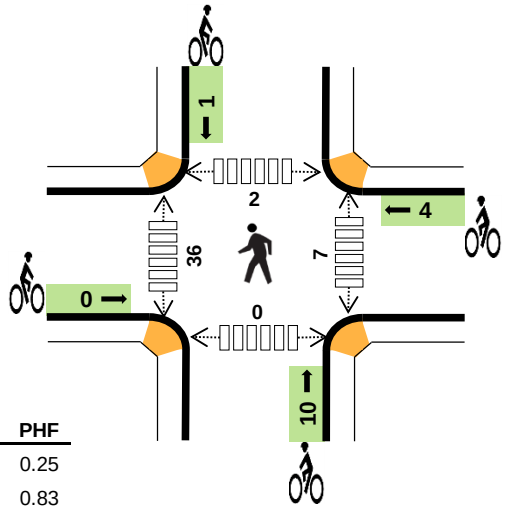
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	3	0	10	14	*27*	1	0	1	0	*2*	1	5	1	0	*7*
4:15 PM	4	0	11	7	*22*	0	0	1	4	*5*	0	4	0	0	*4*
4:30 PM	**1**	**0**	**6**	**10**	***17***	**0**	**0**	**1**	**2**	***3***	**1**	**2**	**0**	**0**	*3*
4:45 PM	**6**	**0**	**7**	**12**	***25***	**0**	**0**	**4**	**1**	***5***	**1**	**7**	**0**	**0**	*8*
5:00 PM	**4**	**0**	**11**	**11**	***26***	**0**	**0**	**4**	**1**	***5***	**0**	**5**	**0**	**0**	*5*
5:15 PM	**4**	**0**	**11**	**13**	***28***	**0**	**0**	**3**	**0**	***3***	**3**	**6**	**3**	**1**	***13***
5:30 PM	4	0	10	11	*25*	0	0	6	0	*6*	3	7	0	1	*11*
5:45 PM	2	0	11	13	*26*	0	0	1	1	*2*	0	8	0	0	*8*
Count Total	28	0	77	91	*196*	1	0	21	9	*31*	9	44	4	2	*59*
Peak Hour	**15**	**0**	**35**	**46**	***96***	**0**	**0**	**12**	**4**	***16***	**5**	**20**	**3**	**1**	***29***

Mark Skaggs: (425) 250-0777 mark.skaggs@idaxdata.com

ELLIOT AVE W
W GALER ST FLYOVER

Date: Thu, Aug 30, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM





	HV %:	PHF
EB	0.0%	0.25
WB	6.7%	0.83
NB	2.1%	0.97
SB	3.6%	0.87
TOTAL	2.8%	0.92

Two-Hour Count Summaries

Interval Start	DWY				W GALER ST FLYOVER				ELLIOT AVE W				ELLIOT AVE W				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	42	0	18	1	0	372	158	0	5	427	1	1,024	0
4:15 PM	0	1	0	1	0	25	0	15	0	0	429	148	0	4	356	3	982	0
4:30 PM	0	0	0	2	0	17	0	10	0	1	402	165	0	5	372	2	976	0
4:45 PM	0	0	0	0	1	26	0	11	0	0	367	169	0	10	362	0	946	3,928
5:00 PM	**0**	**0**	**0**	**0**	**1**	**12**	**0**	**5**	**1**	**0**	**443**	**179**	**0**	**8**	**453**	**0**	**1,102**	4,006
5:15 PM	**0**	**0**	**1**	**0**	**0**	**7**	**0**	**8**	**0**	**0**	**392**	**190**	**0**	**6**	**401**	**0**	**1,005**	4,029
5:30 PM	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**7**	**2**	**0**	**389**	**209**	**0**	**4**	**365**	**0**	**986**	4,039
5:45 PM	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**5**	**0**	**0**	**400**	**202**	**0**	**5**	**356**	**0**	**973**	**4,066**
Count Total	0	1	1	3	2	144	0	79	4	1	3,194	1,420	0	47	3,092	6	7,994	0
Peak Hour	**0**	**0**	**1**	**0**	**1**	**34**	**0**	**25**	**3**	**0**	**1,624**	**780**	**0**	**23**	**1,575**	**0**	**4,066**	**0**

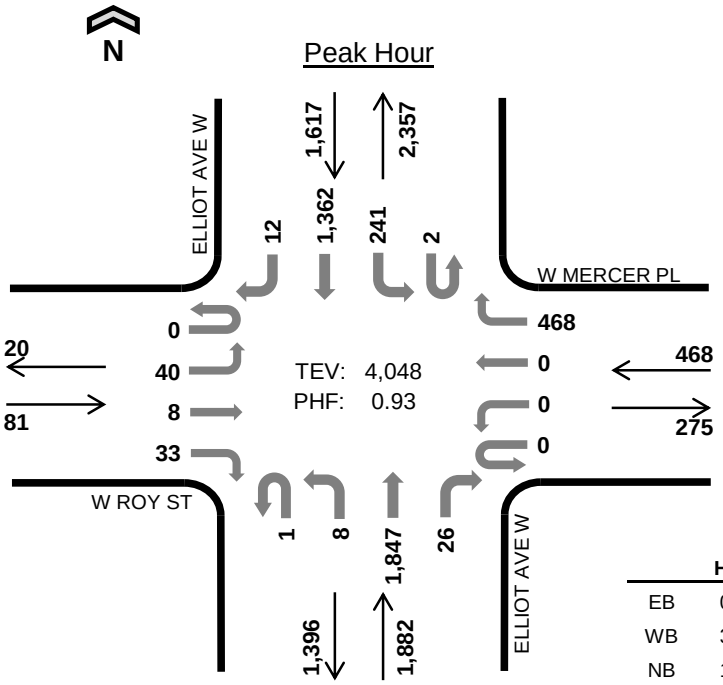
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

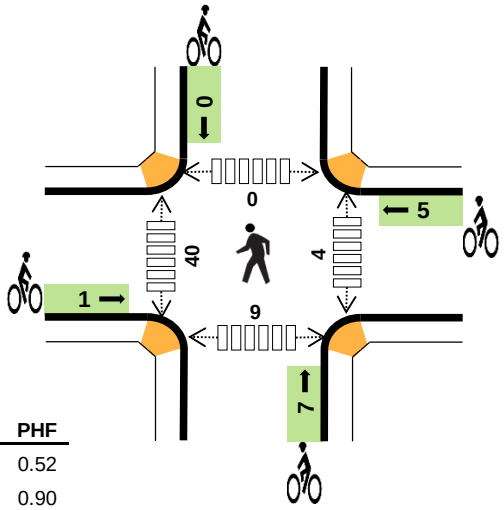
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	6	10	17	*33*	0	0	1	1	*2*	1	2	2	0	*5*
4:15 PM	0	4	12	13	*29*	0	0	1	1	*2*	2	4	1	0	*7*
4:30 PM	0	2	9	12	*23*	0	0	1	2	*3*	1	5	0	0	*6*
4:45 PM	0	2	11	15	*28*	0	0	4	1	*5*	5	11	2	0	*18*
5:00 PM	**0**	**3**	**14**	**14**	***31***	**0**	**1**	**3**	**1**	***5***	**4**	**6**	**2**	**0**	*12*
5:15 PM	**0**	**1**	**11**	**14**	***26***	**0**	**1**	**2**	**0**	***3***	**1**	**9**	**0**	**0**	*10*
5:30 PM	**0**	**0**	**13**	**15**	***28***	**0**	**2**	**4**	**0**	***6***	**2**	**10**	**0**	**0**	*12*
5:45 PM	**0**	**0**	**13**	**15**	***28***	**0**	**0**	**1**	**0**	***1***	**0**	**11**	**0**	**0**	***11***
Count Total	0	18	93	115	*226*	0	4	17	6	*27*	16	58	7	0	*81*
Peak Hour	**0**	**4**	**51**	**58**	***113***	**0**	**4**	**10**	**1**	***15***	**7**	**36**	**2**	**0**	***45***

Mark Skaggs: (425) 250-0777 mark.skaggs@idaxdata.com

ELLIOT AVE W
W MERCER PL

Date: Thu, Aug 30, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM





	HV %:	PHF
EB	0.0%	0.52
WB	3.4%	0.90
NB	1.9%	0.92
SB	3.8%	0.88
TOTAL	2.8%	0.93

Two-Hour Count Summaries

Interval Start	W ROY ST Eastbound				W MERCER PL Westbound				ELLIOT AVE W Northbound				ELLIOT AVE W Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	11	1	12	0	0	0	109	0	0	418	5	0	50	394	4	1,004	0
4:15 PM	0	9	3	11	0	0	0	121	0	3	426	4	0	60	334	0	971	0
4:30 PM	0	8	3	7	0	0	0	117	0	2	443	1	1	51	330	1	964	0
4:45 PM	0	18	6	11	0	0	0	119	0	0	408	2	0	71	335	4	974	3,913
5:00 PM	**0**	**14**	**5**	**20**	**0**	**0**	**0**	**130**	**0**	**4**	**454**	**8**	**1**	**63**	**392**	**2**	**1,093**	4,002
5:15 PM	**0**	**10**	**1**	**5**	**0**	**0**	**0**	**125**	**0**	**3**	**444**	**4**	**0**	**69**	**344**	**3**	**1,008**	4,039
5:30 PM	**0**	**10**	**0**	**4**	**0**	**0**	**0**	**102**	**0**	**1**	**447**	**5**	**1**	**52**	**308**	**3**	**933**	4,008
5:45 PM	**0**	**6**	**2**	**4**	**0**	**0**	**0**	**111**	**1**	**0**	**502**	**9**	**0**	**57**	**318**	**4**	**1,014**	**4,048**
Count Total	0	86	21	74	0	0	0	934	1	13	3,542	38	3	473	2,755	21	7,961	0
Peak Hour	**0**	**40**	**8**	**33**	**0**	**0**	**0**	**468**	**1**	**8**	**1,847**	**26**	**2**	**241**	**1,362**	**12**	**4,048**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	3	7	15	*25*	1	0	1	0	*2*	6	7	0	3	*16*
4:15 PM	2	2	7	14	*25*	1	0	1	0	*2*	1	9	0	2	*12*
4:30 PM	0	2	7	12	*21*	0	0	1	1	*2*	1	17	0	1	*19*
4:45 PM	0	5	5	17	*27*	1	0	2	1	*4*	3	13	0	4	*20*
5:00 PM	**0**	**2**	**11**	**16**	***29***	**0**	**0**	**4**	**0**	***4***	**1**	**16**	**0**	**3**	*20*
5:15 PM	**0**	**6**	**7**	**17**	***30***	**0**	**2**	**0**	**0**	***2***	**1**	**7**	**0**	**4**	*12*
5:30 PM	**0**	**4**	**9**	**15**	***28***	**1**	**2**	**2**	**0**	***5***	**1**	**8**	**0**	**0**	*9*
5:45 PM	**0**	**4**	**9**	**13**	***26***	**0**	**1**	**1**	**0**	***2***	**1**	**9**	**0**	**2**	***12***
Count Total	2	28	62	119	*211*	4	5	12	2	*23*	15	86	0	19	*120*
Peak Hour	**0**	**16**	**36**	**61**	***113***	**1**	**5**	**7**	**0**	***13***	**4**	**40**	**0**	**9**	***53***

Appendix B: Level of Service Definitions

Highway Capacity Manual, 2000

Signalized intersection level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period (for example, the PM peak hour). Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity. The Table below shows LOS criteria for signalized intersections, as described in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2000).

Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements, much like that of a signalized intersection. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). This is because the performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. With this in mind, total average vehicle delay (i.e., average delay of all movements) for a two-way, stop-controlled intersection should be viewed with discretion. Table 2 shows LOS criteria for unsignalized intersections (both all-way and two-way, stop-controlled).

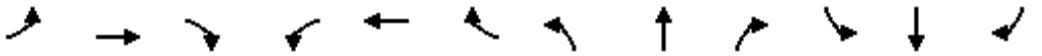
Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

Appendix C: Intersection Operations Level of Service Reports

2018 – Existing

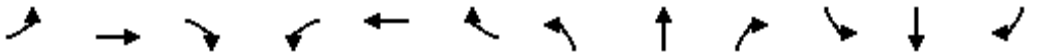


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	5	740	5	0	0	45	795	5	15	1565	75
Future Volume (vph)	90	5	740	5	0	0	45	795	5	15	1565	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	12	12	11	10	12	11	10	12
Grade (%)		-7%			0%			-1%			0%	
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00		1.00	1.00	0.95	1.00	1.00	0.86
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.95		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1702	1611		1797		1624	3135	1429	1665	3240	1340
Flt Permitted		0.73	1.00		0.58		0.13	1.00	1.00	0.33	1.00	1.00
Satd. Flow (perm)		1308	1611		1095		217	3135	1429	577	3240	1340
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	94	5	771	5	0	0	47	828	5	16	1630	78
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	1	0	0	10
Lane Group Flow (vph)	0	99	771	0	5	0	47	828	4	16	1630	68
Confl. Peds. (#/hr)	5		3	3		5	20		5	5		20
Confl. Bikes (#/hr)			7			5			2			7
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	8%	8%	8%	4%	4%	4%
Turn Type	Perm	NA	custom	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4	4		4			2			2	
Permitted Phases	4		2	4			2		2	2		2
Actuated Green, G (s)		16.4	131.0		16.4		114.6	114.6	114.6	114.6	114.6	114.6
Effective Green, g (s)		16.4	131.0		16.4		114.6	114.6	114.6	114.6	114.6	114.6
Actuated g/C Ratio		0.12	0.94		0.12		0.82	0.82	0.82	0.82	0.82	0.82
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.0	2.0		2.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		153	1611		128		177	2566	1169	472	2652	1096
v/s Ratio Prot			0.06					0.26			c0.50	
v/s Ratio Perm		c0.08	0.42		0.00		0.22		0.00	0.03		0.05
v/c Ratio		0.65	0.48		0.04		0.27	0.32	0.00	0.03	0.61	0.06
Uniform Delay, d1		59.0	0.5		54.8		2.9	3.1	2.3	2.4	4.6	2.4
Progression Factor		1.00	1.00		1.00		0.40	0.10	0.00	1.00	1.00	1.00
Incremental Delay, d2		6.9	0.1		0.0		3.4	0.3	0.0	0.1	1.1	0.1
Delay (s)		65.9	0.6		54.9		4.6	0.6	0.0	2.5	5.7	2.5
Level of Service		E	A		D		A	A	A	A	A	A
Approach Delay (s)		8.0			54.9			0.8			5.5	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		

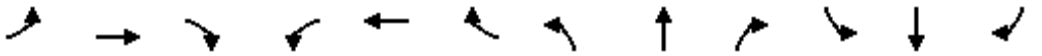
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	20	840	290	35	2290
Future Volume (vph)	25	20	840	290	35	2290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	16	10	13	9	10
Total Lost time (s)	5.0	5.0	5.5	5.0	5.0	5.5
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.91
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	2918	1406	3120	1545	1562	4655
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	2918	1406	3120	1545	1562	4655
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	26	21	875	302	36	2385
RTOR Reduction (vph)	0	19	0	87	0	0
Lane Group Flow (vph)	26	2	875	215	36	2385
Confl. Peds. (#/hr)		1		3	18	
Confl. Bikes (#/hr)		1		1		
Heavy Vehicles (%)	28%	28%	8%	8%	4%	4%
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		1	4 7	2	1 2
Permitted Phases		4				
Actuated Green, G (s)	11.4	11.4	102.1	85.5	11.0	118.6
Effective Green, g (s)	11.4	11.4	102.1	85.5	11.0	118.6
Actuated g/C Ratio	0.08	0.08	0.73	0.61	0.08	0.85
Clearance Time (s)	5.0	5.0	5.5		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	237	114	2275	943	122	3943
v/s Ratio Prot	0.01		0.28	c0.14	0.02	c0.51
v/s Ratio Perm		0.00				
v/c Ratio	0.11	0.02	0.38	0.23	0.30	0.60
Uniform Delay, d1	59.6	59.1	7.1	12.3	60.8	3.4
Progression Factor	1.00	1.00	0.79	0.45	0.93	0.38
Incremental Delay, d2	0.2	0.1	0.4	0.1	1.1	0.2
Delay (s)	59.8	59.2	6.1	5.6	57.8	1.5
Level of Service	E	E	A	A	E	A
Approach Delay (s)	59.5		6.0			2.3
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	4.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	5	5	0	0	225	70	910	25	300	1965	45
Future Volume (vph)	5	5	5	0	0	225	70	910	25	300	1965	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	10	12	10	10	12
Grade (%)		5%			0%			1%			0%	
Total Lost time (s)		4.5				4.0	5.5	4.5	4.5	5.5	4.5	4.5
Lane Util. Factor		1.00				1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		0.90				1.00	1.00	1.00	0.98	1.00	1.00	0.86
Flpb, ped/bikes		1.00				1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95				0.86	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1560				1508	1678	3133	1476	3143	3037	1330
Flt Permitted		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1560				1508	1678	3133	1476	3143	3037	1330
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	5	5	5	0	0	232	72	938	26	309	2026	46
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	11	0	0	12
Lane Group Flow (vph)	0	10	0	0	0	232	72	938	15	309	2026	34
Confl. Peds. (#/hr)			17	17			40		3	3		40
Confl. Bikes (#/hr)												9
Heavy Vehicles (%)	0%	0%	0%	9%	9%	9%	7%	7%	7%	4%	4%	4%
Parking (#/hr)											5	
Turn Type	Split	NA				Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3					5	2		1 4	6	
Permitted Phases						Free			2			6
Actuated Green, G (s)		2.2				140.0	10.2	80.5	80.5	42.8	103.6	103.6
Effective Green, g (s)		2.2				140.0	10.2	80.5	80.5	39.3	103.6	103.6
Actuated g/C Ratio		0.02				1.00	0.07	0.58	0.58	0.28	0.74	0.74
Clearance Time (s)		4.5					5.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0					0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)		24				1508	122	1801	848	882	2247	984
v/s Ratio Prot		0.01					c0.04	0.30		c0.10	c0.67	
v/s Ratio Perm						c0.15			0.01			0.03
v/c Ratio		0.42				0.15	0.59	0.52	0.02	0.35	0.90	0.03
Uniform Delay, d1		68.3				0.0	62.9	18.0	12.8	40.2	14.2	4.9
Progression Factor		1.00				1.00	1.00	1.00	1.00	1.01	1.12	3.38
Incremental Delay, d2		11.4				0.2	5.0	1.1	0.0	0.2	5.3	0.1
Delay (s)		79.7				0.2	67.9	19.1	12.8	40.8	21.2	16.5
Level of Service		E				A	E	B	B	D	C	B
Approach Delay (s)		79.7			0.2			22.4			23.6	
Approach LOS		E			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D



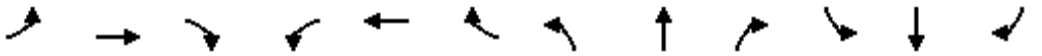
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	5	300	5	5	15	50	1645	5	5	1325	185
Future Volume (vph)	155	5	300	5	5	15	50	1645	5	5	1325	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	12	12	11	10	12	11	10	12
Grade (%)		-7%			0%			-1%			0%	
Total Lost time (s)		4.5	4.0		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00	0.95	1.00	1.00	0.86
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1690	1590		1706		1719	3320	1505	1694	3271	1355
Flt Permitted		0.71	1.00		0.95		0.15	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1264	1590		1635		268	3320	1505	158	3271	1355
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)	170	5	330	5	5	16	55	1808	5	5	1456	203
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	1	0	0	37
Lane Group Flow (vph)	0	175	330	0	13	0	55	1808	4	5	1456	166
Confl. Peds. (#/hr)	3		1	1		3	20		5	5		20
Confl. Bikes (#/hr)									12			4
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Turn Type	Perm	NA	Free	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2			2	
Permitted Phases	4		Free	4			2		2	2		2
Actuated Green, G (s)		23.6	140.0		23.6		107.4	107.4	107.4	107.4	107.4	107.4
Effective Green, g (s)		23.6	140.0		23.6		107.4	107.4	107.4	107.4	107.4	107.4
Actuated g/C Ratio		0.17	1.00		0.17		0.77	0.77	0.77	0.77	0.77	0.77
Clearance Time (s)		4.5			4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.0			2.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		213	1590		275		205	2546	1154	121	2509	1039
v/s Ratio Prot								c0.54			0.45	
v/s Ratio Perm		c0.14	0.21		0.01		0.21		0.00	0.03		0.12
v/c Ratio		0.82	0.21		0.05		0.27	0.71	0.00	0.04	0.58	0.16
Uniform Delay, d1		56.2	0.0		48.8		4.8	8.3	3.8	3.9	6.8	4.3
Progression Factor		1.00	1.00		1.00		0.05	0.03	0.00	1.00	1.00	1.00
Incremental Delay, d2		20.9	0.3		0.0		1.8	1.0	0.0	0.6	1.0	0.3
Delay (s)		77.0	0.3		48.8		2.1	1.2	0.0	4.6	7.8	4.7
Level of Service		E	A		D		A	A	A	A	A	A
Approach Delay (s)		26.9			48.8			1.3			7.4	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	35	25	1625	780	25	1575
Future Volume (vph)	35	25	1625	780	25	1575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	16	10	13	9	10
Total Lost time (s)	5.0	5.0	5.5	5.0	5.0	5.5
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3491	1676	3303	1633	1562	3240
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3491	1676	3303	1633	1562	3240
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	27	1766	848	27	1712
RTOR Reduction (vph)	0	22	0	28	0	0
Lane Group Flow (vph)	38	5	1766	820	27	1712
Confl. Peds. (#/hr)		2		7	7	
Confl. Bikes (#/hr)		4		10		
Heavy Vehicles (%)	7%	7%	2%	2%	4%	4%
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		1	4 7	2	1 2
Permitted Phases		4		2		
Actuated Green, G (s)	26.7	26.7	87.8	129.5	10.0	103.3
Effective Green, g (s)	26.7	26.7	87.8	129.5	10.0	103.3
Actuated g/C Ratio	0.19	0.19	0.63	0.92	0.07	0.74
Clearance Time (s)	5.0	5.0	5.5		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	665	319	2071	1568	111	2390
v/s Ratio Prot	0.01		c0.53	c0.45	0.02	c0.53
v/s Ratio Perm		0.00		0.06		
v/c Ratio	0.06	0.02	0.85	0.52	0.24	0.72
Uniform Delay, d1	46.4	46.0	20.9	0.8	61.4	10.2
Progression Factor	1.00	1.00	0.50	2.18	0.89	0.64
Incremental Delay, d2	0.0	0.0	3.0	0.2	4.5	1.6
Delay (s)	46.4	46.0	13.5	1.9	58.9	8.2
Level of Service	D	D	B	A	E	A
Approach Delay (s)	46.2		9.7			8.9
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

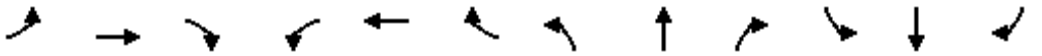
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	10	35	0	0	470	10	1845	25	240	1360	10
Future Volume (vph)	40	10	35	0	0	470	10	1845	25	240	1360	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	10	12	10	10	12
Grade (%)		5%			0%			1%			0%	
Total Lost time (s)		4.5				4.0	5.5	4.5	4.5	5.5	4.5	4.5
Lane Util. Factor		1.00				1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		0.97				0.98	1.00	1.00	0.98	1.00	1.00	0.86
Flpb, ped/bikes		1.00				1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.94				0.86	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1657				1561	1761	3287	1542	3143	3037	1337
Flt Permitted		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1657				1561	1761	3287	1542	3143	3037	1337
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	11	38	0	0	505	11	1984	27	258	1462	11
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	9	0	0	3
Lane Group Flow (vph)	0	74	0	0	0	505	11	1984	18	258	1462	8
Confl. Peds. (#/hr)			9	9			40		4	4		40
Confl. Bikes (#/hr)			1			5			7			
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Parking (#/hr)											5	
Turn Type	custom	NA				Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3					5	2		1 4	6	
Permitted Phases	3					Free			2			6
Actuated Green, G (s)		6.5				140.0	2.0	92.6	92.6	26.4	95.6	95.6
Effective Green, g (s)		6.5				140.0	2.0	92.6	92.6	22.9	95.6	95.6
Actuated g/C Ratio		0.05				1.00	0.01	0.66	0.66	0.16	0.68	0.68
Clearance Time (s)		4.5					5.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0					0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)		76				1561	25	2174	1019	514	2073	912
v/s Ratio Prot		c0.04					0.01	c0.60		c0.08	0.48	
v/s Ratio Perm						c0.32			0.01			0.01
v/c Ratio		0.97				0.32	0.44	0.91	0.02	0.50	0.71	0.01
Uniform Delay, d1		66.7				0.0	68.4	20.2	8.1	53.4	13.6	7.1
Progression Factor		1.00				1.00	1.00	1.00	1.00	0.78	1.58	1.00
Incremental Delay, d2		93.2				0.6	4.4	7.3	0.0	0.2	1.4	0.0
Delay (s)		159.9				0.6	72.9	27.5	8.1	42.1	22.9	7.1
Level of Service		F				A	E	C	A	D	C	A
Approach Delay (s)		159.9			0.6			27.5			25.6	
Approach LOS		F			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

2018 – One Ship Day

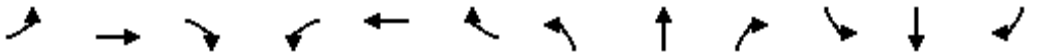


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	5	767	5	0	0	45	827	5	15	1606	85
Future Volume (vph)	98	5	767	5	0	0	45	827	5	15	1606	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	12	12	11	10	12	11	10	12
Grade (%)		-7%			0%			-1%			0%	
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00		1.00	1.00	0.95	1.00	1.00	0.86
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.95		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1702	1611		1797		1624	3135	1429	1666	3240	1340
Flt Permitted		0.73	1.00		0.56		0.12	1.00	1.00	0.32	1.00	1.00
Satd. Flow (perm)		1307	1611		1054		203	3135	1429	555	3240	1340
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	102	5	799	5	0	0	47	861	5	16	1673	89
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	1	0	0	12
Lane Group Flow (vph)	0	107	799	0	5	0	47	861	4	16	1673	77
Confl. Peds. (#/hr)	5		3	3		5	20		5	5		20
Confl. Bikes (#/hr)			7			5			2			7
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	8%	8%	8%	4%	4%	4%
Turn Type	Perm	NA	custom	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4	4		4			2			2	
Permitted Phases	4		2	4			2		2	2		2
Actuated Green, G (s)		17.2	131.0		17.2		113.8	113.8	113.8	113.8	113.8	113.8
Effective Green, g (s)		17.2	131.0		17.2		113.8	113.8	113.8	113.8	113.8	113.8
Actuated g/C Ratio		0.12	0.94		0.12		0.81	0.81	0.81	0.81	0.81	0.81
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.0	2.0		2.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		160	1611		129		165	2548	1161	451	2633	1089
v/s Ratio Prot			0.06					0.27			c0.52	
v/s Ratio Perm		c0.08	0.43		0.00		0.23		0.00	0.03		0.06
v/c Ratio		0.67	0.50		0.04		0.28	0.34	0.00	0.04	0.64	0.07
Uniform Delay, d1		58.7	0.5		54.1		3.2	3.4	2.5	2.5	5.1	2.6
Progression Factor		1.00	1.00		1.00		0.45	0.05	0.00	1.00	1.00	1.00
Incremental Delay, d2		7.9	0.1		0.0		4.0	0.3	0.0	0.1	1.2	0.1
Delay (s)		66.6	0.6		54.2		5.4	0.5	0.0	2.7	6.3	2.7
Level of Service		E	A		D		A	A	A	A	A	A
Approach Delay (s)		8.4			54.2			0.8			6.0	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.8%	ICU Level of Service	H
Analysis Period (min)	15		

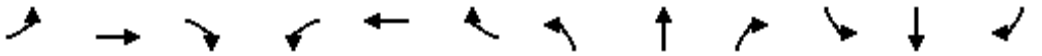
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	117	52	840	442	76	2317
Future Volume (vph)	117	52	840	442	76	2317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	16	10	13	9	10
Total Lost time (s)	5.0	5.0	5.5	5.0	5.0	5.5
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.91
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	2918	1408	3120	1545	1562	4655
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	2918	1408	3120	1545	1562	4655
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	122	54	875	460	79	2414
RTOR Reduction (vph)	0	47	0	140	0	0
Lane Group Flow (vph)	122	7	875	320	79	2414
Confl. Peds. (#/hr)		1		3	18	
Confl. Bikes (#/hr)		1		1		
Heavy Vehicles (%)	28%	28%	8%	8%	4%	4%
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		1	4 7	2	1 2
Permitted Phases		4				
Actuated Green, G (s)	18.5	18.5	92.0	86.7	14.0	111.5
Effective Green, g (s)	18.5	18.5	92.0	86.7	14.0	111.5
Actuated g/C Ratio	0.13	0.13	0.66	0.62	0.10	0.80
Clearance Time (s)	5.0	5.0	5.5		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	385	186	2050	956	156	3707
v/s Ratio Prot	0.04		0.28	c0.21	0.05	c0.52
v/s Ratio Perm		0.01				
v/c Ratio	0.32	0.04	0.43	0.33	0.51	0.65
Uniform Delay, d1	55.0	53.0	11.4	12.8	59.7	6.0
Progression Factor	1.00	1.00	0.56	0.68	0.93	0.58
Incremental Delay, d2	0.5	0.1	0.6	0.2	2.1	0.3
Delay (s)	55.5	53.1	7.0	8.9	57.3	3.8
Level of Service	E	D	A	A	E	A
Approach Delay (s)	54.8		7.7			5.5
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	5	5	0	0	245	70	1042	25	316	2068	45
Future Volume (vph)	5	5	5	0	0	245	70	1042	25	316	2068	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	10	12	10	10	12
Grade (%)		5%			0%			1%			0%	
Total Lost time (s)		4.5				4.0	5.5	4.5	4.5	5.5	4.5	4.5
Lane Util. Factor		1.00				1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		0.90				1.00	1.00	1.00	0.98	1.00	1.00	0.86
Flpb, ped/bikes		1.00				1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95				0.86	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1560				1508	1678	3133	1476	3143	3037	1330
Flt Permitted		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1560				1508	1678	3133	1476	3143	3037	1330
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	5	5	5	0	0	253	72	1074	26	326	2132	46
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	11	0	0	12
Lane Group Flow (vph)	0	10	0	0	0	253	72	1074	15	326	2132	34
Confl. Peds. (#/hr)			17	17			40		3	3		40
Confl. Bikes (#/hr)												9
Heavy Vehicles (%)	0%	0%	0%	9%	9%	9%	7%	7%	7%	4%	4%	4%
Parking (#/hr)											5	
Turn Type	Split	NA				Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3					5	2		1 4	6	
Permitted Phases						Free			2			6
Actuated Green, G (s)		2.2				140.0	10.2	80.5	80.5	42.8	103.6	103.6
Effective Green, g (s)		2.2				140.0	10.2	80.5	80.5	39.3	103.6	103.6
Actuated g/C Ratio		0.02				1.00	0.07	0.58	0.58	0.28	0.74	0.74
Clearance Time (s)		4.5					5.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0					0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)		24				1508	122	1801	848	882	2247	984
v/s Ratio Prot		0.01					c0.04	0.34		c0.10	c0.70	
v/s Ratio Perm						c0.17			0.01			0.03
v/c Ratio		0.42				0.17	0.59	0.60	0.02	0.37	0.95	0.03
Uniform Delay, d1		68.3				0.0	62.9	19.2	12.8	40.4	15.9	4.9
Progression Factor		1.00				1.00	1.00	1.00	1.00	1.02	1.27	2.51
Incremental Delay, d2		11.4				0.2	5.0	1.5	0.0	0.2	8.4	0.1
Delay (s)		79.7				0.2	67.9	20.7	12.8	41.4	28.6	12.2
Level of Service		E				A	E	C	B	D	C	B
Approach Delay (s)		79.7			0.2			23.4			30.0	
Approach LOS		E			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D



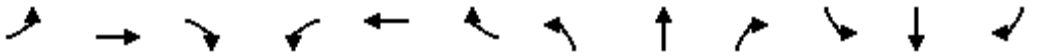
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	154	5	297	5	5	15	50	1642	5	5	1337	188
Future Volume (vph)	154	5	297	5	5	15	50	1642	5	5	1337	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	12	12	11	10	12	11	10	12
Grade (%)		-7%			0%			-1%			0%	
Total Lost time (s)		4.5	4.0		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00	0.95	1.00	1.00	0.86
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1690	1590		1706		1719	3320	1505	1694	3271	1355
Flt Permitted		0.71	1.00		0.95		0.15	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1264	1590		1635		264	3320	1505	160	3271	1355
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)	169	5	326	5	5	16	55	1804	5	5	1469	207
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	1	0	0	38
Lane Group Flow (vph)	0	174	326	0	13	0	55	1804	4	5	1469	169
Confl. Peds. (#/hr)	3		1	1		3	20		5	5		20
Confl. Bikes (#/hr)									12			4
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Turn Type	Perm	NA	Free	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2			2	
Permitted Phases	4		Free	4			2		2	2		2
Actuated Green, G (s)		23.5	140.0		23.5		107.5	107.5	107.5	107.5	107.5	107.5
Effective Green, g (s)		23.5	140.0		23.5		107.5	107.5	107.5	107.5	107.5	107.5
Actuated g/C Ratio		0.17	1.00		0.17		0.77	0.77	0.77	0.77	0.77	0.77
Clearance Time (s)		4.5			4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.0			2.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		212	1590		274		202	2549	1155	122	2511	1040
v/s Ratio Prot								c0.54			0.45	
v/s Ratio Perm		c0.14	0.21		0.01		0.21		0.00	0.03		0.12
v/c Ratio		0.82	0.21		0.05		0.27	0.71	0.00	0.04	0.59	0.16
Uniform Delay, d1		56.2	0.0		48.9		4.8	8.3	3.8	3.9	6.8	4.3
Progression Factor		1.00	1.00		1.00		0.05	0.05	0.00	1.00	1.00	1.00
Incremental Delay, d2		20.9	0.3		0.0		1.5	0.8	0.0	0.6	1.0	0.3
Delay (s)		77.1	0.3		48.9		1.7	1.2	0.0	4.5	7.9	4.6
Level of Service		E	A		D		A	A	A	A	A	A
Approach Delay (s)		27.0			48.9			1.2			7.4	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	22	1625	825	37	1572
Future Volume (vph)	25	22	1625	825	37	1572
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	16	10	13	9	10
Total Lost time (s)	5.0	5.0	5.5	5.0	5.0	5.5
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3491	1678	3303	1633	1562	3240
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3491	1678	3303	1633	1562	3240
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	24	1766	897	40	1709
RTOR Reduction (vph)	0	18	0	30	0	0
Lane Group Flow (vph)	27	6	1766	867	40	1709
Confl. Peds. (#/hr)		2		7	7	
Confl. Bikes (#/hr)		4		10		
Heavy Vehicles (%)	7%	7%	2%	2%	4%	4%
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		1	4 7	2	1 2
Permitted Phases		4		2		
Actuated Green, G (s)	33.6	33.6	80.9	129.5	10.0	96.4
Effective Green, g (s)	33.6	33.6	80.9	129.5	10.0	96.4
Actuated g/C Ratio	0.24	0.24	0.58	0.92	0.07	0.69
Clearance Time (s)	5.0	5.0	5.5		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	837	402	1908	1568	111	2230
v/s Ratio Prot	0.01		c0.53	c0.47	0.03	c0.53
v/s Ratio Perm		0.00		0.06		
v/c Ratio	0.03	0.01	0.93	0.55	0.36	0.77
Uniform Delay, d1	40.7	40.6	26.8	0.8	62.0	14.4
Progression Factor	1.00	1.00	0.58	4.79	0.88	0.66
Incremental Delay, d2	0.0	0.0	5.9	0.3	7.7	2.3
Delay (s)	40.8	40.6	21.5	4.1	62.5	11.7
Level of Service	D	D	C	A	E	B
Approach Delay (s)	40.7		15.7			12.8
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

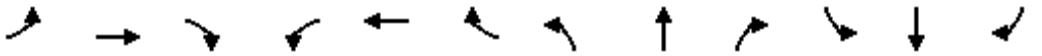
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	10	35	0	0	476	10	1884	25	238	1349	10
Future Volume (vph)	40	10	35	0	0	476	10	1884	25	238	1349	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	10	12	10	10	12
Grade (%)		5%			0%			1%			0%	
Total Lost time (s)		4.5				4.0	5.5	4.5	4.5	5.5	4.5	4.5
Lane Util. Factor		1.00				1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		0.97				0.98	1.00	1.00	0.98	1.00	1.00	0.86
Flpb, ped/bikes		1.00				1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.94				0.86	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1657				1561	1761	3287	1542	3143	3037	1337
Flt Permitted		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1657				1561	1761	3287	1542	3143	3037	1337
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	11	38	0	0	512	11	2026	27	256	1451	11
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	9	0	0	3
Lane Group Flow (vph)	0	74	0	0	0	512	11	2026	18	256	1451	8
Confl. Peds. (#/hr)			9	9			40		4	4		40
Confl. Bikes (#/hr)			1			5			7			
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Parking (#/hr)											5	
Turn Type	custom	NA				Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3					5	2		1 4	6	
Permitted Phases	3					Free			2			6
Actuated Green, G (s)		6.5				140.0	2.0	92.7	92.7	26.3	95.7	95.7
Effective Green, g (s)		6.5				140.0	2.0	92.7	92.7	22.8	95.7	95.7
Actuated g/C Ratio		0.05				1.00	0.01	0.66	0.66	0.16	0.68	0.68
Clearance Time (s)		4.5					5.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0					0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)		76				1561	25	2176	1021	511	2076	913
v/s Ratio Prot		c0.04					0.01	c0.62		c0.08	0.48	
v/s Ratio Perm						c0.33			0.01			0.01
v/c Ratio		0.97				0.33	0.44	0.93	0.02	0.50	0.70	0.01
Uniform Delay, d1		66.7				0.0	68.4	20.8	8.1	53.4	13.4	7.0
Progression Factor		1.00				1.00	1.00	1.00	1.00	0.73	1.80	1.00
Incremental Delay, d2		93.2				0.6	4.4	8.7	0.0	0.2	1.3	0.0
Delay (s)		159.9				0.6	72.9	29.6	8.1	39.4	25.4	7.1
Level of Service		F				A	E	C	A	D	C	A
Approach Delay (s)		159.9			0.6			29.5			27.3	
Approach LOS		F			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

2018 – Two Ship Day

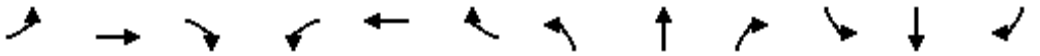


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	5	811	5	0	0	45	878	5	15	1644	95
Future Volume (vph)	111	5	811	5	0	0	45	878	5	15	1644	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	12	12	11	10	12	11	10	12
Grade (%)		-7%			0%			-1%			0%	
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00		1.00	1.00	0.95	1.00	1.00	0.86
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.95		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1701	1612		1797		1624	3135	1428	1667	3240	1340
Flt Permitted		0.73	1.00		0.52		0.11	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)		1305	1612		987		190	3135	1428	520	3240	1340
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	116	5	845	5	0	0	47	915	5	16	1712	99
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	1	0	0	14
Lane Group Flow (vph)	0	121	845	0	5	0	47	915	4	16	1713	85
Confl. Peds. (#/hr)	5		3	3		5	20		5	5		20
Confl. Bikes (#/hr)			7			5			2			7
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	8%	8%	8%	4%	4%	4%
Turn Type	Perm	NA	custom	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4	4		4			2			2	
Permitted Phases	4		2	4			2		2	2		2
Actuated Green, G (s)		18.4	131.0		18.4		112.6	112.6	112.6	112.6	112.6	112.6
Effective Green, g (s)		18.4	131.0		18.4		112.6	112.6	112.6	112.6	112.6	112.6
Actuated g/C Ratio		0.13	0.94		0.13		0.80	0.80	0.80	0.80	0.80	0.80
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.0	2.0		2.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		171	1612		129		152	2521	1148	418	2605	1077
v/s Ratio Prot			0.07					0.29			c0.53	
v/s Ratio Perm		c0.09	0.46		0.01		0.25		0.00	0.03		0.06
v/c Ratio		0.71	0.52		0.04		0.31	0.36	0.00	0.04	0.66	0.08
Uniform Delay, d1		58.2	0.6		53.1		3.6	3.8	2.7	2.8	5.7	2.9
Progression Factor		1.00	1.00		1.00		0.52	0.10	0.03	1.00	1.00	1.00
Incremental Delay, d2		10.4	0.1		0.0		4.7	0.4	0.0	0.2	1.3	0.1
Delay (s)		68.6	0.7		53.1		6.5	0.8	0.1	2.9	7.0	3.0
Level of Service		E	A		D		A	A	A	A	A	A
Approach Delay (s)		9.2			53.1			1.0			6.8	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	113.6%	ICU Level of Service	H
Analysis Period (min)	15		

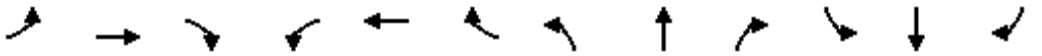
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	267	103	840	586	114	2361
Future Volume (vph)	267	103	840	586	114	2361
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	16	10	13	9	10
Total Lost time (s)	5.0	5.0	5.5	5.0	5.0	5.5
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.91
Frpb, ped/bikes	1.00	0.99	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	2918	1409	3120	1545	1562	4655
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	2918	1409	3120	1545	1562	4655
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	278	107	875	610	119	2459
RTOR Reduction (vph)	0	85	0	197	0	0
Lane Group Flow (vph)	278	22	875	413	119	2459
Confl. Peds. (#/hr)		1		3	18	
Confl. Bikes (#/hr)		1		1		
Heavy Vehicles (%)	28%	28%	8%	8%	4%	4%
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		1	4 7	2	1 2
Permitted Phases		4				
Actuated Green, G (s)	29.0	29.0	78.5	87.1	17.0	101.0
Effective Green, g (s)	29.0	29.0	78.5	87.1	17.0	101.0
Actuated g/C Ratio	0.21	0.21	0.56	0.62	0.12	0.72
Clearance Time (s)	5.0	5.0	5.5		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	604	291	1749	961	189	3358
v/s Ratio Prot	0.10		0.28	c0.27	0.08	c0.53
v/s Ratio Perm		0.02				
v/c Ratio	0.46	0.08	0.50	0.43	0.63	0.73
Uniform Delay, d1	48.6	44.7	18.8	13.6	58.5	11.5
Progression Factor	1.00	1.00	0.49	1.15	0.92	0.67
Incremental Delay, d2	0.6	0.1	0.8	0.3	5.1	0.7
Delay (s)	49.2	44.8	10.0	16.0	58.7	8.4
Level of Service	D	D	A	B	E	A
Approach Delay (s)	48.0		12.5			10.7
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	5	5	0	0	265	70	1166	25	342	2236	45
Future Volume (vph)	5	5	5	0	0	265	70	1166	25	342	2236	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	10	12	10	10	12
Grade (%)		5%			0%			1%			0%	
Total Lost time (s)		4.5				4.0	5.5	4.5	4.5	5.5	4.5	4.5
Lane Util. Factor		1.00				1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		0.90				1.00	1.00	1.00	0.98	1.00	1.00	0.86
Flpb, ped/bikes		1.00				1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95				0.86	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1560				1508	1678	3133	1476	3143	3037	1330
Flt Permitted		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1560				1508	1678	3133	1476	3143	3037	1330
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	5	5	5	0	0	273	72	1202	26	353	2305	46
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	11	0	0	12
Lane Group Flow (vph)	0	10	0	0	0	273	72	1202	15	353	2305	34
Confl. Peds. (#/hr)			17	17			40		3	3		40
Confl. Bikes (#/hr)												9
Heavy Vehicles (%)	0%	0%	0%	9%	9%	9%	7%	7%	7%	4%	4%	4%
Parking (#/hr)											5	
Turn Type	Split	NA				Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3					5	2		1 4	6	
Permitted Phases						Free			2			6
Actuated Green, G (s)		2.2				140.0	10.2	79.5	79.5	43.8	103.6	103.6
Effective Green, g (s)		2.2				140.0	10.2	79.5	79.5	40.3	103.6	103.6
Actuated g/C Ratio		0.02				1.00	0.07	0.57	0.57	0.29	0.74	0.74
Clearance Time (s)		4.5					5.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0					0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)		24				1508	122	1779	838	904	2247	984
v/s Ratio Prot		0.01					c0.04	0.38		c0.11	c0.76	
v/s Ratio Perm						c0.18			0.01			0.03
v/c Ratio		0.42				0.18	0.59	0.68	0.02	0.39	1.03	0.03
Uniform Delay, d1		68.3				0.0	62.9	21.2	13.2	40.0	18.2	4.9
Progression Factor		1.00				1.00	1.00	1.00	1.00	1.06	1.13	1.92
Incremental Delay, d2		11.4				0.3	5.0	2.1	0.0	0.2	23.0	0.0
Delay (s)		79.7				0.3	67.9	23.3	13.2	42.5	43.6	9.4
Level of Service		E				A	E	C	B	D	D	A
Approach Delay (s)		79.7			0.3			25.6			42.8	
Approach LOS		E			A			C			D	

Intersection Summary			
HCM 2000 Control Delay	35.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E



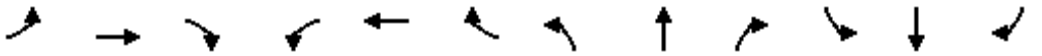
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	5	299	5	5	15	50	1644	5	5	1320	184
Future Volume (vph)	155	5	299	5	5	15	50	1644	5	5	1320	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	12	12	11	10	12	11	10	12
Grade (%)		-7%			0%			-1%			0%	
Total Lost time (s)		4.5	4.0		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00	0.95	1.00	1.00	0.86
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1690	1590		1706		1719	3320	1505	1694	3271	1355
Flt Permitted		0.71	1.00		0.95		0.15	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1264	1590		1635		270	3320	1505	159	3271	1355
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)	170	5	329	5	5	16	55	1807	5	5	1451	202
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	1	0	0	37
Lane Group Flow (vph)	0	175	329	0	13	0	55	1807	4	5	1451	165
Confl. Peds. (#/hr)	3		1	1		3	20		5	5		20
Confl. Bikes (#/hr)									12			4
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Turn Type	Perm	NA	Free	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2			2	
Permitted Phases	4		Free	4			2		2	2		2
Actuated Green, G (s)		23.6	140.0		23.6		107.4	107.4	107.4	107.4	107.4	107.4
Effective Green, g (s)		23.6	140.0		23.6		107.4	107.4	107.4	107.4	107.4	107.4
Actuated g/C Ratio		0.17	1.00		0.17		0.77	0.77	0.77	0.77	0.77	0.77
Clearance Time (s)		4.5			4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		2.0			2.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		213	1590		275		207	2546	1154	121	2509	1039
v/s Ratio Prot								c0.54			0.44	
v/s Ratio Perm		c0.14	0.21		0.01		0.20		0.00	0.03		0.12
v/c Ratio		0.82	0.21		0.05		0.27	0.71	0.00	0.04	0.58	0.16
Uniform Delay, d1		56.2	0.0		48.8		4.8	8.3	3.8	3.9	6.8	4.3
Progression Factor		1.00	1.00		1.00		0.05	0.04	0.00	1.00	1.00	1.00
Incremental Delay, d2		20.9	0.3		0.0		1.8	1.0	0.0	0.6	1.0	0.3
Delay (s)		77.0	0.3		48.8		2.1	1.4	0.0	4.6	7.8	4.6
Level of Service		E	A		D		A	A	A	A	A	A
Approach Delay (s)		26.9			48.8			1.4			7.4	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	32	24	1625	759	20	1574
Future Volume (vph)	32	24	1625	759	20	1574
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	16	10	13	9	10
Total Lost time (s)	5.0	5.0	5.5	5.0	5.0	5.5
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3491	1675	3303	1633	1562	3240
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3491	1675	3303	1633	1562	3240
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	26	1766	825	22	1711
RTOR Reduction (vph)	0	21	0	27	0	0
Lane Group Flow (vph)	35	5	1766	798	22	1711
Confl. Peds. (#/hr)		2		7	7	
Confl. Bikes (#/hr)		4		10		
Heavy Vehicles (%)	7%	7%	2%	2%	4%	4%
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		1	4 7	2	1 2
Permitted Phases		4		2		
Actuated Green, G (s)	24.7	24.7	89.8	129.5	10.0	105.3
Effective Green, g (s)	24.7	24.7	89.8	129.5	10.0	105.3
Actuated g/C Ratio	0.18	0.18	0.64	0.92	0.07	0.75
Clearance Time (s)	5.0	5.0	5.5		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	615	295	2118	1568	111	2436
v/s Ratio Prot	0.01		c0.53	c0.43	0.01	c0.53
v/s Ratio Perm		0.00		0.05		
v/c Ratio	0.06	0.02	0.83	0.51	0.20	0.70
Uniform Delay, d1	48.0	47.6	19.3	0.7	61.2	9.1
Progression Factor	1.00	1.00	0.47	1.87	0.88	0.65
Incremental Delay, d2	0.0	0.0	2.6	0.2	3.5	1.5
Delay (s)	48.0	47.6	11.7	1.6	57.5	7.5
Level of Service	D	D	B	A	E	A
Approach Delay (s)	47.8		8.4			8.1
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	10	35	0	0	467	10	1827	25	239	1357	10
Future Volume (vph)	40	10	35	0	0	467	10	1827	25	239	1357	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	10	12	10	10	12
Grade (%)		5%			0%			1%			0%	
Total Lost time (s)		4.5				4.0	5.5	4.5	4.5	5.5	4.5	4.5
Lane Util. Factor		1.00				1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes		0.97				0.98	1.00	1.00	0.98	1.00	1.00	0.86
Flpb, ped/bikes		1.00				1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.94				0.86	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1657				1561	1761	3287	1542	3143	3037	1337
Flt Permitted		0.98				1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1657				1561	1761	3287	1542	3143	3037	1337
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	11	38	0	0	502	11	1965	27	257	1459	11
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	9	0	0	3
Lane Group Flow (vph)	0	74	0	0	0	502	11	1965	18	257	1459	8
Confl. Peds. (#/hr)			9	9			40		4	4		40
Confl. Bikes (#/hr)			1			5			7			
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Parking (#/hr)											5	
Turn Type	custom	NA				Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3					5	2		1 4	6	
Permitted Phases	3					Free			2			6
Actuated Green, G (s)		6.5				140.0	2.0	92.7	92.7	26.3	95.7	95.7
Effective Green, g (s)		6.5				140.0	2.0	92.7	92.7	22.8	95.7	95.7
Actuated g/C Ratio		0.05				1.00	0.01	0.66	0.66	0.16	0.68	0.68
Clearance Time (s)		4.5					5.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0					0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)		76				1561	25	2176	1021	511	2076	913
v/s Ratio Prot		c0.04					0.01	c0.60		c0.08	0.48	
v/s Ratio Perm						c0.32			0.01			0.01
v/c Ratio		0.97				0.32	0.44	0.90	0.02	0.50	0.70	0.01
Uniform Delay, d1		66.7				0.0	68.4	19.9	8.1	53.4	13.5	7.0
Progression Factor		1.00				1.00	1.00	1.00	1.00	0.80	1.56	1.00
Incremental Delay, d2		93.2				0.5	4.4	6.7	0.0	0.2	1.4	0.0
Delay (s)		159.9				0.5	72.9	26.6	8.1	42.8	22.5	7.1
Level of Service		F				A	E	C	A	D	C	A
Approach Delay (s)		159.9			0.5			26.6			25.4	
Approach LOS		F			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		